Collecting institutional level data from European higher education institutions: evidence from CHINC countries

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The following institutions take part in the project:

- Centre for Higher Education Studies (CHES), Czech Republic
- The Danish Centre for Studies in Research and Research Policy, Århus University, Denmark
- Observatoire des Sciences et des Techniques, France
- Innovation Research Centre, Corvinus University of Budapest, Hungary
- Scuola Superiore, Sant' Anna di studi universitari e di perfezionamento, Italy
- Center for Higher Education Policy Studies (CHEPS), Universiteit Twente, The Netherlands[1]
- NIFU STEP, Studies in Innovation, Research and Education, Norway
- Institute for Innovation and Knowledge Management INGENIO, Spain
- Servizio ricerca USI-SUPSI, Università della Svizzeria italiana, Switzerland
- SPRU (Science and Technology Policy Research), University of Sussex, United Kingdom

[1] CHEPS has subcontracted the *Centrum für Hochschulentwicklung* (CHE) in Germany to assist in the collection of data for German higher education institutions.

Contents

1. Introduction

The primary goal of the CHINC study has been to analyse developments of university funding in eleven European countries and the consequences these developments have had for research and innovation activities performed at Higher Education Institutions (HEI). It is assumed that these trends and developments in funding of HEIs include a levelling-off of public funding, a higher level of private funding, an orientation towards competitive project funding from public sources etc. It is also believed that these changes have affected HEIs in terms of changing their research focus, their internal organisation and their internal mechanisms for redistributing funding etc, as well as the strategic capacities of the institutions. Changes in funding can however not be analysed isolated from the institutional and national context. Consequences of changed funding patterns will be dependent upon how the national system of higher education is configured in terms of governance and funding structures, on the internal organisation of the institutions and how they equip themselves to handle the changes. Changes in funding has thus to be understood within a larger context.

To analyse changes in funding and their consequences the CHINC project decided to utilise a broad set of data and information for the countries represented in the study:

1. Selected quantitative data on all HEIs
2. Detailed quantitative data for a sample of 117 HEIs in the countries represented in the study
3. Qualitative data based on interviews for a sample of 97 HEIs (subset of the quantitative sample)
4. Structured information on the basic institutional features of a selection of HEIs
5. Available information and analysis of national higher education systems

The focus of the CHINC project has been the institutional level, and the study has thus been in need of institutional level data. Since such data are not readily at hand through international sources of data like OECD or Eurostat, a central part of the project has been to identify possible sources of data, what data are available from the various sources, what methodologies to use to collect data and what data are troublesome to collect whatever the choice of methodology, i.e. the gaps in data that will occur in every exploratory study like this.

This report discusses first the needs for data and information necessary to perform an analysis of changes in funding of HEIs and their consequences at institutional level. Such an analysis can be performed through various approaches, and we discuss the reasons behind the choices made in this study. Second, we give an overview of the data collected by the CHINC project (section 3). Third, we summarises the situation in respect of what sources of data the study found available to meet its needs, and what data were found available in each of the participating countries. This overview might be interpreted as an indication of the data situation in Europe for institutional level data (section 4). Last, this report focuses what have been learned through this project, - the possibilities and pitfalls for collecting institutional data, and what conclusions and recommendations can be drawn from the experience of the project. The projects' findings in respect of changes in funding and their consequences is to be found in other reports from the project.

2. Data needs and their realisation

Higher education institutions are complex institutions, which perform a varied set of tasks, using various kinds of resources and give various kinds of outputs. HEIs are partly responsive to the national structures and policies they are embedded in, but they are also partly responsive to the global world of science and the international competition for funding, students and scientific results. HEIs can give multiple reactions to changes in input variables, changes in national policies or to general changes in national economies and policies (See Bonaccorsi, Daraio et al. 2005 for a discussion of constraints on analysis of higher education systems).

The basic characteristic of the CHINC project is to provide disaggregated information and strategic analysis on university-based research at the level of individual institutions. The main aim is to investigate changes in funding patterns and analyse what consequences this have had for research and innovative activities performed at HEIs. In addition to this institutional level approach, the project should also develop a typology of higher education institutions in Europe. The typology serves as a tool not only to understand the system characteristics Europe-wide, but also as a framework for analysing systematic variations in how changes in funding have affected various types of institutions. A complete analysis of the multidimensional higher educations systems, and the multidimensional institutions and their responses to changes will consequently require information along a broad set of dimensions:

System level:

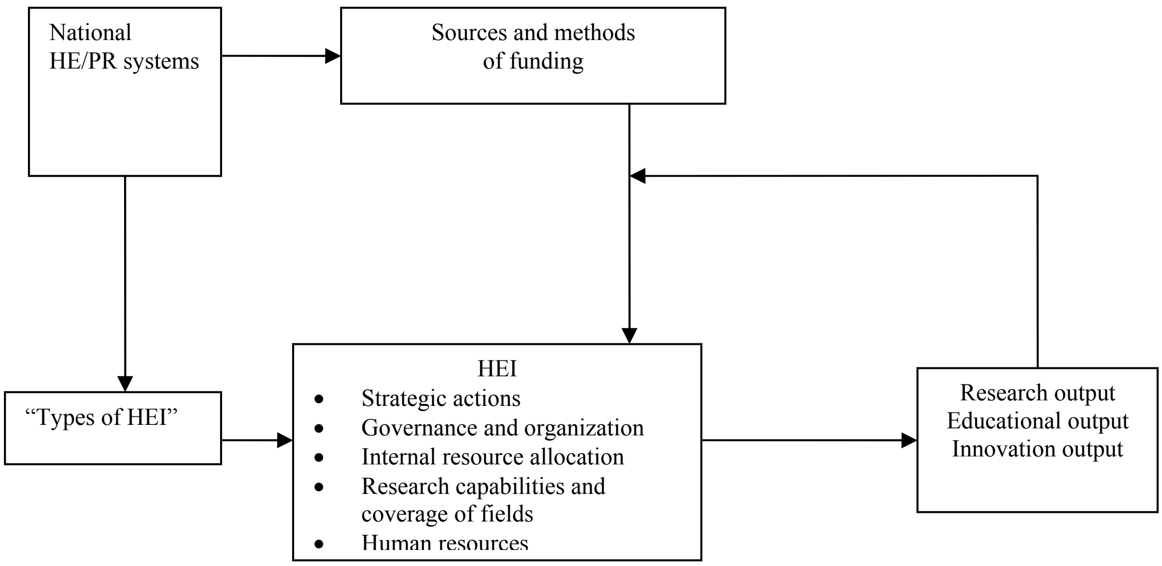
- National and regional systems of higher education and research
- Policies and governance
- Structures of competition and collaboration (at all levels)

Institutional level:

- Institutional size and size of its constituent parts (faculties, departments etc)
- Organisational structure and decision-making processes
- Importance of education and research, importance of the various aspects of research (basic, applied, innovation, commercialisation)
- Strategic decisions and actions
- Inputs in terms of funding, personnel, students, laboratories, equipment etc.
- Outputs in terms of exams, degrees, research results, patents, etc.

To structure this multidimensional space for data-collection and analysis the project has applied this analytical model:

Figure 1 Analytical model of CHINC project



In the model the individual HEI is considered the fundamental unit for analysis. There might be good reasons for analysis at system level or even at sub-institutional level, but for this project the institution has the primary focus. As outlined in the box "HEI", we assume the institutional response to changes in funding is modified by several characteristics of the institution: The abilities to make strategic decisions and the capabilities to effectuate them. How it is organised in terms of faculties, departments, trans-disciplinary centres etc and how they are governed, especially how funding is repatriated. In addition, the composition of scientific fields and disciplines is supposed to affect the institutions' reactions to changes. For example can an institution with a concentration in natural sciences be affected if students change their preferences to humanities and social sciences, which have been the case in some countries. Further, we assume the reactions to be affected by the institutions capacity to make strategic choices and initiatives. An institutions' ability to react to changes by initiating new fields of studies, erecting new laboratories or making alliances will surely affect its responses. Last, we assume the human resources available will affect the institutional responses. The composition of staff in terms of personnel not having teaching obligations (as for the category of researchers in some countries) or in terms of PhDs being on contract will probably form responses.

The institutional responses can however not be assumed to take place isolated from the context. We thus assume the characteristics of the national systems will affect the institutions. Even if we might see a move towards a homogenous European Higher Education Area through initiatives like the Bologna process, national differences in terms of mix of institutions (universities, colleges, research institutions), funding systems (choice of mechanisms and intermediaries), and ways of governance (e.g. federal vs. regional) is still predominant.

In addition we might assume institutional responses will be modified by the type of institution in terms of research capacity and intensity, its tradition for being primarily an educational institution or not, and it's position in the national higher education system, like for example the binary system of Universitäten and Fachhochschulen in Germany. Such effects of institutional characteristics will again be influenced by institutional output, as output is partly determinative for how an institution fits into the typology. As an example we do in some systems see a move of institutions from being basically educationally oriented towards being more research oriented, a movement which can best be characterised by changes in institutional output. Outputs plays also in many systems a part in determining funding volume (i.e. through the use of formulas for funding), and outputs are as such also determining funding levels. We might thus assume it to be a “feed back loop” going from “Sources and methods of funding” through the HEI and its outputs back to “Sources and methods of funding”.

In an optimal situation, there would be no constraints to available data for system or institutional characteristics in this model. Unfortunately, in the real world the needs for data have to be balanced against what is available, relevant and valid. Many analyses of research and innovation and of related policy making routinely uses national level aggregate data in the tradition of the Frascati and Oslo Manuals. Since the CHINC project is analysing the institutional level, much of the already available data where found to be on too high levels of aggregation. Part of the project has thus been to explore the possibilities of collecting disaggregated data either by utilising existing collections or directly from the primary sources. In many respects, the project has been a *feasibility study* investigating available data sources, their contents and their usefulness for analysing developments of higher education institutions.

From the outset of the project, it was obvious that data were not readily available on an equal footing neither for all 11 countries taking part in the study nor for all institutions. Several of the participants in the CHINC project took also part in the Aquameth project[2], which provided a very useful reference for assessing data availability and for possible variable definitions, as well as for the usefulness of variables in analysis. From this and other prior studies done by some of the participants in the project it was known that quantitative data of considerable relevance were available at institutional level in Denmark, Italy, the Netherlands, Norway, Spain, Switzerland and the UK, while the situation were more uncertain for the Czech Republic, France, Germany and Hungary. To make data collection feasible it was necessary to balance the need of rich data for analytical purposes against known constraints on availability. Since the primary focus of the project was to analyse developments of funding it was, as an example, necessary to balance the needs for detailed categories for sources of grants and contracts funding against the likeliness of institutions using the same categories in their accounting systems. If the suggested categories of sources were not recognised at the institutional level, the project would have encountered serious risks of comparing incomparable categories. The solution to this dilemma is to use definitions that are at the same time precise enough to capture the intended content, but wide enough to make allowance for national and institutional differences in funding mechanisms and systems. Similar trade-offs have to be done for most of the variables collected. Due to such deliberations and trade-offs there is in a project like this probably not possible to get absolute confidence in the inter-subjectivity of the definitions chosen and some uncertainty has to be accepted. Below we discuss the choice of variables in more detail.

[2] Advanced QUAntitative METHods for the evaluation of the performance of public sector research. This project is part of the work initiated by the PRIME network of excellence. See Bonaccorsi A, and Daraio C (2006) “Universities as strategic units. Productivity and Efficiency in the European University System” (forthcoming) for further details of the Aquameth project.

3. CHINC data, - the broad picture

This section gives an overview of the projects' organisation and the data needed for implementing the project. Last, it discusses some special considerations for time series.

3.1. Project organisation

The CHINC project was conceived as a network where national correspondents in the 11 countries taking part in the project did data collection (quantitative and qualitative) and validation. In addition, the correspondents contributed with their general insight of the field studied, gave advice on the methodological approach and contributed with their knowledge of the national system of the respective countries. This knowledge of national peculiarities was undoubtedly a prerequisite for understanding the varied landscape of European higher education. Not only does the approach in many cases facilitate immediate access to existing data the participants already have within their institutions or where familiar with through use of existing databases, it also facilitate possibilities for checking out variables for possible pitfalls, misinterpretations due to national context etc before data collection. The implementation of the project in the short time available would probably not have been possible without the network; neither would the project have achieved the same quality without such a network. For a possible extension of the exercise to other countries in the future, we thus recommend using a similar model.

The representatives of three of the countries (the Netherlands, Norway and Switzerland) formed the projects executive group, NIFU STEP of Norway being the contract partner for the project and formally responsible for its implementation. This group had the responsibility for working out the methodology, processing and analysing data, and writing out the reports. The formation of a small group was in our opinion necessary out of needs for efficiency, at the same time paying attention to the need for integrating various competences into the group. The lack of participation from any of the larger European countries in this group might have resulted in a bias towards the problems and issues relevant for the smaller countries. On the other hand did the group have extensive contact with the representatives of the larger countries, as well as these have had the opportunity to give their comments during all phases of the project.

3.2. Knowledge of national systems and general trends

The institutional level of a system of higher education can hardly be understood out of its context. Even if the institutional level is the focus of the CHINC project, it is considered essential to have some background information on the national systems these institutions are situated. Collection of data on the systemic level of national policies and trends was not part of the project as defined by the Commission. However, the project found such information of indispensable value for creating a typology of European HEIs and for interpreting data. The project therefore collected basic descriptive information on characteristics of the national systems of higher education along these dimensions:

- Overall structure of the system
- Governance
- Funding structure
- Mechanisms for funding of education
- Mechanisms for funding of research

- Degree structure
- Evaluative mechanisms
- Emerging issues

This information could of course not be very in-depth since it was intended to give the overall picture in a few pages, and can by no means be regarded as the “complete official description” of the national systems.

In addition, the project has utilised the existing body of knowledge within its field of study. The project has thus compiled a list of references on literature on higher education and research funding, national systems and other related issues, as well as on data and information sources (“*List of references for the project Changes in University Incomes: Their Impact on University-Based Research and Innovation (CHINC)*”). The list of references also includes literature and reports specific to the participating countries and information on data sources available.

3.3. Data on the national institutional matrix

To capture national system characteristics and to build a typology of European higher education institutions, the project initially collected a basic set of data for most higher education institutions in the 11 countries taking part. Which institutions to include were delimited so it included basically all types of higher education institutions in the participating countries, including universities, technical universities, professional universities etc. Since the projects main aim is to study consequences of changing funding for research and innovation, institutions delivering only curricula of less than three years and institutions giving only continuing education were excluded. Such institutions were assumed not to be very active in research or innovative activities and as such of limited interest for the purposes of the project. We should however notice that this cut-off point might have different consequences depending on the structure of national systems. In countries where professional degrees are obtained after more than three years studies, a considerable number of institutions giving professional education (like Fachhochschulen in Germany, Hogescholen in the Netherlands and Høgskolene in Norway) would be included in the sample. In countries where such programmes are of shorter duration (like for engineering in France), a greater part of the institutions will be excluded if they are not also giving longer programmes. Even if the resulting list of institutions includes almost 1000 institutions, it can thus not be considered being all-encompassing (cf Table 2 in the next section for an overview of the number of institutions per country). For this basic data collection, 2002 were selected as the year of reference. Data were collected for the variables listed in Table 1.

Table 1 Variables collected for large sample

General description	Definitions / instructions
Code	Pre filled. Do not change the numbers.
Name of the institution	Full name of the institution (university, college etc) in the national language.
Institution acronym	Fill inn if institution has an acronym or abbreviation. If not, leave empty.
English name of the institution	Insert the official English name of the institution. If no such name exists, leave open.

Year of foundation	In case the institution is a product of earlier mergers between institutions etc, use the year of foundation for the oldest part of the institution. Use the "Comments" column for further explanations when necessary.
Type of institution	Insert type of institution according to the national system of higher education institutions. Use national language. Example France: If institution belongs to the Grande Ecoles category, insert "Grande Ecole". Example Germany: If institution belongs to the Fachhochschulen category, insert "Fachhochschule" or "FH".
Public / Private	Insert "1" if the institution belongs to public sector, i.e. institutions receiving annual core funding form the state. Insert "2" if the institution belongs to private sector, i.e. all institutions not included in public sector.
Region	Insert code for the region where the institution is situated. See spreadsheet "Regions definitions" for codes to be used. Codes used are Eurostat NUTS, 2003 revision, level 2.
Number of under-graduate students	Total number of undergraduate students enrolled (headcount). Exclude vocational and postgraduate education. Bologna masters should be included.
Scientific fields covered	The broad scientific fields covered by the institution. Use the following codes: "1": Humanities and social sciences "2": Natural sciences "3": Technology "4": Medicine If several codes, separate by comma.
Awarding PhD	Insert "1" if the institution is awarding at least one PhD degree or another degree of equivalent level. Otherwise, insert "2".
Number of PhD degrees awarded	The total number of PhD degrees awarded by the institution.
Specialisation classification	If the institution is in some way specialized, indicate kind of specialisation, examples: • Technical university • Business school • Arts • Theology • Agriculture If necessary add new categories
Sample	Insert "1" if you suggested this institution should be included in the projects' final sample of 100+ institutions. Criteria to be used for the choice: availability of data; interest for the case. Indicate more institutions than required as the total sample has to be representative. A shortlist will be made.
Comments	Open for comments on the variables.

The variables include some basic information and characteristics of the institutions. Decisions on what variables to include are a trade-off between the needs for essential information, especially with a few to the possibilities of establishing a useful typology, and the possibilities for collecting data for such a large number of institutions. For the aim of the CHINC project, it was essential to find some variables usable for characterising the research activities without going into too much detail. This is done through the inclusion of variables for the *scientific fields covered* by the institution, its kind of *specialisation* (if relevant), and to variables concerning PhDs; if the institution is a *PhD awarding institution or not*, and if yes also the *number of PhD degrees awarded*. Together with the variable on educational activities, *Number of undergraduate students*, these variables gives a possibility to make a profile of each institution in terms of how dominant the undergraduate level is compared to the PhD level, the turnover rate at PhD level measured by the ration of number of PhD students over number of PhD degrees awarded and the mix of scientific fields covered / specialisation. Admittedly, these variables do not give a full characterisation of the research activities by any means. We are for example not able to give a characterisation of the disciplinary mix as we miss information on the relative size of the scientific fields. This could have been done through either a variable on number of undergraduate students, PhD students or number of academic personnel within each field. Within the resource limits of the project, we did however not find collecting such data possible; for about one thousand institutions, the sheer number set a limitation to the number of variables. For a data collection system of permanent character we will recommend to have variables describing all institutions in some more detail than have been possible in this exercise.

We decided to include also some variables describing other features of the institutions of importance when mapping the institutional topography of European higher education. *Year of foundation* was included to make possible analysis of differences between the traditional or well-established institutions and the ones established in later years. Typically, in several countries there is a group of institutions with long traditions, while another group consists of institutions established after World War II. Since many institutions are the result of mergers over the years, it can be difficult to determine the exact year of establishment. In such cases, the years for the oldest part were selected.

Several countries have a structure of institutions where the various categories of institutions are given dedicated names, e.g. Fachhochschulen, Universities of Applied Science, University Colleges etc. These categories and names usually reflect some systemic feature of the institution, e.g. orientation towards professional education or educations of shorter duration. Such specificities were included in the variable *Type of institution*, and this variable is of importance to determine eventual variances between the groups. A second variable of characterisation distinguishes between *public and private institutions*. HEIs are still predominantly public, but in most countries there are also private institutions, and in some to a substantial degree (e.g. Spain). Last were included a variable on the location of the institution; namely *Region* using Eurostat NUTS, 2003 revision, level 2 as identification. Regions are an important dimension in the European knowledge system, and a type of geographical identification was deemed necessary to include.

3.4. Quantitative data for a selected sample of institutions

The list of institutions with the basic characteristics of each institution resulting from the first data collection, considered together with knowledge on the national systems and the typology of institutions, served as the point of departure for the selection of institutions to be included in the projects final sample of institutions to investigate. This sample should include at least 100 institutions (defined by the project contract) and ideally be representative for the European higher education system along these dimensions:

- National systems (single vs. dual structure, national vs. regional governance)
- National status towards the European Union ("old" vs. "new" members, associate countries)
- Geographic representation and size of country
- Institutional variations in respect of educational vs. research focus
- Institutional size and coverage of scientific fields
- Levels of educational programmes (PhD level or not)
- Public vs. private institutions

It should be obvious that to represent all of these dimensions in a complete way is unattainable without a much larger sample than has been the scope of this project. The higher education systems within the 32 countries (EU 25 plus associated 8) are too complex and have too many dimensions to be represented by a sample of not more than 100 institutions. In the CHINC project, part of the complexity was reduced initially by choosing participating countries that were dispersed along several dimensions. Additional reduction of complexity was done through elaborating a typology of institutions and through analyses of the first sample of institutions. Despite all efforts, the resulting list of institutions to be included in the sample cannot claim to represent in full the European higher education system. In addition to not completely adequately representing all dimensions, the sample of institutions clearly makes an overrepresentation of the smaller countries (i.e. the Netherlands, Norway, Switzerland), while the larger ones are underrepresented. Despite this, we think the sample should represent some of the essential variations to be found across Europe. The institutions included in the sample and their essential features are listed in Appendix 1.

To be able to analyse developments over time it was for this sample essential to collect data for a time series of 10 years. The years between 1994 and 2003 were considered as most relevant as it was assumed data for 2004 would not be available at the time of the data collection (spring 2005). Data were preferably collected for calendar years (not fiscal years) and interpolations for missing years were not done. Special considerations for time series are discussed below.

Table 2 Sample overview and descriptive statistics (2002)

	Czech Republic	Denmark	France	Germany	Hungary	Italy	Netherlands	Norway	Spain	Switzerland	UK	Total
Number of Institutions	64	55	105	334	66	77	72	44	66	19	90	
Institutions in the sample	10	7	12	9	7	14	8	10	16	12	12	117
PhD awarding institutions in the sample	10	6	12	7	7	14	6	6	16	12	12	108
Average number of students	15397	12147	15954	20157	14095	35485	16379	8357	40823	7064	13337	19828
Average number of PhD degrees	115	97	188	473	68	119	198	119	246	229	203	191
Technical universities in the sample	1	1	2	2	2		2		3	2	4	
Remarks			There are 2 “grandes écoles” in the sample ; Number of students is slightly underevaluated due to the French higher education system not yet in the Bologna system.	The large number of PhD-degrees awarded is a result of the sample which is made of five universities including Medical Schools, which in Germany award a very high number of doctoral degrees. The universities of Bielefeld and Mannheim which do not have a Medical school do therefore award a more representative number of doctora degrees	The sample comprises 7 PhD awarding institutions that are public universities.		The sample comprises 6 out of 18 PhD awarding institutions and 2 of 54 Hogescholen (non PhD awarding).	The sample includes six universities, (of which two were “Høgskoler” until 2005) three “Høgskoler” and one business school.	Only public universities are included in the sample	The quantitative sample includes only cantonal universities and federal institutes of technology, but not universities of applied sciences.		

To be able to analyse effects of changes in funding and their consequences it was also obviously needed a dataset not only covering financial data (revenues and expenditures), but also data relating to institutional capacities in terms of manpower and data relating to institutional output in terms of educational and research production. Data were thus collected for these five broad areas or dimensions of higher education institutions (the list of variables within each dimension and their availability are discussed in more detail below):

- Revenues
- Expenditures
- Personnel
- Education production
- Research production

Based on prior experience the project recognized that different countries, systems and institutions most likely would collect and present data in different formats, while in some cases data would be unavailable. In these cases, the national correspondents were asked to obtain as much information as they could get for each category. Variable definitions where consequently made relatively open leaving some room for interpretation of different categories.

3.5. Qualitative data for a selected sample of institutions

Institutional responses to changes in income can partly be analysed and interpreted through quantitative data. For example can a reduction in government appropriations and a parallel increase in revenues from private sources be interpreted as if the institution has taken deliberate action to increase income from private sources as a reaction to diminishing income from public sources. Such causal interpretations are however very uncertain and calls for verification. The need for verification of findings done by analysis of quantitative data was thus one reason for the project to collect also qualitative data through interviews. Of equal or greater importance is however to collect data and information underpinning our understanding of how institutional reactions are formed, what strategic choices are made, what is the role of project funding and the role of research carried out for industry and business in these strategies, on what criteria and knowledge is the strategic decisions based etc. In short, it was also part of the project to perform an exploratory analysis of trends in order to establish stylised facts about what is happening to research activities in European higher education institutions.

To accomplish this objective were elaborated a structured guide for short interviews to collect information at institutional level. The questionnaire was worked out in two phases; a draft version elaborated by the CHINC executive team which was sent to all of the project partners for review. While done primarily to gather objective feedback and group consensus, it was also of importance to ensure that the questionnaire would not generate country bias by focusing on topics not relevant in certain systems or by using phrasing that would be unclear. The second phase consisted in revising the comments from the partners and produced a final version that was then distributed to all of the project partners. A copy of the final questionnaire can be found in Appendix 3.

The guide had some questions with fixed alternatives for answers while some questions were of a more open character. This mix were chosen to facilitate both the need for comparable data across institutions and countries, the need for some in-depth information and the need for not using too much time per interview.

The topics covered in the guide were:

- Research orientation and strategy
- Information management and availability of research-related information
- Trends over the past 10 years
- Institutional policies relating to the institution's research portfolio
- The future outlook for research activities

The first group of questions was designed to elicit background or control information on how universities perceive themselves vis-à-vis academic research and to evaluate the extent to which coordinated research strategies have been developed and implemented. Here we were most interested in finding out how individuals perceived their institution's research ambitions, whether a formal research strategy was in place, that strategy's primary objectives, how long it had been in place and which bodies had played an important role in its development. The second group of questions was designed to assess the types and quality of information institutions collected about research activities, why it is collected and how such information is used. Answers to such questions would be most useful for assessing the extent to which data necessary for pan-European analyses is already being collected. The "trends" section sought to map how individuals' perceptions of how research income and output portfolios have changed since the early 1990s. This section was developed mainly to allow us to check whether individuals' perceptions were consistent with the quantitative data collected in the first phase. Section four, policies, was the largest sub-category and dealt with a range of issues: internal allocation mechanisms, key structural changes to institutions, the influence of external and internal factors, performance measurement and what respondents believed to be the most important changes. In the last section we asked respondents a number of questions related to what they saw as the major challenges for their institution in the coming ten years and which forces they thought would be the major factors behind any changes.

The institutions selected for interviews were the same as for the sample for quantitative data as this would ensure a coherent set of quantitative and qualitative data, thus facilitating analysis of all data in context. The national correspondents did the selection of interviewees. From the executive group it was recommended to choose at each institution persons who fulfilled two criteria:

- Having the necessary knowledge and information about institutional level policies, mechanisms, strategies and how these were influenced by external and internal factors
- Were able to give opinions on the developments over the last 10 years.

Candidates for interviews were administrative leaders for departments/offices of research or budget/economy (or equivalent units according to the structure of the university) as well as vice-rectors for research (or the similar function). This was done to ensure that whoever was interviewed could provide an institution-wide view. Persons within the last group might however be susceptible to change more frequently due to regulations of periods in office, and administrative personnel might thus have a better "institutional memory" which is essential for a project studying changes over time.

The exact procedure taken by individual project partners varied. The standard or baseline approach was to contact potential interviewees, send them the survey in advance and then proceed to do either a face-to-face or telephone interview. The correspondents were asked to prepare themselves before the interview by filling in a template with the essential information on structure, governance etc for the institution in question. Due to very short deadlines for performing the interviews, tight schedules for many of the potential interviewees, leaves for summer vacations among them and, in a very few cases, refusal to take part in the study, the total number of interviews performed are lower than the number of institutions included in the sample for quantitative data. In total 97 interviews were done:

Czech Republic – 6	Denmark – 9	France – 9
UK – 11	Germany – 10	Spain – 10
Hungary – 5	Italy – 6	Switzerland – 15
Netherlands – 8	Norway – 8	**Total – 97**

It has not been possible to evaluate ex post how the choice of interviewees might have affected the outcome of the interviews. If a study of a greater sample of institutions later should be performed, we will recommend analysing ex ante how to get a representative view of institutional developments. Special care should be taken to get hold of divergent views as the "official version" expressed by leading officials in some respects might have a positive bias towards the achievements of the institution. Care should also be taken to map possible variations of views according to the scientific field of the respondent.

Because project partners conducted interviews with individuals in their own country, where both interviewer and interviewee may take certain country features for granted, the executive team did a second check of the interview data. Executive team members each re-read the responses from countries where they did not conduct interviews in order to make sure that the responses were clear and would make sense to a broader audience.

It is prudent to highlight some of the methodological shortcomings of a study like this. First, as can be seen from the distribution above, our respondents are over- and under-represented across the countries. Most notable is the disproportionately high number of Swiss and low number of Italian respondents in the sample, but the imbalance can also be seen in the low number of Hungarian interviews and high number of Dutch interviews (compare the eight in the latter to the ten done in Germany, France and Spain). As a result, any findings will more likely reflect the cultural and economic characteristics of the smaller, wealthier European countries at the expense of the larger ones. Second, the selection of individual respondents was loosely structured and likely dependent on project partners unique network relationships. The diverse nature of institution structures across countries made it difficult to identify one common administrative and/or academic individual for an interview. This means that even within a single country, the respondents often held differing posts within their respective institutions and thus were likely to be incapable, or in an uninformed position, to adequately respond to every question posed to them. While our preferred approach was to interview several individuals at each institution this proved to be too costly an option, in both time and financial resources, to be realistically achieved. Third, the questions were designed to evaluate changes over the past 10 years. In some cases, it can be expected that respondents may not have been at the institution since the early 1990s or in a position throughout the specified time period to be knowledgeable about such changes. As such, it may be the case that the answers received are based on respondents' biased or ill-informed perceptions.

Some of these concerns are simply endemic to survey research; others however are direct consequences of the particular methodology we have employed here. The broad scope of the CHINC project and the diverse institution types we sought to characterize forced us to strike a balance between what was desirable and what was feasible. In our view, the methodology employed here was well thought out and conceptually sound in light of the time, resource and logistical constraints that arose in the course of the study.

The findings from the qualitative study are reported in the CHINC report "*A Qualitative Study of the Changes in European Universities' Research Income and Practices"*.

3.6. Special considerations for time series

This study focuses changes over time. This requires time series and for this study the time span from 1994 to 2003 was chosen. The relevance of a 10-year time span may be discussed, as HEIs are institutions where changes take time to have effect. A longer time span might have been desirable to catch the effects of important changes that took place in several of the national systems in the early 1990s (e.g. the attainment of full university status of the former polytechnics in the UK 1992, the merger of the Høgskoler in Norway 1994). Again, the choice has to be a trade-off between the ideal and the realities. Time series will unavoidably have breaks and the longer the series the more breaks are likely to occur. Also at institutional level there will be breaks in time series because of mergers, internal reorganisations, the introduction of new rules for accounting etc. A time series of 10 years covering 11 countries will unavoidably have some breaks, while a times series longer than 10 years would probably have created even greater problems. Our choice has thus been to use a 10-year time span believing it will be long enough to capture some essential changes, but at the same time short enough to avoid too many breaks in the series.

Time series including monetary values have to be deflated to adjust for inflation. As costs within research and education normally do not follow general costs, OECD recommends use of a special R&D deflator (OECD 2002). For deflating time series, we have thus used the Implicit GDP deflator taken from the OECD National Accounts database and found in the OECD MSTI database. 2000 is set as the basic year (2000 = 1.00). Since the time series covers the period when the Euro was introduced, data have been converted from the former national currencies using the appropriate irrevocable conversion rate found in the OECD MSTI database. Both the OECD implicit GDP deflator and the Euro fixed conversion rate are included in the CHINC database, which facilitate an automatic conversion of monetary values when needed.

Since the CHINC dataset includes several countries there is also of interest to compare the developments along some variables between countries. As long as the relative development within one country is compared to the same developments in another (e.g. revenues per student year A to year B in country C compared to the development for the same years in country D), this pose no problem. If a comparison of fixed indicators is desired (e.g. the fixed revenue per student in country C compared to that of country D), the purchasing power parity for each country has to be invoked to adjust for the relative level of costs in each country. We have thus included a possibility to use the PPP$ conversion rate established by OECD and Eurostat found in the OECD MSTI database to adjust for purchasing power parities. The PPP$ conversion rate is included in the CHINC database and can be applied for automatic conversion of monetary values when needed. It should however be noted that PPP$ is not suited for inter-temporal comparisons but only for inter-spatial (within one year) comparisons. Since the analysis of CHINC data basically are concerning developments over time, the use of PPP$ is avoided.

4. CHINC quantitative data; sources and availability

In this section, we discuss data sources, availability and quality concerning data on higher education institutions along the categories in the analytical model. We first present the data sources, and second the categories of data and the definitions used. Third, we discuss data availability and the limitations to data. At last, we give some advice on how to improve the situation.

4.1. Sources of data

An important part of the CHINC project has been to investigate possible sources of quantitative data for comparing institutions in various countries. As there were few experiences from collecting systematic data for the institutional level, it was from the outset expected considerable variations between countries regarding what sources were available and regarding the contents of each source. The sources used for the various dimensions of quantitative data are shown in Table 3 below.

Table 3 Sources for quantitative data

Country	Funding	Expenses	Personnel	Education production	Research production
Czech Republic	Institute for information on education (UIV)	Institute for information on education (UIV)	Institute for information on education (UIV)	Institute for information on education (UIV)	Publications: ISI and national database for "Other publications" Patents: Industrial propriety office of the Czech Republic
Denmark	Directly from the institutions (no central data available).	Directly from the institutions (no central data available). R&D expenditures: National R&D statistics	Directly from the institutions (no central data available)	Danish Ministry of Education PhD degrees: The Danish Centre for Studies in Research and Research Policy.	
France	Directly from the institutions (no central data available).	Directly from the institutions (no central data available).	Directly from the institutions (no central data available).	Directly from the institutions (no central data available).	Directly from the institutions (no central data available).
Germany	Directly from the institutions.	Directly from the institutions.	Directly from the institutions.	Directly from the institutions.	Directly from the institutions.
Hungary	Directly from the institutions (no central data available).	Directly from the institutions (no central data available).	Directly from the institutions (no central data available).	For the time series data had to be collected directly from the universities because of the integration, however normally data is available from the Ministry of Education.	Directly from the institutions (no central data available). Data on patent applications and patents granted may be extracted from the online databank of the Hungarian Patent Offic

Table 3 Sources for quantitative data, continued

Country	Funding	Expenses	Personnel	Education production	Research production
Italy	Rectors' conference publications, ministry of education sources and CNVSU (National Commitee for the Evaluation of the University System)	Rectors' conference publications, ministry of education sources and CNVSU (National Commitee for the Evaluation of the University System)	Rectors' conference publications, ministry of education sources and CNVSU (National Commitee for the Evaluation of the University System)	Rectors' conference publications, ministry of education sources and CNVSU (National Commitee for the Evaluation of the University System)	Rectors' conference publications, ministry of education sources and CNVSU (National Commitee for the Evaluation of the University System)
The Netherlands	Several sources (ministry, statistical office, research institutions)	Several sources (ministry, statistical office, research institutions)	Several sources (ministry, statistical office, research institutions)	Several sources (ministry, statistical office, research institutions)	ISI publications: CWTS Leiden Other publications: Directly from the institutions Spin-offs: Study for the Ministry of Economic Affairs
Norway	National database for statistics on higher education General university funds (GUF): Ministry of Education and Research	National database for statistics on higher education R&D expenditures: NIFU STEP R&D statistics	National database for statistics on higher education Share of time devoted to R&D: NIFU STEP R&D statistics	National database for statistics on higher education Number of PhD degrees: Register of PhD degrees, NIFU STEP	Publications: ISI analysed by NIFU STEP Patents: National patent office and NIFU STEP
Spain	Vice-Chancellors Conference of the Spanish Universities (CRUE)	Vice-Chancellors Conference of the Spanish Universities (CRUE)	National Institute of Statistics, publication Higher Education Statistics	Council of University Coordination: University Statistics	Publications: ISI Web of Science Licensing revenues, spin-offs and patents: Technology transfer offices.
Switzerland	Swiss Higher education University System of the Swiss Federal Statistical Office	Swiss Higher education University System of the Swiss Federal Statistical Office	Swiss Higher education University System of the Swiss Federal Statistical Office	Swiss Higher education University System of the Swiss Federal Statistical Office	ISI publications : Data are for the Centre d'Etudes sur la Science et la Technology (CEST)
United Kingdom	Higher Education Statiscs Agency	Higher Education Statiscs Agency	Higher Education Statiscs Agency	Higher Education Statiscs Agency	Publications: RAE

The data collection exercise showed it to be mainly three kinds of data sources available for institutional data:

National systems of statistical data:	National agencies (ministries, statistical offices or specialised institutions/bureaus): Czech Republic, Norway, Switzerland and the UK.
Institutional associations:	Rectors' conferences and similar: Italy and Spain.
Higher educations institutions:	Denmark, France, Germany and Hungary[3].

In most countries there are no single source of data for all dimensions of the CHINC project, and in some countries several sources have to be utilised for collecting data for one dimension (e.g. the various aspects of funding has to be collected from several sources). In Germany a single source of data exist; the Federal Statistical Offices, but it could not be utilized for this project as a high fee was demanded for the data.

For the countries having national systems of statistical data or where rectors' conferences etc are responsible, these are covering most dimensions. The exemption is *Research production* were there in no case seems to be a systematically collection of the data relevant for CHINC. There are usually a data provider for publication data based on ISI, while there seems to be no dedicated agency for data collection on patents, spin-offs etc. Data for this dimension is thus only sporadically available. A special problem of availability of ISI data concerns the UK where ISI data are available from a private company that charge licensing fees at a level making it impossible to acquire by the budget of this project. Instead, the national correspondent relied on data from the Research Assessment Exercise. This probably leads to some underestimation of the research output of UK universities. A similar problem concerns German data. The Federal Statistical Office (Bundesamt für Statistik) has a rich dataset on German higher education. The statistical office is willing to licence the dataset, but at a price far exceeding the possibilities of the national correspondent. In general, if private ownership of data combined with high prices hamper data collection and analysis of the developments of European higher education, this problem should be given attention at the relevant policy level and be solved.

For data coherency and availability of time series, the evidence from the CHINCH project without doubt points towards the usefulness of some kind of a responsible national agency (national statistics office, specialised institutions, rectors' conferences etc). Availability of data will be further discussed below, but from the experience of the project there can be no doubt that agencies operating at national level have more data available, more coherent time series and better documentation of what changes have been made and at what time. These data are already validated by agencies with knowledge of the national system, which saves time because this reduces further needs for validation, though not making further validation superfluous. From our perspective data from such sources seems also to have an overall better quality than in the cases where data have been provided from the HEIs. In general, data at the level of the individual institution seems to have a lower quality in terms of coherent time series, availability and conformity to general definitions. The institutional strategies for information collection, processing and use in strategic decision-making processes are investigated through the qualitative part of the CHINC project. The results from this investigation will give some clues to the ongoing developments of information systems at institutional level as well as to the possible improvements (Jongbloed et al: "A Qualitative Study of the Changes in European Universities' Research Income and Practices").

[3] For Hungary the universities were the main data sources, however few data are available from administrative sources (Ministry of Education, Hungarian Patent Office).

For a future monitoring system of higher education institutions in European, we thus recommend national institutions to be the foundation for such a system [4]. For those countries that do not already have such institutions, priority should be given to the development.

4.2. Availability of quantitative data

Decisions on which data to collect are essentially dependent on three factors:

- The primary research questions and the analytical model chosen for finding answers to those questions
- Availability of data which fits the analytical model
- Availability of data which are consistent between institutions, countries and over time

Since the CHINC project partly was to rely on existing data, decisions on data and variables also had to incorporate already existing definitions without excluding HEIs as sources of data. The project could take advantage of the experiences of the PRIME/Aquameth project, in which most of the variables necessary in CHINC had been discussed. CHINC had however a different aim and other research questions to answer, and the project had to develop its own definitions. The dilemma between using existing variables/data and the need for data from sources using other definitions was solved by carefully working out definitions precise enough to comply with existing definitions, but wide enough to incorporate the variety of national and institutional sources of data. The result is a set of definitions that are not statistical definitions, but instructions on how to understand the various variables collected. In this section we show the definitions for the quantitative data collected, discuss problems of comparability for some of the variables and comment on their availability. Details on availability per country and institution are given in Appendix 2.

The CHINC project created a database for data storage and compilation. To all variables in the database there were attached a distinct field indicating the non-availability of data if relevant. This field is here utilised for analysing the availability of data for specific variables, countries and years. As an example, to analyse the availability of data for each category of revenues and each country we sum the number of non-available cases for each country. In case of the Czech Republic there are 10 institutions in the sample. For a time series of 10 years, this gives 100 possible observations for each variable. If *Total revenues* are not available for 5 institutions in one year, this will give a non-availability of 5 percent. Non-availability will also be 5 percent if *Total revenues* were not available for one institution for 5 years of the time series.

In Table 4 below the non-availability rate of each dimension and country is given. The details of each dimension are commented in the following sections.

[4] For a more complete description of the S&T indicators production in European countries refer to the county reports produced by the European network of indicators producers (ENIP), as well as to the summary paper of Esterle and Theves (2005).

Table 4 **Non-availability of data per dimension and country. Non-availability in percent of total possible observations.**

	Revenues	Expenditures	Personnel	Education	Research
CZECH REPUBLIC	34	40	25	0	40
FRANCE	25	35	48	11	59
GERMANY	31	27	37	17	63
HUNGARY	77	71	80	66	79
ITALY	69	42	53	43	86
NETHERLANDS	3	22	18	0	41
NORWAY	6	21	11	6	68
SPAIN	43	0	33	0	75
SWITZERLAND	13	30	16	0	85
UNITED KINGDOM	10	28	30	10	70
TOTAL	32	29	35	14	68

The CHINC project has collected data for 117 institutions for a time series of 10 years. With 30 variables in total this leaves 35 100 possible observations. Force majeure made data collection incomplete for Denmark. As an inclusion would skew the measurement, we exclude Denmark from the availability comparisons. This leaves us with 33 000 possible observations for analysis.

The table shows a total non-availability rate of around 30 percent for revenues, expenditures and personnel data, implying data were available for almost two third of the possible observations. The availability of educational data are even better (non-availability rate of 14 percent), while in the case of research data the availability is at the opposite end; research data were available for only one third of the possible observations. The availability of each variable is analysed in more detail below, and we would here just point to the high rate of unavailability of most third mission variables within the Research dimension. This hampered severely the analysis of consequences of changes in funding for the innovation activities of HEIs. For variables like patents, spin-offs and licensing revenues there seems to be few systematic efforts of data collection. There are also methodological problems (e.g. how to define a spin-off emerging from a university) or comparability is problematic due to variations in definitions (cf. Gulbrandsen and Slipersaeter (2006) “The Third Mission and the Entrepreneurial University Model” for a discussion of methodological problems in this area).

The availability varies between countries, overall being most problematic for Hungary and Italy. Hungarian higher educational institutions have undergone serious reorganizations from 1994-2003. Several universities were merged; faculties were separated from the institutions and added to other universities. Later some newly created universities were detached and remerged with others. This serious reorganisation is the main reason for the lack or gap-toothed time-series. As the reorganising process is ended and and the law on higher education recently enacted, we expect this will have positive impact on the availability of data. In Italy, there has been a change of organisation responsible for data collection during the sample period, accounting for comparability problems as definitions were changed with change of organisation. Also for Italy, some years were not available at all.

Table 5 **Non-availability of data per dimension and year. Non-availability in percent of total possible observations.**

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Revenues	70	35	34	29	24	26	23	24	24	28
Expenditures	53	32	31	27	25	31	21	24	23	34
Personnel	54	44	37	32	34	31	29	28	27	35
Education	39	24	10	14	11	10	7	5	2	18
Research	77	74	67	67	64	63	61	68	71	67

Table 5 shows the non-availability rates of each dimension and year of the sample period. All variables in each dimension are included. For most dimensions, data availability is improving over the years, 1994 being the most problematic year. Most correspondents confirmed it was problematic to go further back in time as in many countries reorganising of the higher education sector had taken place in the beginning of the 1990s, causing breaks in time series or other changes. For all dimensions except Research, there are increases in non-availability for 2003, indicating data for this year were not ready at the time of data collection. We do not expect this situation to last, availability for 2003 will probably be at the same level as the former years when the respective agencies are through with their work. The years in the middle of the time series are thus best suited for time series analysis. For the research variables, there are no improvements of availability over the years, confirming the problematic data situation for this dimension.

It should be noted that unavailability in many cases refers to a few institutions or one or a few variables in each dimension. When data are non-available for a couple of institutions along one or two variables for a country, there is still possible to do time-series analysis for the rest of the institutions. The situation is more problematic if non-availability is spread over many institutions and years.

We will emphasise the fact that the figures given in this section are valid only for the sample of institutions of the CHINC project and for the methodology used for this sample. The figures might thus not be representative for the countries in the sample on a national level. Another sample of institutions would probably also have given other results, as well as would have other strategies for data collection. *The results should thus be understood solely as tentative indicators of availability and not as absolute measurements.*

4.3. Revenues (funding) data: Definitions and problems of comparability

One of the main purposes of the CHINC project was to analyse developments in institutional funding, not least the developments of grants and contracts. As a consequence we asked for relatively detailed data on funding.

Table 6 **Definitions of Revenues variables**

Total revenues of the HE institutions	Total revenues of the HE institution for the reference year as stated in the operating statement or in official national sources. Should exclude revenues for investments; preferably university hospital revenues should be excluded, otherwise comment.

Government appropriations national	Include all amounts received as core funding by the institution through acts of a legislative body (i.e. ministry or national funding agency), except grants and contracts. Where possible, separate Government appropriations into research and non-research categories.
Government appropriations regional	In federal countries separate between national and regional appropriations.
Tuition and fees	Report all tuition and fees assessed against students for education purposes. Include here those tuitions and fees that are remitted to the State as an offset to the State appropriation. Do not report charges for room, board or other services provided to students.
Grants and contracts	Within the "grants and contracts" category, you should try to the extent possible to disaggregate it into the following four components. If this is impossible, report the aggregate value. If it is possible to separate between research and non-research contracts please indicate.
Grants and contracts (government)	Report revenues from government agencies that are for specific research projects or other types of programs. Examples include research projects funded by research councils, training programs and similar activities for which amounts are received or expenditures are reimbursable under the terms of a government grant or contract. Related indirect costs recovered should be reported as well. Should include also European structural funds if they are managed by a national authority.
Grants and contracts (international)	Report revenues from government and non-government agencies outside of the country in which the institution operates that are for specific research projects or other types of programs (e.g. contract teaching or academic enrichment programs).
Grants and contracts (private)	Report revenues from private companies; in which the institution operates for specific research goods and services provided to the funder as stipulations for the receipt of the funds (i.e., industry contracts, consultancy, contract teaching). Contracts from private companies abroad should be included here, otherwise comment.
Grants and contracts (private non-profit)	Report revenues received from charities and private foundations. Please do so only if you think it is important include this category, other wise leave empty. Comment on coverage.
Other revenues	Report revenues from all other sources not applicable to the categories above. If available indicate details.

Total revenues of an institution might be a relatively well-defined concept as it should include all revenues of an institution as stated in its operational statement. Uncertainties apply however to two categories of revenues included in the total:

- *Investments* (buildings, laboratories, specialised equipment etc) which in some cases comes from special budgets and appropriations. University buildings are in some countries not owned by the university but by other government agencies. Consequently, also investments in new buildings do not show up in university budgets. In cases where the university owns the buildings, special appropriations are usually given for new buildings and large renewals. In some cases this might make budgets fluctuate largely and give unexplainable annual fluctuations of total revenues. For these reasons, investments were excluded from Total revenues. Accounting practices and rules for revenues for investments, and their expenditure counterpart, varies between countries, making comparisons difficult.
- The non-research and educational operations of university hospitals are funded either by different government budgets (Ministry of Health etc) or by special appropriations within the university budget. Since such budgets can be of large sums, they might severely distort comparability if included in the total revenues of some institutions. For this reason, revenues for the medical operations of university hospitals were excluded from Total revenues.

Grants and contracts have proven more difficult to operationalise as the use of concepts to some extent will vary according to national systems of funding and the instruments used. As we in some cases expected problems of getting disaggregated data on grants and contracts, a category of grants and contracts total were included. Even if not disaggregated data were available, we expected all institutions to have data on the total. A quality problems for grants and contracts is connected to the extent the institutions themselves have information on all grants and contracts within the institution. Traditionally, grants and contracts have often been granted directly to the individual or the research group without the information necessarily reaching central administration. A second problem relates to the classification in subcategories. We suggested for this project to report grants and contracts in four separate categories of disaggregating, mirroring what we believe are the four main categories of sources for such funding. Still we found these categories not to match 100 percent the categories used by national reporting systems or institutions. One example; in the UK there was a category “Other grants and contracts” which was a residual from the others. To make a comparable total, this category was included in Grants and contracts total, which in this case explains why the total is different from the sum of the subcategories. A third quality problem relates to if only R&D funding or all types or grants and contracts are included. In the case of Denmark, only data for grants and contracts for R&D is available, thus making data for this country not 100 percent comparable to the others as grants and contracts for teaching, consulting etc. are not included. We do not think this account for any substantial part of grants and contracts, making the evaluation of comparability a matter of judgement.

Grants and contracts government includes both federal and regional government, as well as intermediaries getting their funding resources from government, e.g. research councils and other agencies. In some cases, the delimiting of “government” can be problematic since in some countries there have been a movement towards privatisation of government agencies, making them relatively independent of government. Still, we do not think this causes any severe problems within the system of funding of HEIs as the connections to government in most cases are relatively clear. *International sources*, which in this context is conceptualised as public (government and non-government) sources outside of the country where the institution is located. In some cases, it is not possible to separate international sources of funding from other sources for grants and contracts, e.g. Spain. It should be noted that we have grouped all funding from companies, national and foreign alike, in the category private funding. Funding from private companies in other countries is thus not included in the category International sources. *Grants and contracts private* should include funding from private sources for all types of activities the institution engage in, i.e. funding from the business sector for research, consultancy, contract teaching etc. Comparability problems relates here to blurred borders between grants and contracts and private donations. Such donations are normally considered as coming from private-non-profit sources, but e.g. in the case of the UK they are grouped together with private grants and contracts. *Grants and contracts private non-profit* were expected not to play any significant role in most countries. Still it was included, as to test if we could measure any substantial changes in such funding over the last years.

The category of *Tuition and fees* are not relevant in all countries, but were included to map the development of this source of revenues for the countries were relevant. In other countries, such fees apply only to a few private institutions. Problems of comparability might occur because fees for continuing education and/or specialised professional courses are included in some countries.

4.3.1. Availability of Revenues data

In Table 7, we have summarised the non-availability of the most important revenues variables. The table shows non-availability for each country for the whole time-series, i.e. the overall availability for each variable and country, and not for the specific years.

Table 7 Non-availability of Revenues data per country and variable. Non-availability in percent of total possible observations.

	Number of institutions in sample	Total revenues	Government appropriations national	Grants and contracts total	Grants and contracts government	Grants and contracts private	Grants and contracts international	Other revenues
Czech Republic	10	5 %	10 %	10 %	10 %	100 %	90 %	10 %
France	12	28 %	27 %	23 %	24 %	27 %	27 %	23 %
Germany	9	29 %	32 %	32 %	32 %	29 %	32 %	32 %
Hungary	7	70 %	70 %	79 %	79 %	79 %	81 %	84 %
Italy	14	21 %	21 %	100 %	100 %	100 %	41 %	100 %
Netherlands	8	0 %	0 %	0 %	8 %	8 %	8 %	0 %
Norway	10	10 %	7 %	6 %	6 %	6 %	6 %	3 %
Spain	16	0 %	0 %	0 %	100 %	100 %	100 %	0 %
Switzerland	12	13 %	13 %	13 %	13 %	13 %	13 %	13 %
United Kingdom	12	10 %	10 %	10 %	10 %	10 %	10 %	10 %
Total	110	16 %	17 %	27 %	42 %	50 %	42 %	27 %

For the total sample of 110 institutions, *Total revenues* are not available in 16 percent of the cases. In our opinion this non-availability rate should be considered rather high as total revenues is a very important parameter for policy as well as management purposes. Hungary is the extreme case as this variable is not available in 70 percent of the cases. In addition, France, Germany and Italy have a non-availability of more than 20 percent. In the Netherlands and Spain Total revenues are available in all cases.

Appropriations from national *(federal) government* are available in 17 percent of the cases, and shows about the same distribution between countries as for Total revenues.

The case of France poses a special problem as the budget, which is actually managed by the university, does not take into account the salaries of the state-employed researchers. The Ministry of national education pays these, and their wages are not visible at the level of the university. *Total* *revenues* and *Appropriations from government* do thus not include the wages of the state-employed.

Government appropriations from regional government are important only in those countries having a federal structure where regions are responsible for funding HEIs (Spain, Switzerland, and Germany). Availability for this variable is not shown in the table, but availability is in general good for the three countries concerned. Special considerations:

Switzerland:	Include also appropriations from other cantons than where the university is located.
Spain:	Includes also regional government grants and contracts, and is thus not comparable to the other countries.

For *Grants and contracts* the availability is more problematic:

Czech Republic:	Grants and contracts private not available, grants and contracts international not available for most years.
Hungary:	Non-availability at about 80 percent for most categories
Italy:	None of the Grants and contracts categories is available, except international grants and contracts for a few institutions.
Spain:	None of the Grants and contracts subcategories is available. Grants and contracts from national and regional government can not be separated from the general appropriations from these sources, and no exact figures for general appropriations nor grants and contracts is thus possible.

Tuition and fees are not represented in the table since this category is relevant only for a few countries.

For most countries, the non-availability is concentrated to the first period (1994 – 1996) of the sampling years. For instance is the constant non-availability of 13 percent for Switzerland and 10 percent for the UK for all revenues variables a consequence of missing data for all institutions in 1994 and a few institutions the following years. Below we show the non-availability per year and variable.

Table 8 **Non-availability of Revenues data per year and variable. Non-availability in percent of total possible observations.**

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total revenues	61	20	21	13	7	8	5	6	4	19
Government appropriations national	64	18	21	13	7	8	5	7	5	20
Grants and contracts total	65	32	28	25	20	21	18	21	18	21
Grants and contracts government	78	45	45	40	35	35	33	35	38	35
Grants and contracts private	79	55	55	49	44	45	42	44	46	44
Grants and contracts international	79	44	43	36	31	45	43	32	35	35
Other revenues	64	30	29	25	21	22	18	21	18	21

For *Total revenues* and *Government appropriations national*, the data availability improves considerably during the period. Exception is 2003 that has a considerable lower availability for both variables. This is probably a consequence of data collection and processing for this year not being finalised by time of collecting in some countries. We thus expect data for 2003 to become available.

For the various *grants and contracts* variables and the *Other revenues* category availability also improves, but not at the same level as for the prior categories. This is of course due to the total lack of availability for most or some of these categories in some of the countries. Except Hungary, all countries produced totals for the "grants and contracts" category, but a full breakdown in subcategories were available only in Germany, Norway, the Netherlands, Switzerland and the UK. Data on private contracts are thus available only in these five countries and, even in these cases, quality might be problematic since, firstly, many private contracts are managed directly by professors and laboratories; secondly, accounting conventions may also differ on this issue. In the United Kingdom, for example, data include not only industry contracts but also private donations that in other countries are included in Other revenues. In Switzerland, a break in series occurred in 1999 when definitions were changed by transferring subsidies from private foundations to the general budget

At country level, it is consequently possible to build consistent time series for *Total revenues* and *Government appropriations national* for all institutions in the sample for the years 1995 – 2003 for the Czech Republic, the Netherlands, Spain and the UK. For Italy, Norway and Switzerland an all-encompassing time-series is possible for the years 1997 – 2003 (2002 for Italy). For the last group of countries lack of data pertains only to a few institutions, so excluding these makes longer time-series also possible for most institutions in these countries.

Confer the CHINC report "*Changing Patterns of Higher Education Funding: Evidence from CHINC countries*" for further details on funding data.

4.4. Expenditures: Definitions and problems of comparability

Even if changes in incomes are the main aim of the CHINC project, changes in universities, expenditures might be an equally important component for the understanding of changes.

Table 9 Definitions of Expenditures variable

Total expenditures	Report the sum total of all funds expended in the areas listed below. Exclude capital expenditures (investments). Do not include expenditures on auxiliary enterprises (e.g., university bookshops, restaurants) or hospitals. ▪ Instruction. ▪ Research. ▪ Public service. ▪ Academic support (i.e. libraries, computer centre). ▪ Student services (e.g. counseling, academic advising, student unions; student residence halls) – If there is some way of eliminating student residencies and other semi-private facilities, please leave them out – but only if the revenue side is treated likewise. ▪ Current infrastructure costs (for operation and maintenance of buildings/labs).

University hospital expenditures	Indicate if there are any data on university hospital expenditures and how these are calculated.
Personnel expenditures	Report the total amount of salaries and wages paid for institution employees. Also include all fringe benefits (e.g., institutional contributions to employees' retirement and health insurance plans).
Other expenditures	Total functioning costs: includes rents, materials, travel, energy, consumables etc. Please give details on what is included in this category since it might affect comparability.
R&D expenditures	R&D expenditures calculated according to the Frascati manual methodology (see Frascati manual). Fill in only if you have data on individual HE institutions and explain how these were calculated.

Total expenditures were conceptualised as to include all normal operating costs of university's regular operations, as research, teaching, counselling, public services and the operation and maintenance of infrastructure. As investment revenues were excluded, consequently investment expenditures were excluded for the same reasons. Prior experience of data collection indicated it problematic to get detailed comparative expenditures data. Problems relate to different rules for calculation of social benefits for university personnel or if expenditures for student services is included or not. The project considered it most appropriate to specify total expenditures into two main categories; *personnel expenditures* and *other expenditures*, the last one being in fact the residual category.

Since expenditures and research output will vary considerably with the inclusion or not of a university hospital, it was considered of importance to get data on expenditures for *university hospitals*. The project expected however problems with availability for this variable as systems for funding as well as accounting principles for expenditures for university hospitals are known to vary considerably. From the first round of data collection, there was information available on which universities had a university hospital.

R&D expenditures are generally not a category in the accounting systems of the institutions, but are regularly collected and calculated by national statistical offices or other bodies at sector and national level according to the Frascati Manual. R&D statistics at institutional level are in most countries not disclosed due to regulations on statistical secrecy. In the project we were thus uncertain to the possibilities of collecting data for this variable, but since knowledge of R&D expenditures is of great importance for the aim of the project it was decided to be included, if not only for mapping the possibilities of collecting this variable.

4.4.1. Availability of Expenditures data

Table 10 Non-availability of Expenditures data per country and variable. Non-availability in percent of total possible observations.

	Number of institutions in sample	Total exp.	Personnel exp.	Other exp.	University hospital exp. *	R&D exp.
CZECH REPUBLIC	10	0	0	100	0	100
FRANCE	12	32	32	38	38	38
GERMANY	9	13	13	23	13	70
HUNGARY	7	70	70	76	70	70
ITALY	14	23	22	31	100	31
NETHERLANDS	8	3	3	3	4	99
NORWAY	10	5	5	6	42	48
SPAIN	16	0	0	0	0	0
SWITZERLAND	12	0	0	0	90	59
UNITED KINGDOM	12	10	10	10	100	10
TOTAL	110	14	14	26	47	46

* The availability of University hospital expenditures is not adjusted for the existence of a university hospital or not at the institutions. As an example; in Hungary 4 out of the 7 institutions in the sample have hospitals, and several of these could provide data for parts of the sampling years. In general, availability of this variable is probably better than indicated by the table.

Total expenditures are non-available in 14 percent of the cases, and the availability is most problematic in France, Hungary and Italy. In the Czech Republic, the Netherlands, Norway, Spain and Switzerland this variable is available in all or most cases. For the UK, data is missing only for 1994, while for Norway there are some missing cases for 1994 and 1995. Denmark reports it difficult to determine whether capital expenditures are incorporated or not in total expenditures, which makes the comparability problematic. In Spain and the UK capital expenditures are explicitly stated, but not included in Total expenditures.

Personnel expenditures and *Other expenditures* show the same distribution of availability as Total expenditures. Other expenditures are in some cases calculated as the difference between Total expenditures and Personnel expenditures.

In the case of France, state employed researchers are paid directly by the Ministry of national education, and their wages are in general not visible at the level of the university. For some institutions the total personnel expenditures are however available. Personnel expenditures are thus for France not internally consistent, neither comparable with other countries.

The availability of *R&D expenditures* data at institutional level was expected to be problematic as these data are collected by national statistics offices and generally not made available at institutional level. This was largely confirmed through data collection. Since this is an important variable for analysing changes in R&D performance of the institutions, we comment this variable for each country separately:

Czech Republic	Not available but according to the national correspondent the number should be equivalent to the *Grants and contracts total* variable in revenues. In our view, using this equivalent will omit R&D

expenditures as funded by Government appropriations and thus underestimate actual R&D expenditures.

Denmark:	R&D expenditures are available and reported according to the Frascati manual.
France:	Data is reported by institutions after no common guideline, and might thus include various expenditures that might not be in accordance with OECD definitions of R&D.
Germany:	Data are available in a few cases. Definition varies according to institutional practices. While some report 50 percent of all expenditures as R&D expenditures, others report only special operating costs. Data are thus not comparable.
Hungary	Status unclear.
Italy:	Data available for some years and institutions.
Netherlands:	Not available.
Norway:	Available biannually for the larger institutions based on national R&D statistics. Data according to Frascati manual.
Spain:	Available in all cases.
Switzerland:	Available for national R&D statistics based on a survey of the activities of the HE personnel. Data according to Frascati manual.
United Kingdom:	Includes the total amount of expenditures generated by research projects being funded through research contracts. This definition is consistent with the way as the UK report the HERD figures to the OECD, i.e. in accordance with the Frascati manual.

In total R&D expenditures data is available at institutional level in four countries; Denmark, Norway (biannually), Switzerland and the United Kingdom.

Table 11 Non-availability of Expenditures data per year and variable. Non-availability in percent of total possible observations.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total expenditures	51	23	21	15	12	15	7	9	5	21
Personnel expenditures	45	16	15	10	7	9	5	6	4	19
Other expenditures	54	26	25	21	19	33	16	17	16	30
University hospital expenditures *	47	52	52	49	46	47	44	45	43	46
R&D expenditures	68	44	45	42	38	54	35	42	45	53

* The availability of University hospital expenditures is not adjusted for the existence of a university hospital or not at the institutions. Availability of this variable is probably better than indicated by the table.

The overall availability of Expenditures variables over time shows about the same distribution as for Revenues; the non-availability is in general highest for the first year and then decreases to 2002. Availability is then lower for 2003 as the last year in the sample.

For university hospital expenditures and R&D expenditures, data availability is generally low for the years of the sample. Neither do they improve over time. This makes it rather problematic to include these variables in analysis.

Confer the CHINC report "*Changing Patterns of Higher Education Funding: Evidence from CHINC countries*" for further details on expenditures data.

4.5. Personnel: Definitions and problems of comparability

Human resources are the primary asset for HEIs performance. The number of personnel and composition of the staff might thus reflect important changes in the inner life of the institutions and their ability to perform their tasks. Various variables on number of personnel can also be important for normalising revenues and number of students, and by this make cross-institutional comparison possible.

Table 12 Definitions of Personnel variables

Total staff	Total staff contractually engaged by the HE institution. Please indicate in the methodological annex whether PhD students are included in personnel.
Professors	This category should include stable (mostly full-time) academic positions. Specify in methodological notes which national categories are included. For Universities of Applied sciences (Fachhochschulen, Hogescholen, etc.) definitions could differ from universities.
Academic staff engaged in both teaching and research (excluding professors)	This category should include all other academic staff including researchers (non teaching), teachers, teaching assistants (without being titular of a course) both at post-doc and PhD level. If you can separate research-only staff separate in the next category.
Researchers	Report all persons whose specific assignments are made for the purpose of conducting research as their principal activity (e.g. post-docs, PhD-candidates hired as staff by university). In some countries it might be impossible to separate this category from the preceding category. Please comment on coverage.
Technical and administrative staff	This category should include all nonacademic personnel (both technical and administrative). Comment in methodological notes.
Share of time devoted to R&D	If detailed data on individual institutions on the time devoted to R&D activities are available please insert and comment on methodology.

To delimit the various categories of academic and assisting personnel across the varied landscape of European higher education is a difficult task. The category of Professor probably has the most uniform definition, while for other categories the terminology as well as the duties of each category seems to show rather great variations. For this project, we have therefore used broad categories of personnel in the hope it will serve comparability.

A general problem for analysis of HE personnel is the attribution of the various tasks the personnel perform, i.e. research, teaching/advice to students, third mission related activities and administration. For the CHINC study, which focuses the research and innovative activities of HEIs, we should ideally preferred to have valid and relevant data on these aspects of the personnel, e.g. time used for such activities by each category of personnel. We have thus included a variable *Share of time devoted to R&D* which should reflect the estimated time personnel used on R&D according to the methodology developed through OECD and the Frascati manual (OECD 2002). There are however several problems with this methodology (see CHINC report on *Changing Patterns of Higher Education Funding* (Lepori et al 2005) for a detailed discussion); application of the methodology varies strongly between countries (Lepori 2005), the separation of activities is problematic because they are interlinked or the necessary resources for the application of the methodology is lacking. Publication of results from the surveys at institutional level is normally not done due to rules of statistical secrecy; even if some countries do publish the results for larger institutions (see below for details on availability). Given these conceptual and technical problems, we consider that trying to split the activities of HEI personnel is hardly feasible, at least in the European context. We find it more suitable to consider HEIs as multi-output organisations that produce various types of outputs (Bonaccorsi, Daraio and Lepori 2005) and were the composition of staff can give some information on the degree of priority the various categories of output have within the institution. We have thus included the category of *Researchers* to capture personnel who are assigned for conducting research as their principal activity (e.g. researchers on contract or in permanent positions, post-docs, PhD-candidates hired as staff by university). In some countries, this rather large group is performing a relatively large part of the institutions R&D activities. In other countries, this category does not exist within HEIs, or it is technically impossible to separate this category from *Academic staff engaged in both teaching and research*. We should observer that even if a large proportion of researchers within an institution might signify a relatively high R&D intensity within the institution, the existence of the group might also be the result of the configuration of the national system. Comparisons based on composition of personnel might thus be problematic.

The status of PhD students varies between the countries. In Norway and Switzerland PhD students are usually hired on contracts with their institutions, and are considered as part of the academic personnel. For these two countries, PhD students are included in *Academic staff engaged in both teaching and research.* In other countries, PhD students take part in R&D activities, but are considered as students in most respects and are consequently not included in personnel data. This variation might be skew comparisons of e.g. student/staff ratios or revenues/staff ratios.

The measurement of personnel is normally done either in person-years applying Full Time Equivalents (FTE) or in nominal Headcount. For this study, the preference was to have FTE as we assumed this would give a more precise measure of the personnel resources. The availability of FTEs showed however to vary considerably. In the Czech Republic, the Netherlands, Norway and Switzerland all personnel data were measured by FTE, while for Hungary, Spain and the UK personnel data were measured by headcounts. For Denmark data were generally given by FTEs, but with some exceptions. For Germany and France, there were a mix of FTE and headcount, varying between institutions. In the project, we could have compensated for these variations by recalculating headcounts to FTEs by a factor for each category of personnel and country. This would however have required a methodology similar to R&D statistics and fall outside the scope of the project. Instead of engaging in complicated methodological tasks, we have accepted the variations in measurement and the consequent reduction in comparability. Personnel data is thus reported with a mix of FTE and headcount. The reduction in comparability is probably not dramatically, as we expect most academic personnel to be employed in full time positions. For the future, reporting of personnel data should be standardised to one of the formats, following the recommendations of OECD.

4.5.1. Availability of personnel data

Table 13 Non-availability of Personnel data per country and variable. Non-availability in percent of total possible observations.

	Total staff	Professors	Academic staff engaged in both teaching and research	Research-ers	Technical and administ-rative staff	Share of time devoted to R&D
CZECH REPUBLIC	10	10	10	10	10	100
FRANCE	48	71	35	36	29	72
GERMANY	27	27	27	39	27	77
HUNGARY	74	100	63		73	100
ITALY	30	30	30		30	100
NETHERLANDS	0	0	0	9	1	98
NORWAY	3	3	3	3	3	51
SPAIN	0	0	0		0	100
SWITZERLAND	0	0	0		0	0
UNITED KINGDOM	0	0	0	0	90	90
TOTAL	19	23	15		28	85

In several countries the availability of the basic categories of personnel data is very good. This applies to the Czech Republic, Italy, Netherlands, Norway, Spain, Switzerland and the UK. For these countries there is almost 100 percent coverage of academic and technical/administrative staff. Exceptions are the Czech Republic were data is missing for 1994, for Italy were data is missing for 1994 and 1995, and the UK were there are no data on technical and administrative staff. For UK, there is also a problem with *Academic staff engaged in both teaching and research,* as there are actually no data on the full time positions in this category. In the database, only data for part time positions is inserted for UK for this category. In the case of France, data availability is problematic due to the practice of shared positions between universities and the public laboratories. This makes it difficult to make a precise definition of personnel employed by the universities. For Hungary lack of data is due to the general problems of data collection.

The category of researcher was introduced to collect data for the countries were this category is in use and were this kind of personnel plays a significant role in the research activities of universities; namely the Czech Republic, France, Germany, the Netherlands, Norway and the UK. Among these, data availability is in general good, with the exception of the earlier years of the sampling period for France and Germany.

Difficulties were expected for the category *Share of time devoted to R&D;* as such data normally are not available at institutional level. This expectation was justified as only Switzerland had a full coverage of this data. In the case of Norway, data is available bi-annually, as these figures are produced through the bi-annual R&D statistics.

Also for the basic personnel categories, data availability is poorest for the first sampling years (Table 12) and for 2003. For the categories *Researchers* and *Technical and administrative* *staff*, coverage improves somewhat over the years. For *Share of time devoted to R&D*, the unavailability rate is constant.

Table 14 Non-availability of Personnel data per year and variable. Non-availability in percent of total possible observation.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Total staff	46	35	20	17	15	15	8	10	5	21
Professors	49	33	23	16	21	16	15	15	14	26
Academic staff engaged in both teaching and research	42	29	15	12	11	9	7	7	4	18
Researchers	57	42	46	40	43	40	35	35	32	35
Technical and administrative staff	46	44	29	25	25	25	19	20	16	31
Share of time devoted to R&D	81	84	91	81	90	81	90	80	89	81

4.6. Education production: Definitions and problems of comparability

The focus of the CHINC project is changes in funding and their implications for research and innovation. Universities are however institutions performing multiple tasks and it is in our opinion not possible to analyse changes in the research and innovation portfolio without simultaneously taking into account changes in the educational production of the institutions. This is not only due to the fact that the cheer number of students will influence the research capacity of the academic staff, but also to the use of formula funding in many countries. In such formula based funding systems, the number of students enrolled or grades given are often used as input for deciding the size of government appropriations. Besides, educational output in terms of number of PhD degrees can be considered being an indicator for research intensity. Data for some educational variables were thus considered being essential for fulfilling the purpose of the project.

Table 15 Definitions of Education production variables

Number of students (headcount)	Report all students enrolled in courses creditable towards a diploma, certificate, degree or other formal award, excluding what you would call postgraduate education. This should include for example university first degree, Bologna bachelor and master students, etc. Indicate precise coverage in the comments. Year of reference: enrolments at the beginning of the academic year corresponding to the calendar year (e.g. for 2004, specify students for winter semester 2004/5).
Number of degrees	Number of degrees awarded during the calendar year. Degrees should be the first fully recognised degree. This might be slightly different according to each country. Please comment on definition used.
Number of PhD students	Number of PhD candidates enrolled. Year of reference: enrolments at the beginning of the academic year corresponding to the calendar year (e.g. for 2004: winter semester 2004/5).

Number of PhD degrees	Total number of PhD degrees awarded during the calendar year. To the extent that it is possible, report numbers of degrees awarded by discipline using the five main groups defined previously: • Social sciences and humanities; • Performing arts • Natural sciences; • Engineering and technology (including agricultural sciences and computer science); • Medical sciences. For a detailed list of subfields see the Frascati manual.

To find a precise definition of *Number of students* enrolled poses some problems as, despite the Bologna process and the efforts of creating a European area of higher education, the structure of educational programmes and degrees still varies greatly across Europe. The ISCED system of classifications provides a possible classification. Applying the ISCED 5A definition (education at a minimum length of three years) was considered a possibility, but was rejected because it excluded students in professional education programmes, which are of interest for the project. The project thus chose to use a more open definition to adjust for the realities of the national higher education systems.

To be able to analyse educational output relative to number of undergraduate students, the variable for *Number of degrees* were defined as being the first fully recognised degree provided. This definition is also relatively open to give room for the various degree structures.

Number of PhD students is important both as an indicator of educational capacity and for indicating if a institution is oriented towards research or education. An institution oriented towards education will have a lower propensity for having PhD students. The role of the PhD student varies between being a student or a staff member. In some countries (e.g. Norway), PhD students are on contracts and are considered members of the staff. In such countries, the number of PhD students enrolled will be dependent on the number of such contracts available. PhD students on contract will also perform teaching and administration.

Number of PhD degrees is the PhD-level output parallel to Number of degrees at lower level. In addition, the number of PhD degrees can be considered a research output indicator as there normally are considerable research efforts behind a PhD. To turn out PhDs the institution must also have the necessary supervising capacities as well as to provide the opportunities for the students to perform advanced research. The number of PhD degrees by field of science might be an important characteristic for the research profile of an institution. For this reason, the project also wanted to collect number of PhD degrees per scientific field.

4.6.1. Availability of Education production data

Table 16 Non-availability of Education production data per country and variable. Non-availability in percent of total possible observations.

	Number of institutions in sample	Students	Degrees	PhD students	PhD degrees
CZECH REPUBLIC	10	0	0	0	1
FRANCE	12	13	17	9	8
GERMANY	9	7	28	20	12
HUNGARY	7	83	86	43	51
ITALY	14	31	31	70	40
NETHERLANDS	8	0	0	0	0
NORWAY	10	9	16	0	0
SPAIN	16	0	0	0	0
SWITZERLAND	12	0	0	0	0
UNITED KINGDOM	12	10	10	10	10
TOTAL	110	13	16	15	11

Overall, the student production variables seem to have the lowest non-availability rate among the dimensions collected; between 11 and 16 percent. The exceptions are Hungary, Italy and France, the two last ones to a considerable lower extent.

Number of students is available in all cases for the Czech Republic, Netherlands, Spain and Switzerland. For the UK data is missing only for 1994. The same is the case for Norway, while here data is incomplete also for a couple of other years. For Italy data are not available for 1994 and 1995, while they are almost complete for the following years.

Problems of measurement for this variable relates to separation between graduate and postgraduate level, the separation between full time and part time students and to the possibilities of a person registering more than once. For Norway it was not possible to separate between undergraduate and graduate level for the two first years in the sample. Data include all students (but not PhD students) for these years, and is thus overestimated compared to other years. In the case of France, the number of students is the total number of registration. This means that a student registered in two different courses might be counted twice. For Italy is counted full-time, part-time, dual students and external students (dual students do part of their training on the job, external students only are allowed to sit in on exams and do not take any classes). Also for UK part-time students are counted as full-time students. Data for Swiss universities includes students enrolled in old 4-year diploma curriculum, as well as students enrolled in Bologna bachelor and master. In total, comparability for number of students is probably not as good as indicated by the high level of availability.

Data for *Number of degrees* are not quite as available as number of students, even though there are no gaps for the Czech Republic, Netherlands, Spain and Switzerland. Availability is poorer than for number of students especially for Germany and Norway. For both countries, there are gaps in data for the first 6 – 7 years. For Norway, coverage is 100 percent after 2000.

The varying length of study programs makes some problems of measurement for Number of degrees. Many countries have changed their program structure over the last ten years; in most cases for adaptation of the Bachelor/Masters model. For the early years of the sample the structure were in some countries different, e.g. .the license degree in Switzerland and requirement of five years studies for giving first degree in Denmark. In Norway, the first degree was not widely recognised by employers. Neither was the first degree used as a mandatory point of entry for students continuing to upper levels. Consequently, students did not formalise their first degrees by a diploma.

Data for *PhD students* and *PhD degrees* show complete availability for the Czech Republic, Netherlands, Norway, Spain and Switzerland. For the UK data is not available for 1994. The situation for France is somewhat better for these variables than for undergraduate students; while there for Italy is a higher non-availability rate as data are missing for several years.

There are not reported any special problems of measurement for PhD students and PhD degrees. The correspondents were asked to report also on Number of PhD degrees per scientific field. Such data were available only for Norway, Spain and the UK. These data are not included in the database, nor used for analysis.

Table 17 Non-availability of Education production data per year and variable. Non-availability in percent of total possible observations.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Students	41	23	10	9	8	7	4	6	4	19
Degrees	45	27	14	11	13	12	8	8	4	19
PhD students	35	23	7	19	17	16	14	4	1	17
PhD degrees	35	22	7	18	5	4	1	4	1	17

For the total sample, the availability for all Education production variables is improving over the years. The poorest availability is also here 1994, while the non-availability rate for these variables are also increasing again for 2003.

4.7. Research production: Definitions and problems of comparability

In addition to students, the main output from HEIs are research results as published in journal articles and books, and as utilised in patents and spin-off companies. Research results are important for the CHINC project as one of its ambitions is to analyse the consequences changes in funding have had for research and innovation activities. Quantitative measurement of research and innovation output is a much debated issue within indicators production. So far, most indicators have been based on publication data, normally using datasets from ISI. Few other sources of data have been available that provides coherent and comparable indicators across countries and institutions. Since to our knowledge, most existing data on innovation activities were collected ad-hoc and without a view to international comparability, we would include a few such variables to test the availability; licensing revenues, patents held and spin-off companies formed.

Table 18 Definitions of Research production variables

ISI publications	Total number of ISI (Institute of Scientific Information) publications in the year. Publications with at least one address from the institution (full address counting).
Other publications	If other (research) publications counts exist, please indicate figure and sources.
Licensing revenues	If you have any data, report here income generated by the institution from research (i.e. Intellectual Property Rights) commercialisation activities.
Patents held	If you have any data, report here information about the number patents applied for and received during the reporting period.

Spin-off companies formed	If you have any data report here any information about the number of spin-off companies formed as a direct result of the institution's research activities. A spin-off is a starter from a (semi-)public research organisation or university that aims to apply newly developed scientific knowledge. That is, a spin-off is a small high tech firm.

For *ISI publications* the definition is the most "open" of the ones normally used, making possible inclusion of all publications where at least on of the authors have his or her address at the institution. Alternatively, we could have used a "fractional count" which would have given a ratio to the institution according to the number of authors from the institution per publication. This would require the existence of such data for all institutions in the sample prior to the project, as constructing such datasets requires too much work to be feasible within the project. The decision was thus simple. We do not expect any comparability problems for ISI publications, except for those already well known; priority to English language journals, wrong or missing address identification of authors, honorary inclusion of some authors, inclusion of authors without any significant contribution to the article etc. We do not think these problems are more serious for this project than for others using these data. More problematic is probably the missing coverage by ISI of many European language journals and the general lack of systematic data on other publications (books, reports etc).

To open up for the possibilities of analysing also scientific results published through other channels than journals registered by ISI, the category *Other publications* were included. This is an open category giving the possibility to report any available data on research publications different to ISI. As the category has the character of a "feasibility test", possible comparability problems have to be considered with this in mind. As shown in Table 19 below, only a few countries were able to deliver data for this category. We have thus not made any detailed studies of comparability for this project. Definitions that are more precise should be considered for future data collection, including consideration of the existing systems or reporting.

Measurement of third mission activities of universities is in general problematic as the borders to private firms or private activities of academic personnel can be difficult to identify. Patents can thus be owned by companies even if the original idea stems from university research. In many countries commercial exploitation of research results have been done by the academic personnel as private subjects ("professor privilege"), and not by the institutions. Consequently, there has been no routine data collection in this field. At those institutions which have organised activities in this domain (i.e. establishing technology transfer offices, hiring patent lawyers or liaison officers etc), this is relatively new and long time series cannot be expected. Comparability problems can also be expected for the third mission variables included. For *Patents held,* it was opened up for reporting patents applications as well as patents received. This is obviously problematic as a patent applied for not necessarily will be granted, and the two essentially measures two different stages in the process. This is reflected in data, as for France there are reported patents applied for, while for other countries received patents are reported. There are also variations in methodology and sources of data. For some countries data are reported from national patents offices or similar (i.e. the Czech Republic where data are from the Industrial propriety office), while for others they are reported by the institutions (i.e. the UK were data are reported through RAE) or through surveys done in other contexts (i.e. Norway where data where collected for the purpose of another study). For future reporting, there should also be a delimitation between national patents and patents granted through the European Patents Office, from the US and possibly also Japan and other countries.

There is obvious comparability problems also for *Licensing revenues* and *Spin-off companies formed* as there is no established methodology for the collection. Licensing revenues are probably least problematic of the two as this is relatively easy to report, if they are defined in institutional accounts. The amounts earned from licensing revenues are usually not of much significance. For a university with a budget of several hundreds of millions of Euro the licensing revenues might not be large enough to be identified at all in the accounting system, or they are so small that they show up as insignificant when normalised by total revenues. For Spin-off companies the problem often relates to ownership; what should be the formal relationship between the HEI and the company to define it as a spin-off from the HEI? Should the HEI or a professor be the majority owner, or is the ownership insignificant if the spin-off is created to commercialise a research result from the HEI? At what time does a spin-off cease to be a spin-off, and a regular company replace it? For future data collection in this field, such questions need to be considered.

4.7.1. Availability of Research production data

The availability of Research production data observed through the CHINC project confirmed the expectations in front of the project. Except for ISI publications, availability was poor for all variables. There was full coverage of ISI data for the Czech Republic, Norway and Spain. For France and Germany, where data were collected directly from the institutions, also ISI publications were difficult to obtain. Data obviously exists through ISI, but there has been no systematic reporting at the institutions. For Hungary the problem is that so far, to our knowledge, there is produced no dedicated dataset by ISI for this country. For Italy ISI publications data were available from 1995 through 2001, while for the Netherlands data were not available for all institutions after 2001. In the case of Switzerland, data were missing for 2003 for all institutions, and for other years for two institutions. For the UK, where ISI publications were replaced by publications submitted to the RAE, data was only available 1996 – 2000 as the 2001 RAE was used as data source.

Table 19 Non-availability of Research production data per country and variable. Non-availability in percent of total cases.

	ISI publications	Other publications	Patents held	Licensing revenues	Spin-off companies formed
CZECH REPUBLIC	0	0	0	100	100
FRANCE	78	69	37	70	40
GERMANY	78	73	42	79	44
HUNGARY	100	100	61	76	59
ITALY	30	100	100	100	100
NETHERLANDS	14	4	59	75	53
NORWAY	0	100	40	100	100
SPAIN	0	100	91	91	91
SWITZERLAND	26	100	100	100	100
UNITED KINGDOM	50	50	50	100	100
TOTAL	35	73	61	89	81

Other publications were systematically available in the Czech Republic, the Netherlands and the UK. In the Czech Republic, data on other publications are collected in a national database when resulting from research funded by public sources. In addition, some of the institutions collect data by themselves. These data might overlap the national dataset, and the total number in this category might thus be overestimated. For the Netherlands, the institutions report total number of publications in their annual report. These figures include all scientific publications, also publications registered by ISI, and there is thus a double counting of ISI publications.

Patents held were available for all institutions and years in the Czech Republic only. For all other countries data were either totally unavailable (Italy and Switzerland), available for some years only (Norway available 1998 – 2003, the UK available 1996 – 2000) or available for a variety of institutions each year.

Licensing revenues and *Spin-off companies formed* were both not available at all in five countries (the Czech Republic, Italy, Norway, Switzerland and the UK) or available only for certain institutions and years. For the Netherlands, number of Spin-off companies formed was for some institutions reported for several years without specification of the precise number per year.

Table 20 Non-availability of Research production data per year and variable. Non-availability in percent of total possible observations.

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
ISI publications	50	36	24	24	23	23	22	32	50	61
Other publications	81	79	67	68	67	67	66	76	77	79
Patents held	76	76	65	64	54	54	51	62	61	48
Licensing revenues	94	94	93	93	92	93	91	91	88	76
Spin-off companies formed	87	87	86	86	84	80	76	77	80	70

As Table 18 shows, availability for ISI publications are best for the middle years of the sample period, while for the other variables there are few changes over the years. This conceals however the fact that availability for some countries and some variables did improve through the sampling period.

5. Summary and recommendations

In our opinion the CHINC project can be understood in two ways; as a pilot / feasibility study for the possibilities of creating a system for monitoring developments of European higher education institutions, and, second, as a research project with the aim of describing how changes in funding of HEIs have affected their research and innovation activities. This twofold aim of the project is interlinked; without access to relevant and valid data at institutional level, it is not possible to describe or analyse the developments. The project can thus also be evaluated by two criteria; first, has the project taken the necessary methodological steps and precautions to map availability and actually collect valid data useable for monitoring and analysis? Second, has the collected dataset been utilised in the project in a way that gives new insights into the developments of HEIs? The fulfilment of the last criteria has to be evaluated through the project's two main research reports; one on changing patterns of higher education funding and one on the qualitative aspects and consequences of changes of funding, and will not be commented on further here. The possible fulfilment of the first criteria is demonstrated and discussed in this report, and we will use this section partly to summarise our experiences, implicitly evaluate them and then give some recommendations.

5.1. The overall approach

The requirements of the project tender in terms of data to collect and analysis to perform were relatively high, especially when considering the available resources. The project team thus had to find a way of collecting data without using too many resources. Based on prior experiences, the choice was made to rely to some extent on variables and definitions already tested in other projects. This approach utilised experiences already acquired and made us aware of possible problematical areas and of definitions that had to be given special attention not to exclude data from a particular country or group of institutions. An alternative approach could have been to focus the research questions and then asked for the data needed to answer those questions. This would have been more in line with the methodology textbook, but at the risk of defining variables not possible to collect. Still, we cannot be sure to have created the optimal set of variables for the purposes of the project. In a way, the dilemma between building on prior experiences, with the possibilities for repetition of other exercises, and the needs for a fresh approach was solved through collecting both quantitative and qualitative data. When quantitative variables had to be defined relatively close to what we already knew were available, the qualitative questionnaire could be designed as to give answers to the specific research questions of the project.

To use, for the quantitative data, as far as possible already collected and validated data, was also a decision made partly to answer one of the inherent tasks of the project, namely to map data availablility, and partly to be able to answer the projects research questions in due time and in a methodologically sound way. If the projects main aim had been to map data availability at the higher education institutions themselves, the project must of course have adopted another approach. However, this was not the aim, but to map what data were already collected and made available by others, and only in cases were other sources where not available would we collect data directly from the institutions. As the prior sections of this report have demonstrated, this proved to be a sensible decision as we in general have found already existing data to be of a better quality compared to data collected directly from the institutions. The pre of already collected data lies predominantly in the validation and documentation processes. For data collected by national statistical offices or dedicated professional institutions in the realm of higher education studies, a process of validation is normally already carried out. The validation process normally also produces documentation on changes in definitions, coverage etc; - essentially documenting the break in series always to be found in time series of some length. Still, we found it necessary to make further validations of data delivered. Also in countries which since many years have had a well developed reporting system (e.g. like Switzerland and Norway), there occur unexplained breaks in the series, data are missing for some years or institutions, variations in data reported from one year to the other are unreasonably large, etc. Actually, the need for further validation of existing data took the project team by some surprise, and we recommend the actual costs in respect of time and resources for this activity to be included in future studies, as proper validation is essential for the quality of the study. Data collected directly from the higher education institutions required even more validations, as the institutions themselves usually do not have resources or the will to engage themselves in such processes. The decision of re-using already collected data was thus of course also done partly out of economical reasons, economic in the meaning of reducing time and indirectly the costs of collecting data.

The organisation of the project as a network of national correspondents in the 11 countries, where the correspondents did data collection (quantitative and qualitative) and validation, giving advice on the methodological approach, contributing with their general insight of the field studied and with their knowledge of the national system of the respective countries, proved very efficient. Without doubt, it enhanced the quality of the project considerably. At the same time, it was necessary to form a smaller executive group, which could more intensively discuss the methodological choices to be made, the interpretations of the findings etc. Such discussions normally have to take place in a smaller forum. We thus do not hesitate to recommend a similar organisational structure also for the future. The one problem with this organisational structure we have observed is that communication between the network and the executive group can be hampered if they do not have the possibility to meet regularly. As in this project, budget constraints made regular meetings for the whole consortium practically impossible, most of the communication had to be done by email. This is often effective, but cannot replace face-to-face discussions in all respects.

5.2. Data availability and comparability

The focus of the project is stated in its title: *Changes in University Incomes: Their Impact on University-Based Research and Innovation*. The focus on input in terms of revenues and on a specific part of the institutional output, namely what relates to research, set the scope for the analytical model to apply and for the data collection. Even if research and third mission activities were the focal point, HEIs have in our opinion to be understood as multifunctional institutions with several kinds of inputs and a multitude of outputs. HEIs are complex institutions balancing between their main activities of education, research, dissemination of results and third mission activities. Not only do they have to balance these activities between each other, there is also a balance internally in each activity; between basic and applied research, between undergraduate and post-graduate education, between dissemination for the scientific community and the public, to name a few. To make these activities work, there is an additional need for balancing various sources of income, the hiring of various groups of personnel, the balancing and priorities between the various scientific fields and disciplines etc. In our opinion, the multifunctional reality of HEIs had to be incorporated in the analysis to meet the requirements of the project. This also set a dictum for what data to collect, as data collection should reflect our understanding of the institutions. In retrospect, we see the need for inclusion of some variable on the relative size of the scientific fields covered by each institution. The balance of fields and disciplines is of importance for understanding several aspects of institutional revenues (.e.g. importance of the various sources of funding, repatriation mechanisms etc.) as well as institutional outputs and strategies. The project tried to capture this dimension through collecting data on number of PhD degrees awarded in each field of science. Such data were not available in most countries, and we could not make analysis based on these data. Alternative proxies could have been number of personnel or number of students within each field. This we have not tested.

As the CHINC project can be understood as a feasibility study for the collection of data on individual higher education institutions, the mapping of data availability has been central. Data availability is summarised in Section 4 and details are in Appendix 2 of this report. Here we summarise only the essential and critical findings:

1. Data collected from national agencies and institutions seems to us more coherent and better documented than data collected directly from the institutions.
2. The organisation of the higher education and research system in some countries sets limits to what data are available (within the CHINC project notably France). For other countries reorganising of the bodies responsible (e.g. Italy) or the unwillingness of institutions to report data (e.g. Hungary) set limitations to availability.
3. For most variables, data availability improves over the years. This indicates the possibility of establishing a permanent monitoring system, which also can include the past 5 – 8 years.
4. Output from research and data on third mission activities were the most difficult to collect. Problems refer to lack of an established methodology (except for ISI publications), lack of routine data collection in this field, and, in the case of the UK, the pricing policies of institutions having monopoly on ISI data.
5. For revenues, it proved problematic to collect consistent data on the various categories of grants and contracts.
6. Data on R&D intensity as measured by person years or expenditures devoted to R&D (as measured by the OECD/Frascati manual approach) were in most cases unavailable at the institutional level. This hampered our analysis. Still, we know that for all countries reporting to OECD and Eurostat, some data on R&D intensity exist within national statistics offices. Public availability is probably dependent on national regulations and practices. On the other hand, the methodology behind such data is disputed, and their usefulness can be discussed (OECD 1997).
7. Several problems of comparability have been observed, at various levels of seriousness:
    a. Revenues: Government grants and contracts are in some cases included in General university funding. Delimitation of the various categories of grants and contracts might be obscure.
    b. Personnel: Variations in respect of national systems inclusion of the category of (non-teaching) researcher or not, and if PhD students are on contract (and implicitly included in personnel) or not.
    c. Students: Variations in the structures of programmes and routines of student registration. The inclusion of PhD students in Total number of students is not systematic.
    d. Research production: Where available, data on third mission output is produced by various methodologies, making comparisons problematic.
8. There are obvious needs for validation of data, irrespectively of their source, and the resources needed for validation should not be underestimated.

5.3. Recommendations

Based on the CHINC experiences we will make a few recommendations with a view to the possible future analysis of the developments of European higher education institutions:

In our opinion, the project has demonstrated the feasibility of collecting time series of data for the various aspects relevant for studies of higher education institutions. Despite several problems, the project has demonstrated the possibilities for a wide selection of countries and institutions. *We recommend the continuation and extension of the data collection at European level for the purposes of monitoring and analysis of European higher education institutions, as a resource for giving advice to policymakers, and for benchmarking purposes.* It is important for such a system to be beneficial for most stakeholders, including higher education institutions and their organisations. An analysis of stakeholders' needs should thus be done as part of future work.

The systematic collection of qualitative data on the institutional experiences, policies and strategies is a necessary suplement to quantiative data as it makes possible to draw valuable, contextually-relevant perspectives on institutional structures and changes to them that cannot be gleaned from quantitative indicators alone. *In addition to regular and systematic quantitative data collection, we thus recommend also systematic mapping of policy developments and opinions at the institutional level.* This will make possible the comparative analysis of institutional developments across countries, types of higher educational systems and institutional variations, as well as the reactions to policy initiatives.

The usefulness of national experts for collecting and interpreting national data has been proved indispensable through the project. *We recommend a European monitoring system to be built as a network of national centres of expertise.* Such centres are found in most European countries. In countries were such centres do not exist, the government should be encouraged to establish one.

The project has documented some problems of data availability, comparability and validity. In our opinion, the usefulness of a monitoring system depends on the quality of data. Through activities of PRIME Network of Excellence (ENIP, Observatory of European Universities and Aquameth), several initiatives are made to promote better definitions, methodologies and validation practices. *For future data collecting exercises, we recommend to pay attention to the outcome of ongoing PRIME activities, as well as to relevant discussions initiated by IPTS (ERA-Watch), OECD and Eurostat.* Attention should be given to the possibilities of conflicting initiatives in terms of definitions and data collecting routines (collecting identical data twice), as well to the potential relevant and useful experiences of the various stakeholders.

The project has documented problems of data availability and validity especially for the grants and contracts part of revenues, for measurement of R&D intensity, and for research and innovation production. For revenues data, better definitions as well as routines for data collection are needed. For R&D intensity data are not available at institutions level, as well as there are well-known problems with the established methodology. For research and innovation production, problems include lack of an established methodology, available data due to missing routines for collection as well as to monopolising of data. For all fields, the project has experienced greater needs for data validation than was expected. *To enhance future data quality and validity, we recommend paying special attention to the methodological problems concerning grants and contracts, measurement of R&D intensity, and to the overall data situation and methodology for research and innovation production.* For grants and contracts we recommend to pay attention to the work already in progress through PRIME/ENIP, while the problems relating to R&D intensity calls for a discussion within in the statistical system of OECD and Eurostat. The monopoly on data on scientific publication calls for action at political level, while the lack of relevant methodology and coherent data for measurement of research and innovation production should be a concern for everybody with an interest in the future of the European knowledge society, i.e. researchers, universities and other knowledge producing institutions, and policymakers.

6. Appendix 1: Institutions included in the CHINC sample

The column “Included in Qualitative sample” indicated institutions where interviews were done.

	Acro-nym	Year of Foun-dation	Speciali-sation	No. of under-graduate students 2002	No. of PhD stu-dents 2002	No of PhD De-grees 2002	Included in Quali-tative sample
CZECH REPUBLIC							
Česká zemědělská univerzita v Praze	ČZU	1906	Agriculture	9 184	718	37	X
České vysoké učení technické v Praze	ČVUT	1707	Technical university	19 736	2 400	100	X
Masarykova univerzita v Brně	MU	1919		23 119	2 565	165	X
Mendelova zemědělská a lesnická univerzita v Brně	MZLU	1919	Agriculture	5 942	646	66	X
Univerzita Karlova v Praze	UK	1348		37 129	6 193	364	
Univerzita Palackého v Olomouci	UP	1573		13 586	1 277	104	
Vysoká škola báňská - Technická univerzita Ostrava	VŠB-TU	1716		14 695	1 331	102	
Vysoká škola chemicko-technologická v Praze	VŠCHT	1807	Chemistry	2 133	815	63	X
Vysoká škola ekonomická v Praze	VŠE	1953	Economy	14 392	762	40	X
Vysoké učení technické v Brně	VUT	1899		14 055	1 702	109	
DENMARK							
Aalborg Universitet	AAU (AUC)	1974		9 777	386	84	
Aarhus Universitet	AU	1928		20 374	885	180	X
Danmarks Tekniske Universitet	DTU	1829	Technical university	6 406	172	33	X
Den Kgl. Veterinær- og Landbohøjskole	KVL	1858	Agriculture	3 117	14		X
Københavns Universitet	KU	1479		33 272	1 281	253	X
Det Kgl. Danske Kunstakademi, Arkitektskolen	KARCH	1754	Arcitecht-ure	1 295	14		X
Handelshøjskolen i København	CBS	1917	Business	10786	172	33	X

	Acronym	Year of Foundation	Specialisation	No. of undergraduate students 2002	No. of PhD students 2002	No of PhD Degrees 2002	Included in Qualitative sample
FRANCE							
Ecole nationale des ponts et chaussées	ENPC	1747	Engineering	1 273	136	27	X
Ecole Supérieure d'Electricité	SUPELEC	1894	Engineering	1 346	186	42	
Université Claude-Bernard – Lyon I	UCBL	1835		25 946	1 248	278	X
Université de Bourgogne – Dijon	UB	1722		24 815	988	122	X
Université de Marne-la-Vallée		1991		10 640	318	27	X
Université de Nantes		1422		30 450	1 157	173	
Université de Technologie de Compiègne	UTC	1972	Technical university		244	56	X
Université des Sciences et Technologies de Lille – Lille I		1854		18 986	1 020	220	X
Université du Havre		1967		6 633	139	16	X
Université Louis Pasteur – Strasbourg I	ULP	1621		15 322	1 118	260	X
Université Paris Sud – Paris XI		1958		26 346	2 320	464	
Université Pierre et Marie Curie – Paris VI	UPMC	1960		29 690	2 918	575	X
GERMANY							
Fachhochschule Mannheim, Hochschule für Technik und Gestaltung		1898		3 530			X
Friedrich-Schiller-Universität Jena		1558		16 865	765	411	X
Georg-August-Universität Göttingen		1737		19 638		375	X
Hochschule für Angewandte Wissenschaften Hamburg		1970		26 748			X
Humboldt-Universität zu Berlin		1810		33 622	1 237	788	X
Rheinisch-Westfälische Technische Hochschule Aachen		1870		29 667	2 268	732	X
Technische Universität München		1868		18 016	942	659	X
Universität Bielefeld		1969		21 200	1 387	236	X
Ruprecht-Karls-Universität Heidelberg		1386		24 382	1 330		X
Universität Mannheim		1907		12 131	323	108	X

	Acronym	Year of Foundation	Specialisation	No. of undergraduate students 2002	No. of PhD students 2002	No of PhD Degrees 2002	Included in Qualitative sample
HUNGARY							
Budapesti Műszaki és Gazdaságtudományi Egyetem	BME	1782	Technical, Business	NA	833	NA	X
Debreceni Egyetem	DE	1912	Medicine, Law, Natural Sciences	24 723	719	128	X
Miskolci Egyetem	ME	1949	Humanities	8 035	472	16	
Pécsi Tudományegyetem	PTE	1367	Generalist	29 394	1037	77	X
Semmelweis Egyetem	SE	1951	Medicine	NA	370	117	(X)
Szegedi Tudományegyetem	SZTE	1921	Agriculture	28 278	525	111	X
Veszprémi Egyetem	VE	1949	Technical, agriculture	8 233	167	29	X
ITALY							
Università degli studi "Ca' Foscari" di Venezia	unive	1868		17 233	249	24	X
Università degli studi della Basilicata	unibas	1982		6 416	152	21	
Università degli studi della Calabria	unical	1968		27 105	245	40	
Università degli studi della Tuscia	unitus	1979		NA	146	16	X
Università degli studi di Bologna	unibo	1088		99 059	1633	405	
Università degli studi di Catania	unict	1434		55 033	1003	169	X
Università degli studi di Firenze	unifi	1924		58 041	1223	232	
Università degli studi di Genova	unige	1307		35 003	788	166	X
Università degli studi di Modena e Reggio Emilia	unimore	1176		14 848	276	50	X
Università degli studi di Padova	unipd	1222		56 185	1057	179	
Università degli studi di Palermo	unipa	1805		61 314	767	151	
Università degli studi di Roma "Tor Vergata"	uniroma 2			28 114	812	105	
Università degli studi di Trento	unitn	1983		14 367	284	32	X
Università degli studi di Trieste	units	1924		24 069	433	73	X

	Acronym	Year of Foundation	Specialisation	No. of undergraduate students 2002	No. of PhD students 2002	No of PhD Degrees 2002	Included in Qualitative sample
NETHERLANDS							
Chr. Hogeschool Windesheim, Zwolle				13 106			X
Hogeschool. van Utrecht				29 454			X
Rijksuniversiteit Groningen	RUG	1614		20 171	604	228	X
Technische Universiteit Delft	TUD	1842		13 123	667	178	X
Universiteit Leiden	LEI	1575		15 351	622	233	X
Universiteit Maastricht	UM	1976		11 332	338	100	X
Universiteit Twente, Enschede	UT	1961		6582	443	111	X
Universiteit van Amsterdam	UvA	1632		21 910	534	335	X
NORWAY							
Høgskolen i Agder	HIA	1994		6 082	26	0	
Høgskolen i Bodø	HBO	1994		3 502	15	0	X
Høgskolen i Oslo	HIO	1994		6 082	10	0	X
Norges handelshøgskole	NHH	1936	Business school	2 211	53	11	X
Norges teknisk-naturvitenskapelige universitet	NTNU	1911		15 954	648	203	X
Universitet for miljø og biovitenskap	UMB	1859		1 755	100	55	X
Universitetet i Bergen	UiB	1946		13 057	353	158	X
Universitetet i Oslo	UiO	1811		24 379	721	231	
Universitetet i Stavanger	UiS	1969		5 908	49	0	X
Universitetet i Tromsø	UiT	1968		4 638	215	55	X
SPAIN							
Universidad Autónoma Barcelona	uab	1968		37 080	3 616	331	
Universidad Autónoma Madrid	uam	1968		30 215	3 563	388	
Universidad Complutense de Madrid	ucm	1508		89 050	10 559	573	
Universidad de Barcelona	uba	1430		55 386	2 982	480	X
Universidad de Granada	ugr	1531		56 303	2 992	265	X
Universidad de Islas Baleares	uib	1978		13 352	459	53	X
Universidad de La Rioja	uri	1992		6 910	361	13	X
Universidad de León	ule	1979		14 567	639	53	X
Universidad de Salamanca	usal	1215		29 035	2 033	158	X
Universidad de Santiago	usc	1495		41 654	1 458	221	X
Universidad de Sevilla	use	1505		67 147	3 817	353	
Universidad de Valencia	uveg	1500		50 224	2 869	322	X
Universidad del Pais Vasco	upv	1968		52 619	2 015	171	

	Acro-nym	Year of Foun-dation	Speciali-sation	No. of under-graduate students 2002	No. of PhD stu-dents 2002	No of PhD De-grees 2002	Included in Quali-tative sample
SPAIN continued							
Universidad Politécnica de Cataluña	upc	1971	Technical university	31 735	1 937	175	X
Universidad Politécnica de Madrid	upm	1971	Technical university	43 496	1 228	194	
Universidad Politécnica de Valencia	upva	1971	Technical university	34 392	1 669	190	X
SWITZERLAND							
Ecole Polytechnique Fédérale de Lausanne	EPFL	1968	Technical University	4 465	906	189	X
Eidgenössische Technische Hochschule Zürich	ETHZ	1854	Technical University	9 275	2 449	463	X
Università della Svizzera italiana	UNISI	1996	Specialised in a few domains	1 481	77	5	X
Universität Basel	UNIBS	1460		6 307	1 678	345	X
Universität Bern	UNIBE	1528		10 219	1 379	409	
Universität Luzern	UNILU	1574	Specialised in a few domains	536	74	2	
Universität Sankt Gallen	UNISG	1898	Business School	4 104	811	128	X
Universität Zürich	UNIZH	1833		19 104	3 095	643	X
Université de Fribourg	UNIFR	1889		8 634	945	85	X
Université de Genève	UNIGE	1559		10 132	1 522	252	X
Université de Lausanne	UNIL	1537		7 851	1 538	154	X
Université de Neuchâtel	UNINE	1838		2 654	483	68	
UNITED KINGDOM							
Anglia Polytechnic University		1992	Technical university	22 275	320	10	X
Imperial College of Science, Technology		1907		7 230	2 415	435	X
Leeds Metropolitan University		1992	Technical university	21 025	265	5	X
Nottingham Trent University		1992	Technical university	18 890	450	30	X
Royal Holloway, University of London		1879		4 120	615	65	X
University of Aberdeen		1495		9 525	1 280	205	X
University of Brighton		1992	Technical university	14 770	350	25	X
University of Cambridge		1318		16 375	6 015	935	
University of Newcastle		1800		14 110	2 520	305	X
University of Salford		1896		16 075	990	70	X
University of St Andrews		1410		6 500	785	140	X
University of Sussex		1961		9 145	1 250	210	X

7. Appendix 2 Details of data and data availability

Detailed overview over data and their availability per country and institution.

7.1. Czech Republic

7.1.1. Revenues

Source of data: UIV - Institute for information on education

Comments to variables:

Total revenues include all revenues of the institution, included all kinds of support for education and research activity. Based on data collected by UIV.

Government appropriations national: Because of a complicated structure of funding it is here stated the basic formula funding of educational activity from the state budget, However, there are other sources of income from state budget, direct or indirect. These are comparatively lower, then formula funding of educational activity, although its importance growth recently. Based on data collected by UIV.

Government appropriations regional: Not relevant in the Czech Republic.

Tuition and fees: Only fees from study in foreign languages, fees for admission, and fees for extended time of study are collected. Theses data are not nationally collected.

Grants and contracts: Include all kinds of support of research.

Grants and contracts (government): Include support for research from public budget distributed in various ways: Through Grant Agency of Czech Republic, Ministries and other. Include the target as well as institutional support. Data based on UIV.

Grants and contracts (international): Grants from other sources, include private and international. Data based on UIV.

Data availability:

Data for 1994 in most cases not available. Where data are available, only Total revenues available.

Data for Grants and contracts (private) are not collected centrally and thus not available.

Data for Grants and contracts (private non-profit) are not collected centrally and thus not available.

Data for Grants and contracts (international) available only for 2003.

Data for Tuition and fees are not collected centrally and thus not available.

7.1.2. Expenditures

Source of data: UIV - Institute for information on education

Comments to variables:

Total expenditures: Total expenditures of the institution.

Personnel expenditures: Include personal expenditures for all kinds of personal (academic as well as non-academic staff).

R&D expenditures: This is not available but number should be equivalent to the Grants and contracts variable in revenues.

Data availability:

Other expenditures and R&D expenditures are in general not available.

No data 1994 for these institutions:
10015 Univerzita Palackého v Olomouci
10019 Vysoká škola báňská - Technická univerzita Ostrava
10020 Vysoká škola ekonomická v Praze
10021 Vysoká škola chemicko-technologická v Praze
10024 Vysoké učení technické v Brně

7.1.3. Personnel

Source of data: UIV - Institute for information on education

Comment on data for 1995:
Till now we have not received information concerning the "suspicious" data from 1995. The numbers for staff are higher than in 1996 and there was no reason for it. Maybe they are not FET data but we do not know it for sure yet. There must be some methodological problem, following data (since 1996) are much more reliable.

Comments to variables:

Total staff: FTE - full time equivalent, PhD students not included.

Professors: professors and "docents" - associate professors.

Academic staff engaged in both teaching and research: Professors and associate professors not included, research staff not included.

Technical and administrative staff: All non-academic personnel.

Data availability:
Share of time devoted to R&D: Not available.
No data available for 1994.

7.1.4. Education

Comments to variables:

In the dataset from the Czech Republic PhD students were included in Number of students. In the database number of PhD students are subtracted from number of students.

In the dataset from the Czech Republic Number of PhD degrees were included in Number of degrees. In the database number of PhD degrees are subtracted from number of degrees.

7.1.5. Research

Comments to variables:

ISI publications: Nr. of publications in a year searched by address of author or co-author. Inculdes all types of documents, all languages, SCI expanded, SSCI, Aand HCI.

Other publications: Data are split into two differently collected sets of data by the Czech correspondents.

1, "The RIV number" contains the results of research funded from public sources, and collected in national dbase.

2, Second variable, which in the dataset is called "other publications", contain research results from dbases of research publication collected independently by some schools themselves. These numbers should always include the RIV, but also all other publications, in some cases not only of strictly scientific character, and surely they should contain results funded from other sources the public. Unfortunately, this variable is incomplete, some schools don't have such dbase other use it only since recent years.

For the database the "RIV number" is inserted since this seems most complete in terms of data available.

Patents held: National patents, utility models and industrial design registered by the Industrial propriety office of the Czech Republic. All registered applications in the year.

Data availability:

Licensing revenues are not collected centrally and thus not available.
Spin-off companies formed not available

7.2. Denmark

At the time of writing, data collection for Denmark was not completed. The overview below is thus probably not in accordance with the actual situation as data availability is probably better than indicated.

7.2.1. Revenues

Sources of data: Directly from each institution.

Regional appropriations: Does not apply to Denmark.

Tuition and fees: Does not apply to sample institutions, except Copenhagen Business School.

Grants and contracts: The following numbers (in Grants and Contracts) are only R&D and therefore numbers for education are not included. It is therefore not possible to make calculations with these numbers together with "Total Revenues" etc… In the financial reports the statements are not that detailed.

Data availability:

No data available for these institutions:
11003 Aalborg University
11007 The Royal Academy, School of Architecture

Limited years available for these institutions:

11001 University of Copenhagen:
No data on Total revenues 1994 – 1997
No data on Government appropriations national
No data on Grants and contracts (all categories) 1994 – 2001
No data on Other revenues

11002 University of Aarhus
No data on Total revenues 1994 – 1999
No data on Government appropriations national 1994 – 1999
No data on Grants and contracts (all categories) 1994 – 2001
No data on Other revenues 1994 – 1999

11004 Technical University of Denmark
No data on Total revenues 1994 – 2001
No data on Government appropriations national 1994 -2002
No data on Grants and contracts (all categories) 1994 – 2001
No data on Other revenues 1994 – 2002

11005 The Royal Veterinary and Agricultural University
No data on Total revenues 1994 – 2000
No data on Government appropriations national 1994 -2001
No data on Grants and contracts (all categories) 1994 – 2001
No data on Other revenues 1994 – 2001 and 2003

11006 Copenhagen Business School

No data on Total revenues 1994 – 1997
No data on Government appropriations national 1994 -1997
No data on Tuition and fees 1994 -1997
No data on Grants and contracts total 1994 – 1997
No data on Grants and contracts, other sources 1994 – 2002
No data on Other revenues 1994 – 1997

7.2.2. Expenditures

Sources of data: Web-site of each institution, except for R&D expenditures which are from Danish R&D statistics.

It is not possible to determine whether capital expenditures are incorporated or not in total expenditures.

University hospitals: University hospitals are in Denmark not funded through universities but by the counties.

R&D expenditures: R&D expenditures reported following the Frascati manual. R&D expenditures are total of all R&D expenditures reported.

Other expenditures: Calculated as Total expenditures minus Personnel expenditures.

Data availability:

No data available for these institutions:

11003 Aalborg University
11007 The Royal Academy, School of Architecture

Limited years available for these institutions:

11001 University of Copenhagen: No data 1994 – 1997, except R&D expenditures available also 1995.

11002 University of Aarhus No data 1994 – 1999, except R&D expenditures available also 1995 and 1997.

11004 Technical University of Denmark

No data 1994 – 2001, except R&D expenditures available also 1995, 1997 and 1999 – 2003.

11005 The Royal Veterinary and Agricultural University

No data on Total expenditures 1994 – 1999.
No data on Personnel expenditures 1994 – 2001. No data on R&D expenditures 1994, 1996 and 1998.

11006 Copenhagen Business School

No data 1994 – 1997, except R&D expenditures also available 1995 and 1997.

7.2.3. Personnel

Sources of data: Web-site of each institution and R&D statistics.

Measurement in general in FTE, except headcount for some institutions and years.

PhD students included in total personnel.

Researchers include all people employed at the institution involved in research except professors and technical and administrative personnel.
Exception for institution 11003 where Researchers are included in Academic staff engaged in both teaching and research.

Data availability:

Share of time devoted to R&D not available.

Limited years available for these institutions:

11001 University of Copenhagen:	No data on Total staff 1994 – 1997. No data on Professors 1994, 1996 and 1998. No data on Researchers 1994, 1996 and 1998. No data on Technical and administrative staff.
11002 University of Aarhus	No data on Total staff 1994. No data on Professors 1994, 1996 and 1998. No data on Researchers 1994, 1996 and 1998. No data on Technical and administrative staff 1994.
11003 Aalborg University	No data on sub-categories 1994.
11004 Technical University of Denmark	No data on Total staff 1994 – 1999. No data on Professors 1994, 1996 and 1998. No data on Researchers 1994, 1996 and 1998. No data on Technical and administrative staff 1994 – 1999.
11005 The Royal Veterinary and Agricultural University	No data on Total staff 1994 – 1999. No data on Professors 1994, 1996 and 1998. No data on Researchers 1994, 1996 and 1998. No data on Technical and administrative staff 1994 – 1999.
11006 Copenhagen Business School	No data on Total staff 1994 – 1999. No data on Professors 1994, 1996 and 1998. No data on Researchers 1994, 1996 and 1998. No data on Technical and administrative staff 1994 – 1999 and 2001.
11007 The Royal Academy, School of Architecture	No data on 1994 – 1996. No data on Researchers.

7.2.4. Education

Data source: the Danish Ministry of Education, www.uvm.dk, except PhD degrees from The Danish Centre for Studies in Research and Research Policy.

Students: The total number of students enrolled in the specified institution at 01-10 in year xxxx

Degrees: Degrees awarded to students who have had at least 5 years of full-time study

7.2.5. Research

No data available.

7.3. France

Comments by the French partner in italics.
The French data at the level of university problematic for several reasons ; we have answered as much as we could to the CHINC data definitions ; nevertheless, there are a few important comments we would like to emphasize and which are applicable for all universities (except ENPC).

Data sources:
For this phase of data gathering, we used own university data sources, from their accounting system. There are no national sources to answer to all the data asked for.

7.3.1. Revenues

BUDGET: the budget which is actually managed by the university does not take into account the salaries of the State-employed researchers. The later are paid by the Ministry of national education, and their wages are not visible at the level of the university. This leads us to present the only data available of budget that are total budget (without wages of state-employed). Revenues from investments are excluded when specified.

Data availability:

No data available for this institution:
12053 Université Pierre et Marie Curie - Paris VI

Limited years available for these institutions:
12006 Université de Technologie de Compiégne (no data 1994 – 1997)
12018 Université de Bourgogne-Dijon (no data 1994 – 1997)
12024 Université des sciences et technologies de Lille -Lille I (no data 1994 – 1996)
12056 Université de Marne-la-Vallée (no data 1994 – 1997)
12062 Université Paris Sud - Paris XI (no data 1994 and 1996)
12075 Université du Havre (no data 1994)
12078 Université Louis Pasteur - Strasbourg I (no data 1994)

7.3.2. Expenditures

Personnel expenditures: Still, a few people are directly paid by the university, and most of the universities know the amounts devoted to their employees. We chose not to put it on the "personnel expenditures". This can be discussed and asked for by the coordinator. We then would make it appear.

R&D expenditures: when we have this amount, it comes from a budgetary line within the institutions called R&D, this might include various things that might not be totally linked with R&D.

Data availability:

No data available for these institutions:
12006 Université de Technologie de Compiégne
12053 Université Pierre et Marie Curie - Paris VI

Limited years available for these institutions:

- 12018 Université de Bourgogne-Dijon (no data 1994 – 1997)
- 12024 Université des sciences et technologies de Lille -Lille I (no data 1994 – 1996)
- 12043 Université de Nantes (no data 1994 – 1996, limited for other years)
- 12056 Université de Marne-la-Vallée (no data 1994 – 1996)
- 12062 Université Paris Sud - Paris XI (no data 1994 and 1996)
- 12075 Université du Havre (no data 1994)
- 12078 Université Louis Pasteur - Strasbourg I (no data 1994)

R&D expenditures: Where available R&D expenditures is a subunit to the total expenditures.

7.3.3. Personnel

Professor: in France, the people employed for research in a university is either a teacher-researcher (3rd line of file) or a researcher (4th line of file) employed by CNRS for example, and working within the institution in a joint lab. That excludes for us the qualification of Professor within the French context.

This category could apply for the only ENPC institution but data is not available.
Share of time devoted to Research: the French case is the following - a teacher-researcher is supposed to devote 50% of his time for research and 50% for teaching. A researcher is supposed to devote 100% of his time to research. There are no other sources to gather this information.

Data availability:

Time devoted to R&D not available.

Measurement varies between Headcount and FTE.

Limitations to data availability:

12006 Université de Technologie de Compiégne
- 1994 – 1997 no data
- 1998 – 2003: data only for categories "Academic staff engaged in both teaching and research" and "Researchers".

12018 Université de Bourgogne-Dijon
- All years: no data on number of professors
- 1994 – 1999: only data for categories "Academic staff engaged in both teaching and research" and "Technical and administrative staff".

12024 Université des sciences et technologies de Lille -Lille I:
- 1994 – 1997: no data,
- 1998 – 2004: no data on "Professors" and "Technical and administrative staff".

12043 Université de Nantes:
- 1994 – 2001: only data for "Academic staff engaged in both teaching and research" available
- 2002 – 2003: data on "Technical and administrative staff" also available.

12053 Université Pierre et Marie Curie - Paris VI:
- 1994 – 2001: only data for "Technical and administrative staff" available
- 2002 – 2003: also data on "Researchers" available.

12056 Université de Marne-la-Vallée:

Data for number of professors not available.

12062 Université Paris Sud - Paris XI:
“Total staff” and “Professors” not available any year.
1994 – 1995: Only data on “Academic staff engaged in both teaching and research and “Researchers” available.
1996 – 2000: Only data on “Academic staff engaged in both teaching and research and “Technical and administrative staff” available.

12075 Université du Havre:
“Total staff” not available 1994 – 1998 and 2002 – 2203.
“Professors” not available any year.
“Academic staff engaged in both teaching and research” not available 1994 – 1998.
“Researchers” not available 1994 – 1996 and 2002 – 2003.
“Technical and administrative staff” not available 1994 – 1998.

12078 Université Louis Pasteur - Strasbourg I
No data 1994 – 1997.
“Professors” not available any year.

12103 Ecole nationale des ponts et chaussées
“Total staff” not available 1994 – 1995.
“Professors” not available any year.
“Academic staff engaged in both teaching and research” not available any year.
“Researchers” not available 1994 – 1995.
“Technical and administrative staff” not available 1994 – 1995.

12106 Ecole Supérieure d'Electricité
“Professors” not available any year.

7.3.4. Education

The number of students is the total number of registration. This means that a student registered in two different courses might be counted twice.

Data availability:

No data on PhD degrees according to scientific field.

12006 Université de Technologie de Compiégne
No data 1994 – 1997.
Number of students and degrees not available 1998 – 2003.

12018 Université de Bourgogne-Dijon
Number of degrees not available 1994 - 1995.

12030 Université Claude -Bernard - Lyon I
No data 1994 – 1995.

12043 Université de Nantes:
For 1994 only data on number of PhD degrees.

12056 Université de Marne-la-Vallée:
No data on number of PhD degrees 1994 – 1995 (can be zero?)

12062 Université Paris Sud - Paris XI:
No data on number of degrees 1998 – 2000.
No data on number of PhD students and PhD degrees 2003.

12078 Université Louis Pasteur - Strasbourg I
No data on number of students 1994 – 1995.
No data on number of degrees 1994 and 2000.
No data on number of PhD students 1994 – 1997.

7.3.5. Research

Data availability:

12006 Université de Technologie de Compiégne
No data for "ISI publications".
No data for 1994 – 1997.

12018 Université de Bourgogne-Dijon
No data for "ISI publications", "Other publications" and "Licensing revenues".

12024 Université des sciences et technologies de Lille -Lille I:
No data for "ISI publications" and "Other publications".

12030 Université Claude -Bernard - Lyon I
No data for "ISI publications", "Licensing revenues" "Patents held" and "Spin-off companies formed".

12043 Université de Nantes:
No data for "ISI-publications" and "Other publications" 1994.
No data for "Licensing revenues" "Patents held" and "Spin-off companies formed".

12053 Université Pierre et Marie Curie - Paris VI:
No data for "ISI-publications" and "Other publications".
No data for "Licensing revenues" 1994 – 1995.
No data for "Spin-off companies formed" 1994 - 1999.

12056 Université de Marne-la-Vallée:
No data for "ISI-publications" 1994 - 2000.
No data for "Other publications" and "Licensing revenues".

12062 Université Paris Sud - Paris XI:
No data for "ISI-publications", "Other publications", "Licensing revenues" and "Patents held".

12075 Université du Havre:
No data available.

12078 Université Louis Pasteur - Strasbourg I
No data for "ISI-publications" 1994 – 1995 and 2002 – 2003.
No data for "Other publications", "Licensing revenues", "Patents held" and "Spin-off companies formed".

12103 Ecole nationale des ponts et chaussées

No data for “ISI-publications” 1994 – 1997.
No data for “Other publications” 1994.
No data for “Licensing revenues” and “Spin-off companies formed”.

12106 Ecole Supérieure d'Electricité
No data for “ISI-publications” 1994 – 1999.
No data for “Other publications” 1994 - 1999.
No data for “Licensing revenues” 1998 – 2001.

7.4. Germany

7.4.1. Revenues

Data in Euros and 1000 Euros.

Data availability:

No data on revenues for this institution:
13002 Rheinisch-Westfälische Technische Hochschule Aachen

Limited years available for these institutions:
13084 Georg-August-Universität Göttingen
Revenues are without medical part of the university.
No data 1994 – 2000.
2001 - 2003: Only data for "Total revenues" and "Grants and contracts private" available.

13089 Hochschule für Angewandte Wissenschaften Hamburg
No data 1994 – 1996.

13153 Fachhochschule Mannheim, Hochschule für Technik und Gestaltung
No data 1994.
"Grants and contracts total" are not specified.

13155 Universität Mannheim
For 1994 – 1997 only data on "Government appropriations regional" available.

13163 Technische Universität München
No data 1994.

7.4.2. Expenditures

Data in Euros and 1000 Euros.

Data availability:

No data on R&D expenditures for these institutions:
13002 Rheinisch-Westfälische Technische Hochschule Aachen
13020 Humboldt-Universität zu Berlin
13084 Georg-August-Universität Göttingen
13153 Fachhochschule Mannheim, Hochschule für Technik und Gestaltung
13155 Universität Mannheim
13163 Technische Universität München

Limited years available for these institutions:
13084 Georg-August-Universität Göttingen
Expenditures are without medical part of the university.
No data 1994 – 2000.

13153 Fachhochschule Mannheim, Hochschule für Technik und Gestaltung
No data 1994.

13163 Technische Universität München
No data 1994.
No data on “Other expenditures”.

13089 Hochschule für Angewandte Wissenschaften Hamburg
No data 1994 – 1996.

7.4.3. Personnel

Data in headcount and FTE (varies between institutions).

These institutions have not given information on unit used:
13020 Humboldt-Universität zu Berlin
13089 Hochschule für Angewandte Wissenschaften Hamburg
13112 Friedrich-Schiller-Universität Jena
13155 Universität Mannheim
Set as FTE in database.

Data availability:

No data on “Time devoted to R&D” for these institutions.
13002 Rheinisch-Westfälische Technische Hochschule Aachen (stipulated as 50 percent according to Humboldtian ideals. Inserted as NOT available in the database.).
13020 Humboldt-Universität zu Berlin
13027 Universität Bielefeld
13084 Georg-August-Universität Göttingen
13089 Hochschule für Angewandte Wissenschaften Hamburg
13153 Fachhochschule Mannheim, Hochschule für Technik und Gestaltung (estimated to 20%. This figure NOT included in database.)
13163 Technische Universität München

Limited years available for these institutions:
13020 Humboldt-Universität zu Berlin
No data 1994.

13084 Georg-August-Universität Göttingen
No data 1994 – 2000.
No data for “Researchers”.
Data are inserted in database without personnel in medicine.

13089 Hochschule für Angewandte Wissenschaften Hamburg
No data 1994 – 2001.

13163 Technische Universität München
No data 1994 – 2001.

7.4.4. Education

Data availability:

No data on PhD degrees according to scientific field.

Limitations to data availability for these institutions:

13020 Humboldt-Universität zu Berlin

Number of degrees not available 1994 – 1995.

13084 Georg-August-Universität Göttingen

Number of degrees not available 1994 – 2001.
Number of PhD students not available.
Number of PhD degrees not available 1994 – 1998.
Data are inserted in database without students or degrees in medicine.

13089 Hochschule für Angewandte Wissenschaften Hamburg

No data 1994 – 1996.
No data on Number of PhD students and PhD degrees 1994 – 2002 as the college did not have right to award PhDs before 2003.

13153 Fachhochschule Mannheim, Hochschule für Technik und Gestaltung

No data 1994, 1996 and 1998.
No data on number of PhD students and PhD degrees. Probably because this institution as a Fachhochschule does not award PhDs (no information given in the dataset).

13163 Technische Universität München

Number of degrees not available 1994 – 2001.
Number of PhD students not available 1994 – 1995.

7.4.5. Research

Data availability:

No data available for this institution:

13153 Fachhochschule Mannheim, Hochschule für Technik und Gestaltung

Limitations to data availability for these institutions:

13002 Rheinisch-Westfälische Technische Hochschule Aachen

Data on “Other publications” “Promotions- und Habilitationsarbeiten”.
No data on “Licencing revenues” 1994 – 2001. No information on unit used given. Interpreted as million Euro based on size of university and converted to 1000 Euro in database.
No data on “Number of spin-off companies formed” 1994 – 1995.
No data on “Number of patents held” 1994 – 2001.

13020 Humboldt-Universität zu Berlin

No data on “ISI-publications”.
No data on “Other publications”.
No data on “Licencing revenues”.

13027 Universität Bielefeld

No data on “ISI-publications”.
No data on “Other publications”.
No data on “Licencing revenues”.

These comments are given:
“Number of ISI publications” need to be answered by individual inquiry.

"Number of other publications" can not be answered since no bibliometric registration has been done until now.
"Number of patents": Legislation was changed in 2002, since then and until now : 2 patents. Inserted into database as one in 2002 and one in 2003.
"Number of spin-off companies formed": As far as known about 15 companies were founded - and still exist - since late 90's, not counted self-employed lawyers, accountants, consultants, etc. Inserted into database as 3 each year 1999 – 2003.

13084 Georg-August-Universität Göttingen
No data on "ISI-publications".
No data on "Other publications".
No data on "Licencing revenues".
No data on "Number of spin-off companies formed" 1994 – 1999.
No data on "Number of patents held" 1994 – 1996.

13089 Hochschule für Angewandte Wissenschaften Hamburg
No data 1994 – 1997.
No data on "ISI-publications".

13112 Friedrich-Schiller-Universität Jena
No data on "ISI-publications".
No data on "Other publications".
No data on "Number of spin-off companies formed" 1994 – 1999.

13155 Universität Mannheim
ISI data not available. Data from the university's own counting in the category "Beitrag in Zeitschrift" in "Anlage_ research-2". These might differ to ISI categories.

"Other publications" are in the database inserted as the sum of the following categories of publications in the universities own counting. Includes the following categories: Arbeitspapier / Diskussionspapier, Beitrag in Tagungsband, Buch, Buchbeitrag, Diplomarbeit, Dissertation, Habilitation, Herausgeberschaften.
These categories in the report from the university are excluded: Interner Bericht / Report, Lexikonarikel, Preprint, Rezensionen, Studienarbeit, Tagungsband, Vortrag, Weiterer Beitrag, Zeitungsartikel.

No data on "Licencing revenues" 1994 – 2001.

"Number of patents held": The university has reported 4 patents for the total period 1994 – 2003 with no reference to year. These are in the database inserted as one per year for the years 1994, 1997, 2001 and 2003.

"Number of spin-off companies formed" is based on list of spin-offs from the university. List is not complete, and the number probably underestimated.

13163 Technische Universität München
No data except "Number of patents held" 2003.

7.5. Hungary

7.5.1. Revenues

Data in 1000 HUF.

Data availability:

Government appropriations regional: Not available in Hungary. Up to now regions were not financiers of R&D
Tuition and fees: Total income from education.

Contracts: The most problematic part of data collection relates to the contracts. Only University of Debrecen managed to fill each row in the table. University of Pécs could provide only a part of financial data, they did not provide financial data on international contracts. University of Szeged was able to give the number of contracts only. Neither Semmelweis, nor Miskolc Universities could provide any data on the contracts. Each university reported as a very time consuming task.

Grants and contracts (government): Some universities were able to provide information only on the number of contracts.

Grants and contracts (international): Some universities were able to provide information only on the number of contracts.

Grants and contracts (private): Some universities were able to provide information only on the number of contracts.

Other revenues: Revenues not included in the above categorization.

No data available for this institution:
14009 Miskolci Egyetem

Limited years available for these institutions:
14002 Budapesti Műszaki és Gazdaságtudományi Egyetem
No data 1994 -1995.
Data only for “Grants and contracts” 1996- 2003.

14003 Debreceni Egyetem
No data 1994 – 1999, 2001 and 2003.

14011 Pécsi Tudományegyetem
No data 1994 – 1999, 2001 and 2003.

14013 Szegedi Tudományegyetem
No data 1994 – 1999.
Limitations to certain variables for other years.

14016 Veszprémi Egyetem
No data 1994 – 1997, 1999, 2001 and 2003.

Severe limitations to data for this institution:
14012 Semmelweis Egyetem
Only data for “Total revenues” and “Government appropriations national”.

7.5.2. Expenditures

Data in 1000 HUF.

Data availability:
No data available for these institutions:

14002 Budapesti Műszaki és Gazdaságtudományi Egyetem
14009 Miskolci Egyetem

Limited years available for these institutions:

14003 Debreceni Egyetem
No data 1994 – 1999, 2001 and 2003.

14011 Pécsi Tudományegyetem
No data 1994 – 1999, 2001 and 2003.

14013 Szegedi Tudományegyetem
No data 1994 – 1999.

14016 Veszprémi Egyetem
No data 1994 – 1997, 1999, 2001 and 2003.

For some of these institutions data for 2004 are available and included in the database.

7.5.3. Personnel

Data in headcount.

Data availability:

“Number of professors” not specified for any institution.
“Share of time devoted to R&D” not available for any institution.

No data available for this institution:

14009 Miskolci Egyetem

Limited years available for these institutions:

14002 Budapesti Műszaki és Gazdaságtudományi Egyetem
No data for 1994 – 1995.
For years 1996 – 2003 only data on “Academic staff engaged in both teaching and research” available.

14003 Debreceni Egyetem
No data 1994 – 1999, 2001 and 2003.
Data for 2000 only for one of the institutions’ faculties.

14011 Pécsi Tudományegyetem
No data 1994 – 1999, 2001 and 2003.

14013 Szegedi Tudományegyetem
No data 1994 – 1999.

14016 Veszprémi Egyetem

No data 1994 – 1997, 1999, 2001 and 2003.
No data on “Academic staff engaged in both teaching and research” available.

For some of these institutions data for 2004 are available and included in the database.

For this institution data for 1993 is available and inserted into the database:
14012 Semmelweis Egyetem

7.5.4. Education

Data availability:

Limited years available for these institutions:

14002 Budapesti Műszaki és Gazdaságtudományi Egyetem
No data for number of students.
No data on number of degrees.
No data on number of PhD degrees.

14003 Debreceni Egyetem
No data 1994 – 1999, 2001 and 2003.

14009 Miskolci Egyetem
Number of students available only for 2002.
Number of degrees not available.
Number of PhD degrees not available 1994.

14011 Pécsi Tudományegyetem
No data 1994 – 1999, 2001 and 2003.

14012 Semmelweis Egyetem
No data on number of students and number of degrees.

14013 Szegedi Tudományegyetem
No data 1994 – 1995.
No data on number of students 1996 – 1999.
No data on number of degrees 1996 – 2000.
No data on number of PhD students 1996 – 1998.

14016 Veszprémi Egyetem
No data 1994 – 1997, 1999, 2001 and 2003.

For some of these institutions data for 2004 are available and included in the database.

7.5.5. Research

Comments to variables:

ISI publications: These data are not yet available in Hungary, but IKU is working on this compilation with the Institute for Research Organisation of the Hungarian Academy of Sciences, results are expected in a few months.

Licensing revenues: Available data in HUF1000

Patents held: Patents filed to the Hungarian Patent Office (HPO) and patents granted by the HPO. For the database patents granted are inserted.

Spin-off companies formed: The Hungarian Law that regulates to set up spin off was enacted in December 2004. Before 2005 it may find spin out or semi- spin out firms around (or in) the universities.

Data availability:

No data available for this institution:

14009 Miskolci Egyetem

Limited years available for these institutions:

14002 Budapesti Műszaki és Gazdaságtudományi Egyetem

No data on “Number of spin-off companies formed”.

14003 Debreceni Egyetem

No data 1994 – 1999, 2001 and 2003.

For other years only data “Number of spin-off companies formed” available.

14011 Pécsi Tudományegyetem

No data 1994 – 1999, 2001 and 2003.

For other years only data “Number of spin-off companies formed” available.

14012 Semmelweis Egyetem

No data on “Licensing revenues”.

14013 Szegedi Tudományegyetem

No data 1994 – 1996

No data on “Licensing revenues” 1997 - 1999.

No data on “Number of spin-off companies formed” 1997 - 1999.

No data on “Patents held” 1997 - 1999.

14016 Veszprémi Egyetem

No data 1994 – 1997, 1999, 2001 and 2003.

For some of these institutions data for 2004 are available and included in the database.

7.6. Italy

7.6.1. Revenues

Data in 1000 Euro.

Data availability:

No data available for 1994 and 2003.

Grants and contracts, only data on "Grants and contracts international" available, but then not for years 1999 – 2000.

Tuition and fees not available years 1998 – 1999.

Other revenues not available.

Limitations to data availability for this institutions:

15041 Università degli studi di Padova: No data 1995 and 1996.

7.6.2. Expenditures

Data availability:

No data available for 1994 and 2003.

"University hospitals expenditures" not available.

"R&D expenditures" not available 1999.

"Other expenditures" not available 1999.

Limitations to data availability for these institutions:

15041 Università degli studi di Padova: No data 1995 and 1996.

15034 Università degli studi di Modena e Reggio Emilia: No data on "Personnel expenditures" and "Total expenditures" 1999.

7.6.3. Personnel

Data availability:

No data available for 1994, 1995 and 2003.

"Share of time devoted to research" not available.

7.6.4. Education

Data availability:

"Number of students" not available 1994, 1995 and 2003.
"Number of degrees" not available 1994, 1995 and 2003.
"Number of PhD students" not available 1994 – 2000.
"Number of PhD degrees" not available 1994 – 1997.
Limitations to data availability for these institutions:

- 15010 Università degli studi della Calabria: No data on "Number of students" and "Number of degrees" 1996.
- 15071 Università degli studi della Tuscia: No data on "Number of students" 2002.

7.6.5. Research

Data availability:

Only "Number of ISI publications available". Not available 1994, 2002 and 2003.

7.7. Netherlands

7.7.1. *Revenues*

Data in 1000 Euro.

Government appropriations national includes Rijksbijdrage (core funding).

Grants and contracts includes research council grants as well as contract work (teaching and research), excludes financial revenues (interest) and other.

7.7.2. *Expenditures*

Data availability:

R&D expenditures not available.

7.7.3. *Personnel*

Data in FTE.

Total staff: Includes academic and support staff, in FTE (also includes students employed as teaching or research assistants).

Academic staff engaged in both teaching and research: Includes PhD students (see below)
Researchers: Based on universities' reports, which in turn are based on (sometimes highly suspicious) splits made across teaching, research and administrative tasks.

Technical and administrative staff: In Dutch: Ondersteunend en Beheers personeel (OBP), in FTE.

Data availability:

“Share of time devoted to R&D” not available.

7.7.4. *Education*

Number of students (headcount): Full-time, part-time, dual students and external students (dual students do part of their training on the job, external students only are allowed to sit in on exams and do not take any classes)

Number of degrees: The figure for the universities is the equivalent of a Master's degree. For hogescholen the figure relates to the equivalent of a Bachelor's degree.

Number of PhD students: In fact PhD students are employed by the Dutch universities (they are included in their staff).

7.7.5. Research

Comments to variables and availability:

ISI publications: Datasource: CWTS Leiden. Data for 2002 - 2003 years not available.

Other publications: Total scientific publications as stated in the institution's yearly accounts. Includes ISI as well as non-ISI publications.

Data availability:

Licensing revenues: Not available.

Patents held: Not available except for these institutions and years:
16003 Technische Universiteit Delft, available 1994 – 2003.
16005 Universiteit Twente, Enschede, available 2000 – 2002.

Spin-off companies formed: The data shown are based on a one-off study for the Ministry of Economic Affairs ("Researchers op Ondernemerspad"). Data available 1999 – 2001 only and as yearly average for these years.

7.8. Norway

7.8.1. Revenues

Data in 1000 NOK.

Data source: Norwegian social science data services (NSD): Database for statistics on higher education (DBH).

Data source *general university funds (GUF)* 1994-2000: National account, Ministry of Finance

Government appropriations national: General university funds (GUF) from the Ministry of Education and Research.

Government appropriations regional: Not relevant for Norway.

Tuition and fees: Norway has no tuition or fees for students in public higher education institutions.

Data availability:

Limited years available for these institutions:

All institutions: No sub-categories of Grants and contracts 1994 – 1997.

17005 Universitet for miljø og biovitenskap
No data 1994 – 1996 (except Government appropriations National).

17006 Universitetet i Stavanger
Limitations to data 1996 (Total revenues not available).

17017 Høgskolen i Agder
Limitations to data 1995 – 1996 (Total revenues not available).

17020 Høgskolen i Bodø
Limitations to data 1995 – 1996 (Total revenues not available).

17031 17031 Høgskolen i Oslo
No data 1994 – 1995, limitations to data 1996 (Total revenues not available).

7.8.2. Expenditures

Data in 1000 NOK.

Data source: NIFU STEP for R&D expenditures. Database for statistics on higher education (DBH) for all other expenditures.

University hospital expenditures not available.

R&D expenditures: Are not included in total expenditures as a sub-category, but are the R&D part of personnel and other expenditures. Includes all R&D expenditure; labour costs, other current costs, scientific equipment, land and buildings. Includes R&D expenditures at university hospitals as well for those institutions having a university hospital.

Data availability:

Limited years available for these institutions:

17005 Universitet for miljø og biovitenskap
No data 1994 – 1996 (except R&D expenditures).

17031 Høgskolen i Oslo
No data 1994 – 1995 (except R&D expenditures).

7.8.3. Personnel

Share of time devoted to R&D only available for odd years (1995, 1997, etc).

Data availability:

Limited years available for these institutions:

17031 Høgskolen i Oslo
No data 1994.

17020 Høgskolen i Bodø
No data 1994 – 1996.

7.8.4. Education

Data sources:
For Number of students, Number of degrees and Number of PhD students: Norwegian social science data services (NSD): Database for statistics on higher education (DBH).

For Number of PhD degrees: Register of PhD degrees, NIFU STEP.

Number of PhD students in FTE.

Comments to variables:

Number of students:

For years 1994 and 1995 separation between graduate and postgraduate level are not possible. Data include all students, and is thus overestimated compared to other years.

Number of degrees:

Date for some first degrees is not available for some institutions, i.e. data are incomplete.

Data 1994-1999 are in general problematic. Many students did not register their first degree as it was not widely recognised by employers. For students continuing to upper levels, first degree was not used as a mandatory point of entry. Consequently students did not have to formalise their first degrees.

Høgskolen i Bodø, Høgskolen i Agder and Høgskolen i Oslo are institutions basically providing vocational or lower level educational programmes. They will thus have a higher proportion of lower level degrees than other institutions.

Number of PhD students

PhD students are in Norway normally on a temporary contract with their institutions. This applies to most, but not all, students. Number of PhD students on contract are used as proxy for number of students. For this reason, the number of PhD students are probably underestimated.

Høgskolen i Bodø, Høgskolen i Agder and Universitetet i Stavanger have only recently been given the right to award PhDs. Prior to this their PhD students were awarded their degrees at other institutions. This explains why these institutions have PhD students but no (or very few) PhDs awarded. Høgskolen i Oslo did not award a PhD in the period covered.

PhD degrees awarded

See comment above on PhD students. Since students from other institutions have been awarded PhDs at some of the universities, number of PhDs awarded is probably higher than what should be expected from the number of PhD students.

Data availability:

Limited years available for these institutions:

17005 Universitet for miljø og biovitenskap
No data 1994 – 1999 for Number of degrees.

17008 Norges handelshøgskole
No data 1994 – 1999 for Number of degrees.

17006 Universitetet i Stavange
No data 1994 for Number of students and Number of degrees.

17017 Høgskolen i Agder
No data 1994 for Number of students and Number of degrees.

17020 Høgskolen i Bodø
No data 1994 for Number of students and Number of degrees.

17031 Høgskolen i Oslo
No data 1994 for Number of students and Number of degrees.

7.8.5. Research

Sources of data:

ISI Publications: Thompson ISI National Citation Report (NCR) for Norway and National Science Indicators (NSI) database.

Patents held: Survey of NIFU STEP based on patents registered by national patent authority.

Data availability:

Other publications: Not available.

Number of patents: No data 1994 – 1997.

Licensing revenues: Not available.

Spin-off companies formed: Not available.

Comments to variables:

Number of patents includes only patents positively confirmed by academic personnel. Total numbers are probably underestimated. Data only available for years 1998 - 2003.

7.9. Spain

7.9.1. Revenues

Data in Euro.

Source of data: Vice-Chancellors Conference of the Spanish Universities (CRUE).
Data for 2003 are predicted.

In the original dataset funds for investments were included in total revenues. As this category was decided not to be included in the CHINC dataset, they are excluded for reason of comparability.

Government appropriations (national) includes government grants and contracts. Government (national) grants and contracts are also included in "Grants and contracts" and thus the subcategories add up to more than "Total revenues".

Government appropriations (regional) includes government grants and contracts. Government (regional) grants and contracts are also included in "Grants and contracts" and thus the subcategories add up to more than "Total revenues".

Grants and contracts include all grants and contracts. Can not be separated into subcategories.

Other revenues include funds from other public institutions different from national and regional government funds; European Union and international funds; private sector funds; patrimonial funds; financial assets and financial liabilities.

7.9.2. Expenditures

Data in Euro.

Source of data: Vice-Chancellors Conference of the Spanish Universities (CRUE).
Data for 2003 are predicted.

In the original dataset expenditures for investments were included in total expenditures. As this category was decided not to be included in the CHINC dataset, they are excluded for reason of comparability.

University hospital expenditures are not available.

7.9.3. Personnel

Data in headcount. (Data for total academic staff is available in headcount. Not inserted into database due to problems with computing ratio to Technical and administrative staff which is not available in FTE.)

Data source: National Institute of Statistics, publication Higher Education Statistics.
Data for 2003 are predicted values, information not available.

Comments to variables:

Total staff: PhD students are not included

Researchers: The position of researchers does not exist as an independent category.
Technical and administrative staff: It is not possible to calculate FTE for technical and administrative staff, information not available.

Share of time devoted to R&D: The academic staff has both teaching and research duties, although there are no clear rules on research duties for academic staff. The thumb rule criterion of one third of the working time is frequently used. Set as "NOT available" in database.

7.9.4. Education

Data source: Council of University Coordination from the University Statistics

Data on PhD degrees by scientific field not available.

Comments to variables:

Number of students (headcount): ISCED5 level
Number of degrees: Graduates at ISCED5 level.
Number of PhD students: Those enrolled in doctoral courses are also included.
Number of PhD degrees: Information not available by field of study. Values for 2003 are predicted.

7.9.5. Research

Comments to variables and availability:

ISI publications: Number of publications per university is calculated through global counting. This implies that if in one article there are several universities being mentioned, the article is counted one time per each university. Data source: Web of Science.

Data availability:

Other publications: Information not available

Licensing revenues: Information only available for 2003 only. Information provided from the technology transfer office.
No data for these institutions:
18030 Universidad de León
18046 Universidad del Pais Vasco

Patents held: Information only available for 2003 only. Information provided from the technology transfer office.
No data for this institution:
18046 Universidad del Pais Vasco

Spin-off companies formed: Information only available for 2003; information provided from the technology transfer office.
No data for these institutions:
18030 Universidad de León
18046 Universidad del Pais Vasco

7.10. Switzerland

Source of data for Revenues: All data from the financial statistics of universities. Source. SFSO. Corrections (déductions des dépenses non universitaires) have been divided proportionally in the different categories (these are never very large sums).

Source of data for R&D expenditures: SFSO statistics based on a survey of the activities of the HE personnel.

7.10.1. Revenues

Data availability:

Reduced data availability for this institution:

19006 Università della Svizzera italiana (no data 1994 – 1997, university established 1996).

Comments to categories used:

Total revenues: This is the sum of the following categories.

Government appropriations national: SFSO categories. Confédération: autres subventions fédérales. Confédération: contribution aux investissements figurant dans le compte courant. Confédération: contributions liées à des projets de coopération et d´innovation. Confédération: Enveloppe budgétaire EPF. Main items : general budget of the FIT and federal contribution to the cantonal universities.

Government appropriations regional: SFSO categories : Autres cantons: Accord intercantonal universitaire ; Autres cantons: Autres subventions des autres cantons ; Canton: imputations internes ; Communes ; Couverture. Mostly : contribution of their own canton + contributions of other cantons based on intercantonal agreement.
Tuition and fees: Include also revenues from continuing education

Grants and contracts: It is not equal of the sum of the previous categories since in includes also non divided means (SFSO category: autres sources externes).

Grants and contracts (government): Includes all public contracts from Confederation, funding agencies (SNF, CTI) and Cantons. SFSO categories. Autres cantons: Mandats publics. Canton: Mandats publics. Commission pour la technologie et l´innovation CTI. Communes: Mandats publics. Déduction des dépenses non universitaires (FNRS). Fonds national suisse de la recherche scientifique. Mandats de recherche de la Confédération. Mandats de recherche des autres collectivités publiques

Grants and contracts (international): Includes EU programs, COST and other international programs (not divided).

Grants and contracts (private): Includes private non profit

Grants and contracts (private non-profit): Included in grants and contracts private
Other revenues: Includes own means of the universities, charities, service. SFSO categories : Autres moyens propres de la haute école. Fondations alimentant le budget ordinaire. Fondations privées. Revenu de la fortune de l'université. Revenus des prestations de service

7.10.2. Expenditures

Data in SFR.

Data availability:

No data 1994.
Data on “R&D expenditures” only available for years 1996, 1998 and 2000.

Reduced data availability for this institution:
19006 Università della Svizzera italiana (no data 1994 – 1997, university established 1996).

Comments to categories used:
Total expenditures: Sum of personnel and other expenditures
University hospital expenditures: No data
Personnel expenditures: Includes all personnel with a work contract with the university (irrespectively if stable or temporary). Includes also social charges.
Other expenditures: Includes all functioning expenditures and capital costs, but not investments which are normally financed directly by the Confederation and the Cantons.
R&D expenditures: Source. SFSO statistics based on a survey of the activities of the HE personnel

7.10.3. Personnel

Source: SFSO

Data in FTE, except “Share of time devoted to R&D” which is in percent.

Data availability:

Reduced data availability for this institution:
19006 Università della Svizzera italiana (no data 1994 – 1997, university established 1996).

Comments to categories used:
Total staff: FTE. Since most PhD students have a contract with the university for research or teaching activity these numbers include a large share of PhD students (which, however cannot be identified as such in the personnel statistics). Total staff might differ slightly for the sum of the categories below because some staff might be unclassified.

Professors: Includes personnel categories I and II: this covers normally ordinary and extraordinary professors, as well as assistant professors.

Academic staff engaged in both teaching and research: Includes all other academic staff except professors (personnel categories III-X).

Researchers: A separate category does not exist in all Swiss universities since in most cases people are engaged both for research and education. Thus no data are given on this variable.

Technical and administrative staff: Personnel categories XI-XVII.

Share of time devoted to R&D: Source. SFSO statistics based on a survey of the activities of the HE personnel. Data deviant in three cases (see comments in database).

7.10.4. Education

No data on PhD degrees according to scientific field.

Comments to variables:

Number of students (headcount): For universities includes students enrolled in old 4-year diploma curriculum, as well as students enrolled in Bologna bachelor and master. Excludes all postgraduate education. Data source: federal office of statistics.

Number of degrees: For universities includes the old license, as well as Bologna mater degrees; excludes Bologna bachelor and all postgraduate education. Data source: Federal Office of Statistics

Number of PhD students: Data source: SFSO

Number of PhD degrees: Data source: SFSO

7.10.5. Research

Comments to variables and availability:

ISI publications : Data are for the Centre d'Etudes sur la Science et la Technology. CEST produces data averaged on periods of five years; we take here the median year (1982= average 1980-1985); data for 1981, 1982, 2002 are interpolated while there are no data for 2003. There are no data for Luzern and USI since the numbers are too small.
Data prior to 1993 are excluded from the database.

Other publications: There are generally no other sources on scientific publications of Swiss Universities, except that some universities publish information on their annual reports, which is however not comparable.

Licensing revenues, Patents held and Spin-off companies formed: There are some data on patents and spin-off companies for OECD survey performed by CEST. Quality of data is probably rather poor since not all Swiss universities have complete central data on technology transfer activities.

7.11. United Kingdom

7.11.1. Revenues

Data in 1000 Pound.

Data for 1994 not available.

In the original UK dataset investments were included in total revenues. As this category was decided not to be included in the CHINC dataset, they are excluded for reason of comparability.

The original UK dataset had a category "Operational revenues" which included all income in respect of services rendered to outside bodies, including the supply of goods and consultancies, all non-research income from UK central government bodies, non-departmental public bodies, UK local authorities and UK health and hospital authorities, all non-research income for services rendered to industrial and commercial companies and public corporations operating in the UK; income received from UK health or hospital authorities for the funding of any employees of the institution, including posts in academic teaching, except those relating to the provision of a service and income from property rights and licenses.
In the database this category is labelled as "Other revenues".

The original UK dataset had a category "Other grants and contracts" which included other externally sponsored research not included in the other grants and contracts categories. For reason of comparability this category is added to "Grants and contracts total" in the database. The subcategories of grants and contracts will thus not add up to the total.

7.11.2. Expenditures

Data in 1000 Pound.
Data for 1994 not available.

Personnel expenditures are in the UK dataset separated into two categories:

> Personnel expenditures academic which includes costs in respect of academic staff, defined as staff whose primary function is teaching and/or research, paid from within the budgets of academic departments and allocated to the appropriate cost centre in £000
>
> Personnel expenditures support which includes costs in respect of non-academic staff paid from within the budgets of academic departments and allocated to the appropriate cost centre in £000.
>
> For reasons of comparability the two categories are aggregated into Personnel expenditures in the database.

Other expenditures are in the UK dataset separated into three categories:

> Deprec. Expenditures which includes depreciation costs on equipment capitalised according to where the assets being depreciated are located £000.
>
> Other expenditures which includes costs in respect of payments to non-contracted staff or individuals, all other non-staff costs, equipment which has not been depreciated, expenditure on

maintenance contracts and telephone costs (calls, rental and non-capitalised equipment) if not charged to departments in £000

Interestexpenditures which includes costs in respect of interest payable on premises, residences & catering operations and other expenditure in £000

For reasons of comparability the three categories are aggregated into Other expenditures in the database.

R&D expenditures include the total amount of expenditures generated by research projects being funded by research contracts. This definition is consistent with the way as the UK report the HERD figures to the OECD in £000.

NB R&D expenditures are not included in total expenditures as a sub-category, but are the R&D part of personnel and other expenditures.

University hospital expenditures are not available.

7.11.3. Personnel

Data in Headcount.

No data available for 1994.

Comments to variables:

Total staff: The total number of full time and part time academic staff working in research and/or teaching activities.

Professors: The total number of full time only academic personnel with stable academic positions working in research and teaching activities.

Academic staff engaged in both teaching and research: Not available.
For the database the category "Academic staff part time" (which is not a variable asked for) is inserted into this category.

Researchers: The total number of full time only academic personnel with stable academic positions working in research activities.

Academic staff part time: The total number of part time only academic staff working in research and/or teaching activities.
For the database this category is inserted as "Academic staff engaged in both teaching and research".

Technical and administrative staff: Not available (it has to be imputed).

Share of time devoted to R&D: Not available (it has to be imputed).

7.11.4. Education

Data in headcounts for students and number for degrees.

No data available for 1994.

Comments to variables:

Number of students (headcount): Total number of full time and part time undergraduate students (studying for a first degree)

Number of degrees: Total number of awarded first degrees.

Number of PhD students: Total number of full time and part time RESEARCH postgradutate students (This includes postgradute students being enrolled as a Dphil students and also Mphil -two years master - students. There is no information for PhD enrolled students ONLY.

Number of PhD degrees: It is the total number of awarded Doctoral (mainly Dphil) degrees.

Number of PhD degrees natural sciences: Total number of awarded Doctoral (mainly Dphil) degrees in natural sciences defined according Frascati manual.

Number of PhD degrees medical: It is the total number of awarded Doctoral (mainly Dphil) degrees in medical sciences and medicine allied sciences defined according Frascati manual

Number of PhD degrees engineering: It is the total number of awarded Doctoral (mainly Dphil) degrees in engineering and technology according Frascati manual.

Number of PhD degrees Performing arts: Not available in the UK

Number of PhD degrees in social sciences and humanities: It is the total number of awarded Doctoral (mainly Dphil) degrees in social sciences, humanities and arts. It was not possible to split performing arts from the social sciences

7.11.5. Research

Comments to variables and availability:

ISI publications:
Not available in the UK for free. It is possible to ask ISI/Thompsom and its UK branch -Evidence ltd- to produce the data. The cost of this will be around U$S 6,500. Of which U$S 5,000 is the ISI license. RAE publications are used instead of ISI publications. It includes all the submitted journal publications in the 2001 RAE.
No data available 1994 – 1995 and 2001 – 2003.

Other publications:
Includes all the others publications in the 2001 RAE (such as Books, Book Chapters, Reports, Compositions, etc)

Licensing revenues: Not available in the UK.

Patents held: Includes all Patents in the 2001 RAE submitted by each individual researcher.

Spin-off companies formed: Not available in the UK.

8. Appendix 3 Questionnaire for qualitative study

CHINC Project Phase 2 - Qualitative information

Institution name and identification number:

Part 1. Research Orientation and Strategies

Objective: To collect information about the positioning, types of research, and research orientation of higher education institutions. In addition, seeks to identify and characterize strategic plans (at different levels) for research.

1. Does your institution have a formal research strategy (e.g., as laid out in a document such as a strategic plan)?	Insert answer
Yes: No:	

2. What kind of document is it (e.g., mission statement, faculty-level structural development plans)?	Insert answer

2.1 What are the strategy's main objectives (indicate up to three)?	Insert answer
Objective 1: Objective 2: Objective 3:	

2.2 What are the main means for achieving them (indicate up to three)?	Insert answer
Mean 1: Mean 2: Mean 3:	

2.3 Which body(ies) developed this strategy?	Insert answer

If possible we would greatly appreciate if you could provide us with a copy of the most recent version of the document.

3. How long has this strategy been in place?	Insert answer

4. Which of the following categories do you believe best fits your institution's research ambitions?	Tick appropriate

	box
a) World-class research institution. b) Internationally active research institution. c) Nationally renowned institution. d) "Specialized" world-class research institution. e) Regional research provider. f) Primarily teaching oriented institution. e) Other (please specify).	

Part 2. Information management

Objective: To determine the types and quality of information available about research and research-related activities. For what purposes is such information collected? How is such information used in decision-making?

5. *Does your institutions regularly collect data and produce analyses for the following areas (and their evolution over time)?*	Tick appropriate box
a) Research income disaggregated by source. b) Expenditures disaggregated by subunits (e.g., departments, institutes or research centres). c) Research output disaggregated by type (e.g., scientific publications, patents and other qualitative or quantitative measures). d) Staff time allocation for research and other institution activities.	

6. *For what purpose is the information collected? You may select multiple examples but in this case please rank your choices by importance.*	Tick appropriate box
a) For institution-wide strategic planning and budgeting. b) For managing contracts and distributing funding between internal units (e.g., departments or research centres). c) For performance-oriented payment of researchers (incl. individual contracts). d) For internal quality evaluation and management. e) Required or requested by third parties (e.g., national authorities). f) For marketing and public relations purposes. g) Other (please specify).	

7. *Does your institution have an office/department responsible for analysing information in the areas above?*	Insert answer

7.1 How long has it existed	Insert answer

Part 3. Trends

Objective: To map how research income and output portfolios have changed in the past ten years. What specific income sources and outputs have changed substantially in the time period?

8. *How has your institution's research income portfolio changed in the past 10 years with respect to the following areas? For each area below please indicate whether funding has increased, remained stable or decreased.*	Insert "Increased", "Stable" or "Decreased"
a) Government core funding. b) Private (industry) funding. c) Private (non-profit) funding, including donations. d) Competitive project funding from research councils or similar governmental sources. e) International funding (please distinguish between EU-level and other international funding). f) Other (please specify).	

9. *In the past 10 years, what major changes have occurred in your institution's research activity and research training activities? Please indicate up to three major changes (e.g., adding, closing or merging research units or the creation of specialized interdisciplinary centres).*	Insert answer

10. *How have the combined effects of any changes listed above affected the following areas?*	Insert answer to each question
a) Orientation of research (e.g., fundamental, applied, or strategic). b) Research productivity (e.g., publications per researcher). c) Balance of teaching and research activity. d) Staff composition (e.g., permanent versus temporary positions). e) Public-private partnerships in research & development. f) Commercialisation of research. g) Types of output (e.g. types of publications, patents, consultancies, services). h) Other (please specify).	

Part 4. Policies

Objective: To collect information about the actions and policies undertaken in response to changes in the (inter)national research environment and changing income mixes.

11.	*Which of the options below best characterizes your institution's internal system for distributing funds to sub-units?*	Tick appropriate box
a)	Formula based and driven mostly by input criteria (e.g., staff positions, student enrolments, space).	
b)	Formula-based and driven mostly by performance criteria such as measures of research output (e.g., publications, grants won, peer review ratings).	
c)	Formula-based and driven by mix of input and output criteria.	
d)	Based on input-oriented negotiations between sub-units and central level.	
e)	Based on performance-oriented contract management between sub-units and central level.	
f)	Historical considerations.	
g)	Other (please specify).	

12.	*Over the past 10 years did your institution introduce or modify existing incentives for generating external (i.e. competitive, third party, industry-based) research income for its faculties/departments/units?*	Tick appropriate box
a)	Providing premiums or matching funds for units that are successful in bringing in external funding/competitive research contracts.	
b)	Allowing units that generate research income to keep a substantial part of the earnings.	
c)	Introducing a form of performance-based funding that rewards units/faculties/departments on the basis of research outputs (e.g., publications, citations, or an assessment/rating of the unit's research quality).	
d)	Giving greater visibility to institutes/individuals' performance.	
e)	Other (please specify).	

13.	*What role do the following units play in decision-making and planning for research activities?*	Insert answer to each question
a)	Chairs or individual researchers.	
b)	Faculty.	
c)	Faculty sub-units (e.g. schools or institutes).	
d)	Interdisciplinary research institutes outside faculties.	
e)	Other (please specify).	

14.	*In the past 10 years what key changes has your institution made in the structure of its faculties/departments/institutes/support infrastructure to promote research?* *Please indicate what you believe to be the three most important changes. Examples may include the establishment or elimination of specialized or multi-disciplinary research units, the merging of faculties or departments and the establishment of support units for income generation and commercialization.*	Insert 3 most important changes

15.	*To what extent were the actions/policies you identified in questions 12-14 driven by forces that originate from outside the institution? Please elaborate on the three policies you believe were most influential.*	Insert answer for 3 most influential
a)	Developments in the national system/government policies/subsidies for research (e.g. government policy, research council policies).	
b)	Disciplinary developments in the field of science (e.g. emerging fields, opportunities).	
c)	The needs of business and industry.	
d)	European research policy (e.g. Framework programmes).	

16.	*How does your institution evaluate the research performance of its staff? For each of the points below please indicate whether the sub-item is heavily used, generally used, or not used.*	Insert the appropritate category
a)	Informal discussion with the person responsible.	
b)	Internal formal review (for example by disciplinary commissions).	
c)	External review by experts.	
d)	Use of publications and other data.	
e)	Other (please specify).	

16.1	*Over the past 10 years has your institution substantially changed the way in which it evaluates the research performance of its staff? If so, why?*	Insert answer

17.	*What, in your opinion, has been the most important action taken in the last 10 years by your institution to achieve any of the following goals?*	Insert answer to each question
a)	Increasing the volume of institution-wide research.	
b)	Increasing the institution's research income (from third party sources, research councils, government, business/industry, EU, research commercialisation).	
c)	Increasing the quality of research in your institution.	
d)	Increasing/initiating research in particular disciplinary areas.	
e)	Stimulating research collaboration with private partners from outside the institution.	

f)	Other (please specify).	

18.	*In relation to your institution's technology transfer policy and its research commercialisation activities, does your institution have:*	Tick appropriate boxes
a)	A formal technology transfer policy (written down on paper).	
b)	A technology transfer office or a patenting office with a number of dedicated staff members.	
c)	Formal rules and regulations for the commercialisation of research results and the guarding of intellectual property.	
d)	Active promotion of spin-offs, incubator activities, technology parks.	
e)	Cooperative arrangements with industry partners.	
f)	Other (please specify).	

Part 5. Future outlook

***Objective*:** To identify the major challenges within research your institution will face in the coming 10 years. What forces will be relevant for institutions' research activities and income sources?

19.	*From which of the following revenue sources will your institution actively try to generate (more) research income in the coming ten years? Please rank each of the sources below on a scale from 0 (not try) to 3 (actively pursue).*	Insert ranking
a)	Research contracts from industry.	
b)	Research contracts from national or regional authorities.	
c)	Research contract from international authorities.	
d)	Competitive research grants from national research councils.	
e)	(Competitive) research grants from organisations or charities.	
f)	Competitive research grants from European research councils.	
g)	Competitive research grants from European Framework Programmes.	
h)	Research grants from regional sources and regional authorities.	
i)	Basic research subsidies from national government or national organizations.	

20.	*As a result of your institution's research strategy, will the training of research master's students and PhD candidates be more, equally or less important than it is today for your institution?*	Insert answer

21.	*Do you think collaboration with private partners will increase in the coming 10 years? If so, how do you think this will affect your institution's research portfolio?*	Insert answer

22.	*What do you foresee as the most significant structural changes to your institution's research in the coming 10 years? Please identify up to three that you see as most important.*	Insert three changes

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