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Academia in the 21st century

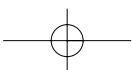
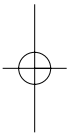
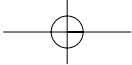
An analysis of trends and perspectives in higher education and research

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Wetenschaps- en **T**echnologiebeleid





Contents

Part I

Academia in the 21st century

An analysis of trends and perspectives in higher education and research

5

Part II

On Looking through the wrong end of the telescope

Being sundry observations of the state of academia in the 21st century from an historical perspective

55

Part III

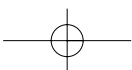
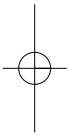
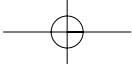
Appendix

1 Summaries

83

2 Matrix

167

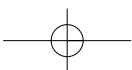
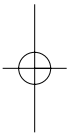
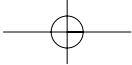




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Contents

Preface	9
Summary	11
1 Outline of the project	17
1.1 Introduction	17
1.2 Stakeholders	19
1.3 What we have and have not done to answer the questions	20
1.4 Trends	21
2 Outcomes per trend	23
2.1 Information and communication technology (ICT)	23
2.1.1 Introduction	23
2.1.2 Expectations regarding teaching and learning	23
2.1.3 The future	23
2.1.3.1 Competition with private providers	24
2.1.3.2 Strategic implementation choices	24
2.1.3.3 Disappearance of face-to-face teaching and learning	25
2.1.4 Expectations regarding research	25
2.1.5 The future	26
2.1.5.1 The reliability of electronic sources	26
2.1.5.2 The availability of knowledge	26
2.1.5.3 Investments in ICT infrastructure	27
2.1.5.4 Unbundling the university	27
2.2 Marketisation and the changed role of government	28
2.2.1 Introduction	28
2.2.2 Consequences for academia	29
2.2.3 Possible policy options	30
2.3 Globalisation, internationalisation and regionalisation	32
2.3.1 Introduction	32
2.3.2 Internationalisation of teaching	33
2.3.3 Globalisation and the role of the university	34
2.3.4 The European Research Area	35
2.3.5 Changing role of national and regional governments	36

2.4	The network society/economy	37
2.4.1	Introduction	37
2.4.2	Many questions for universities	38
2.4.3	And some partial answers	39
2.4.3.1	The organisation of research inside universities	39
2.4.3.2	Links with industry	40
2.5	The knowledge (driven) society	41
2.5.1	General changes	41
2.5.2	The epistemic role of the university	43
2.6	Socio-cultural and demographical trends	44
2.6.1	Introduction	44
2.6.2	Socio-cultural trends and the academic profession	45
2.6.3	Demographical trends and human resources management	47
3	Final considerations	49
3.1	A general reflection	49
3.1.1	The role and position of stakeholders	50
3.2	Organisational change in academia	51
3.2.1	Differentiation at the system level	51
3.2.2	Differentiation at the organisational level	52
3.2.3	Excellence and diversity	52
3.2.4	Role of universities in the knowledge society	54

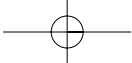
Preface

Decision-makers have always been fascinated by the future. This is also the case in the field of higher education, science and research. In this study many of those future-oriented views related to academia have been collected. One will find a range of visions from stakeholders with different backgrounds and coming from different locations. Some of these views are optimistic about academia's future, whereas others foresee mainly doom scenarios. Either way, as it has been formulated in the final chapter of this study, academia's future will be challenging, uncertain, and fascinating to watch.

The *Adviesraad voor het Wetenschaps- en Technologiebeleid* (AWT) has commissioned the Center for Higher Education Policy Studies (CHEPS) of the University of Twente to prepare a working document in which these different views about the future of academia are brought to the fore, in particular with respect to science, technology and research. The intention has been to present a range of perspectives and images of academia's future. The underlying thoughts and perceptions of stakeholders – why do people hold certain images about academic's future? – have been a point of special attention.

To do justice to this challenging assignment CHEPS has formed a broad project team. This project team has scanned numerous documents, and subsequently summarised and analysed them. The results of this work can be read in the following pages. The outline of the study can be found in the first chapter. There we describe how we decomposed the three key questions of the assignment into workable proportions. In the second chapter one will find the main results of the study. There we present the different views with respect to the main trends in the academic environment. In the third chapter, we comment upon the outcomes for each trend.

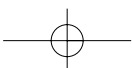
The CHEPS team was made up of Anne Klemperer, Barend van der Meulen, Guy Neave, Henno Theisens, Marijk van der Wende and the present writers. They have been supported by information specialist Marwine van der Molen and the CHEPS-secretariat. On behalf of the CHEPS team we would like to take the opportunity to thank the AWT for this gripping assignment and for the pleasant and



stimulating discussions with two of its staff members, Véronique Timmerhuis and Ton Langendorff. We hope that this working document will be helpful for the AWT and will contribute valuably to their advisory activities.

Finally we hope of course that many people who are interested in the future of academia enjoy reading this study. May it contribute to their vision on academia's future!

Harry de Boer & Jeroen Huisman
Enschede, 2002



Summary

The *Adviesraad voor het Wetenschaps- en Technologiebeleid* (AWT) commissioned the Center for Higher Education Policy Studies (CHEPS) of the University of Twente to explore academia's future. It was decided to carry out this challenging assignment by reviewing all sorts of relevant documents from different backgrounds and locations. What are in the eyes of stakeholders world-wide the main trends that will or should have an impact of the future of academia? What is expected from academia by different stakeholders in the years to come? Are there clear or definite ambitions towards academia? How can these ambitions be realised? A motley collection of approximately eighty books, articles, policy papers and websites have been consulted to present a world-wide state-of-the-art of future visions regarding academia. Summaries of the consulted documents can be found in Part III Appendix 1.¹

To present a wide spectrum of views we have distinguished the following sets of stakeholders: academics, institutional leaders, national governments, national agencies and advisory bodies, supranational bodies and business and industry. We believe that these stakeholders will be main players in the game of teaching and research and that their opinions may count. What kind of trends do they foresee happening? What kind of impact may these trends have on academia in their eyes? What are the main opportunities or threats for academia in the coming years?

At least seven major comprehensive trends have been found in the reviewed literature on academia's future. They are in random order: 1) the development of information and communication technologies, 2) the marketisation in higher education and science (including a changed role of national governments), 3) globalisation, internationalisation and regionalisation, 4) an advancing network society (rise of consortia, strategic alliances, etc), 5) an advancing knowledge society, 6) socio-cultural trends and 7) demographical trends.

Clearly definitions and meanings regarding these trends vary. Moreover, each of these trends contains different elements; marketisation, for instance, contains a broad range of topics. It is beyond the scope of this study at hand to discuss such

1 Please see section 1.3 of the report for a detailed description of the research method that we have used.

issues in detail. And, it goes without saying that some of these trends are interrelated: strong competition in e-learning in a networked, knowledge driven society in a global context is a conceivable vision of the future.

The first trend, ICT, is in relation to academia's future usually linked to education. An overwhelming number of studies point at the gains of ICT. ICT makes the knowledge society happen. There are several interesting subjects mentioned in the literature that reveal intriguing issues. First, the use of new technologies may enable new providers to enter the market of higher education. There is fear among some analysts that traditional providers of knowledge will not be able to compete with the private sector. Second, ICT will call for strategic choices. Substantial investments are needed in this new area. What, if any, will be the returns? What is the kind of technology one wants or needs to invest in? Third, what will happen to traditional teaching and learning? Will they disappear? Will the "dual mode universities" be the standard ones?

There are not many controversies regarding the use of ICT in the area of research. Using ICT research will be faster, more international, and probably yield benefits in terms of efficient use of resources, databases and infrastructure. Potential problems are the reliability of electronic resources and its potential consequences for the quality of the research results. What about the availability of knowledge? Does greater accessibility of knowledge for laymen break into the sole domain of academics? And, as with teaching, to develop and maintain an ICT-infrastructure is expensive, both in terms of decisions as well as in terms of money. What are the costs and who has to bear them? A fascinating issue related to ICT – and other trends – is the unbundling of the university. Unbundling may happen in several ways, if it happens at all. First, unified tasks of teaching and research "in one person" may be separated. Second, tasks of teaching and research may be separated in an organisational way. Third, it may refer to a strengthening of networks, weakening organisational coherence. And, finally, there may be a watershed among different disciplines.

The second trend is described as marketisation (and includes the changed role of national governments towards education and science). It is a slightly opaque term referring to several developments taking place at the same time. Among these are the spread of the market discourse, the massification of higher education, the increasing number of private providers, the rise of (global) markets for education and research. The effects of marketisation for academia are numerous, as a consequence of the various elements connected to marketisation.

The following issues seem to become highly relevant in the coming years. In relation to the changed role of national governments, universities are confronted with output steering, lump-sum funding, and increased pressures to strengthen the relationships with their stakeholders (amongst them students and industry). The funding base of universities will diversify further. To compete on "markets" institutional leadership and management has been strengthened. And marketisation puts pressures on traditional functions, especially basic research. Who will fund basic research and to what extent? Many other consequences of marketisation are closely related to the trends described below (e.g. international mobility of and competition for students and staff).

The third trend concerns globalisation, internationalisation and regionalisation. Summarising such comprehensive developments in one paragraph leads obviously to oversimplifications. The underlying development for research is that the universities' organisational environment will shift from a national to an international level. Of course, research has always been international, but at the same time, it has a national identity too. Having mentioned this the following issues are frequently described in this context:

- the internationalisation of teaching, linked to distance learning, borderless education, and the "privatisation" of education.
- globalisation and the role of the university. Here contrasting views are spotted. In a global competition in which national economies open up, universities are seen as key players in national innovation systems. Should for that reason national stakeholders still protect universities? But it may also be that universities become less dependent on national initiatives.
- the European research area raises many questions. Several underlying factors make sceptics believe that the present multi-level governance system will be continued for a while.
- the changing role of national and regional governments, which is a highly controversial topic. Are national governments stepping back? What kind of role will they play: facilitator, regulator, and/or investor? Will Brussels, or, as an opposite, local communities (regions), be playing the first fiddle?

The fourth trend that is distinguished in this study concerns the advancing network society (or economy) and presents universities questions of how they should organise their research and of how they should position themselves in such networks. What are, for instance, the implications of the development of networks that have less formal structures than the rather rigid discipline-based structures of

faculties? A special point of interest regarding the organisation of research inside universities concerns the ongoing specialisation of research on the one hand, and the growing notion that the most innovative research is performed inter- or multidisciplinarily. If universities are going to participate fully in a networked economy, what will be the consequences for leadership and management? Does such a university require a decentralised structure? And, if it does, how should coherent, institution-wide policies be developed and implemented?

Other topics deal with the relationships between industry (and society) and universities. For example, will increased co-operation and competition with new providers of knowledge drive universities outside the public domain? How does it affect the relationships between (national) government and institutions for higher education? Consortia, strategic alliances and other partnerships between existing (public) knowledge providers and new ones will take place, both at the regional, national and international level. The co-operation with new partners will have an impact on the disciplinary focus and on the application of the developed knowledge. Some believe that it will be hard to escape from closer links with industry, at least in some areas, because cutting edge research requires tremendous investments that can not simply and solely be made by universities. Anyway, the network society will demand greater flexibility. If universities are not able or willing to increase their level of flexibility, they will have a hard time.

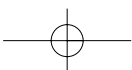
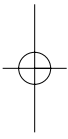
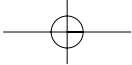
The fifth trend is the (rise of) the knowledge society. The knowledge society is in higher education debates often connected to the challenge of the mode of knowledge production. Gibbons' "Mode 2" is supposed to be on its way. But, as clearly stated in section 2.5.1, there is much more to the knowledge society. Previous "massifications of higher education" have contributed to the scientification of society. As a consequence, there is a growing number of people that are able to assess performances of public organisations such as universities. And, the production of knowledge has partly moved to other organisations. The latter increases the opportunities for co-operation, but implies at the same time that universities will lose their monopoly.

In the knowledge society there will be ample room to establish strong bonds of universities in innovation policies and processes ("triple helix thesis"). Applicable knowledge will be a strategic source. In such a context entrepreneurialism will become an appreciated quality. But the key question for many is whether universities will indeed become entrepreneurial or try to stick to their more traditional roles and values? (which in many countries implies that they do not naturally engage in commercial activities).

The sixth trend refers to changes in the socio-cultural domain. Issues such as individualism within society, scientification of society, or consumerism are not often mentioned. But they may have serious consequences. In an atomised society with calculating citizens public funding may be under siege, which at the end of the day may affect basic research because that kind of research is usually dependent on public money. Other consequences of socio-cultural developments will take place with respect to the academic profession. The concept of professionalism will change: status must constantly be earned and legitimised. Increased social accountability and transparency will demystify (parts of) science. Moreover, professionals are expected to become multi-skilled. On the other hand, knowledge will be a strategic source in knowledge societies, which logically would result in tributes of appreciation for knowledge workers.

The final trend in this study concerns demography, in particular the ageing of the work force, both at the upper and lower levels. Highly qualified researchers will retire on a large scale in a relatively short period of time and youngsters appear not to be very eager to pursue an academic career. It means that the question who produces the new knowledge in the knowledge society becomes a critical one!

In the final chapter of this part of the study one will find general observations and a reflection on the main findings. We have taken the opportunity to highlight certain topics that cross-cut the trends that are described before. These topics are by no means exhaustive, but because of a changing blend of stakeholders and a presumed accelerating pace of change, the addressed topics will come to the fore. The topics that can be found on the final pages of the working document are: differentiation at the system and at the organisational level, excellence and diversity, and the role of universities in a knowledge society.



1

Outline of the project

1.1 Introduction

This study for the *Adviesraad voor het Wetenschaps- en Technologiebeleid (AWT)* concerns a literature review regarding academia in the 21st century. The aim is to reflect the variety of views on academia by processing the selected literature into coherent patterns and lines of reasoning about the future of academia. The study is particularly focused on academia's future regarding science, technology and research. Nevertheless, some attention has been paid to higher education and teaching, because of its interwovenness with, and consequently impact on, research. It should be regarded as a working document for the AWT and we hope that it will offer the AWT a source of inspiration for further policy-making. This quest at issue for the academia's future is explorative by nature. A motley but limited collection of books, articles, policy papers and websites has been consulted. Summaries of a part of this collection can be found in Part III Appendix 1.

The following three interrelated questions will be answered on the basis of the review of the literature:

1. What will happen in the environments of academia in the next decade(s)?
2. What is expected from academia in the coming decades? What are the ambitions of the relevant stakeholders towards academia (including academia itself)?
3. What is needed to realise these ambitions? What kinds of bottlenecks are observed? What kinds of policy options are proposed in the reviewed literature?

To answer these questions we have used a format that is based on the following premises. First, the future of academia is influenced by an environment that is rapidly changing. Various kinds of changing factors, trends and circumstances have an effect on academia in the short or in the long run.

Some of these developments are exogenous by nature, while others have a more endogenous character. The latter refers to developments that single actors can, by and large, directly influence, while exogenous trends are seen as a given, hardly changeable by the actions of an individual actor or organisation. The first

step in our quest for academia's future concerns the exploration of their environments. What are the big issues, trends and developments in the coming decade that will effect academia in one way or another?

Academia is, of course, not just a plaything of its outside world. They can to some extent anticipate what is coming. This is also true for other players in the game of higher education and science policy. What matters is what actors perceive and how they intend to cope with these changing circumstances. At the end of the day, the future of academia is determined by the interactions of various actors that hold different perceptions on the changes and trends.

The second step in the present study is to disentangle the thoughts and perceptions of various actors regarding the trends and shifts in the environment of academia. These actors will have different ambitions, expectations and interests regarding academia. They have, in other words, different stakes. We map the consequences of the trends and developments for academia's future as perceived by the stakeholders. What are the consequences of trend X for academia in the eyes of stakeholder Y? At this second step we do not only list the perceived effects but also make an inventory of the stakeholders' expectations and ambitions towards academia's future. Or, to phrase it slightly differently, why do certain stakeholders hold particular views or claims on academia in the coming years? What are the assumptions of the stakeholders regarding academia's future?

Third, we try to explore problems that may hamper in the eyes of particular stakeholders a desirable future for academia. Do they believe that their ambitions and expectations can be realised? What kinds of plans and policies should be set in motion? What happens in the eyes of stakeholders if no measures are taken?

This working document is structured in the following way. First, we will briefly introduce the stakeholders that we have distinguished. Then we will describe our mode of operating to answer the key questions of this study. Next, in section 1.4, one can find the answers to the first key question of this exploratory study, that is a presentation of the main trends and developments in the academic environment. The results regarding the second and third key question can be found in chapter 2. For each trend we have articulated our main observations regarding academia in the 21st century. What are, for instance, the views and beliefs about ICT and the future of academia? Are there conflicting views on the impacts of particular trends? Finally, we will put forward a few general remarks about the outcomes of this study in chapter 3.

1.2 Stakeholders

As stated clearly in the introduction, the stakeholders' perceptions of comprehensive trends and their potential effects on academia, combined with the stakeholders' expectations from academia, will have an impact on the future of academia. With the aim to present views from "the whole spectrum" and not just from one or two angles, we have distinguished the following sets of stakeholders in the present study:

1. Academics, researchers, professionals.
2. Institutional leaders and managers.
3. National governments (in a broad sense, that is, for instance, including different ministries).
4. National agencies and advisory bodies such as NWO, National Science Foundation, DFG, AWT, Wissenschaftsrat, etc.
5. Supranational bodies such as OECD, Worldbank, ESF.
6. Business and industry, including both multinationals and small businesses.

It goes without saying that this list of stakeholders can be organised in different ways and can be refined without problems. At the same time, no one will deny that these are relevant stakeholders regarding the position and function of research and science in the coming years. They are, in other words, players whose opinions count. Do these stakeholders stress different trends? What kind of reasoning and rationales do they present? What are the main differences in opinion? Do they expect different things from academia in the years ahead? And what kind of opportunities and threats do they observe? What are, in their eyes, the main challenges for academia in the coming decade?

In sum, we will present a scattered view of academia in the 21st century by presenting different views of various stakeholders from several countries with respect to academia's future on the basis of their perceptions of a few comprehensive trends. In this process we will try to get a grip on the stakeholders' line of reasoning. Both the summaries of the reviewed literature (Appendix 1) and the matrix (summary by means of key words; Appendix 2) are classified on the basis of the distinguished stakeholders. In the next section we will further expound our method of working in order to answer these intriguing questions.

1.3 What we have and have not done to answer the questions

It should be clear that within the timeframe and format agreed upon the picture of the "Academia in the 21st century" is a kind of snapshot. The reviewed literature is a selection from a huge number of documents, articles, books and white papers that deal in one way or another with academia's future. In this section we will explain our method of working by specifying what we have and have not done.

After a brief scan of a limited number of relevant documents regarding the future of academia and discussions within the project team (including briefings with the AWT), we have selected seven major trends that without question will be major events in the environments of academia in the next decade. During the remainder of the project it became clear that the choice of the seven trends was highly justified: we found almost no other frequently-mentioned trends with respect to academia's future. The general trends are presented in the following section. They have further been used as input into the search processes (described in the next paragraph).

We have used various search engines to consult many (electronic) databases (of university libraries, scientific journals, citation indexes, etc.). First, we have consulted these databases on the basis of general keywords directly linked to the key questions of the study at issue. It concerns key words such as "future", "universities", "21st century", "academia", "scholarship", "academics" and "research". Second, we have referred to these databases using search terms that are related to the discovered trends in combination with the earlier mentioned keywords (e.g. "academia" and "knowledge society"). Third, we have extensively consulted the Internet, using the same kind of keywords. Fourth, we have searched the Internet with respect to some of the selected stakeholders. We have visited the pages of, for example, national agencies in the field of education and science, supranational bodies, and umbrella organisations to see if they recently published documents or statements that are of relevance for the future of academia. Fifth, we have consulted our networks as a source of information. Finally, we have only selected recently published documents and articles as the reference list shows.

There are several reasons to assume that the outcomes of our quest for academia's future are limited and biased to some extent. First, we have used a limited number of keywords in the search processes. There are of course documents containing valuable information about academia's future that were not marked in the search processes. Second, there is the "language bias". We have mainly studied

English documents (and some Dutch and German documents). Other languages have been left aside, which means that studies not written in English are under-represented. Third, we have left aside future explorations and projections that are related to one specific research area. There are numerous studies regarding the future of particular fields, subjects and disciplines such as nanotechnology, agricultural sciences etc. All these particular studies have been left out this quest for academia's future, because of the general character of this study.

Despite these limitations and potential biases, the quest regarding the academia in the 21st century has yielded interesting outcomes as you may read in the next sections. More than eighty documents were ultimately selected, summarised and analysed. The summaries of the studied documents can be found in Appendix 1. The reviewed literature is also summarised in a matrix, in which the views and opinions of the various stakeholders are presented by means of key words (Appendix 2). In fact, this matrix contains the answers at a glance to key questions of this study at issue. That is, trends, expectations, ambitions, proposed policies, and bottlenecks can be found in the matrix in key words.

1.4 Trends

One easily finds many trends, developments or changing circumstances that may have an impact on academia in the 21st century when one scans literature, policy documents and statements regarding higher education and science policy (as described in section 1.3). Without stretching the truth these numerous developments can be condensed to the following seven headings:

1. The development of information and communication technologies (ICT)
2. The marketisation in HE (including changing roles of national governments)
3. Globalisation, internationalisation and regionalisation (including Europeanisation)
4. The advance of the network society or economy (consortia, public private partnerships, transnational cooperation)
5. The advance of the knowledge (driven) society or economy
6. Socio-cultural trends
7. Demographical trends

A few words regarding the interpretation of these trends. First, the content that stakeholders ascribe to these comprehensive trends may differ from one stakeholder to the other. Definitions and meaning will vary. Developments such as the knowledge society are hard to describe adequately. There are persistent academic

disputes about (conceptual) differences between, for instance, globalisation and internationalisation. There is no consensus about the exact meaning of these comprehensive trends. It is beyond the scope of this present study to clarify the theoretical and conceptual meanings of these trends in detail. Given the purpose of the present study we take the different conceptual views more or less for granted. We believe that there is, by and large, a kind of "common knowledge" about these phenomena. We will report, however, when authors use a particular definition of one of the trends.

Second, most of the trends are obviously interrelated. ICT-developments, for instance, are associated with the knowledge society or with globalization. We will return to this observation in the final chapter.

Third, the comprehensive trends that are presented in this section are composed of various elements. Regarding the analysis of the study at issue, however, we have to focus on a limited number of trends. A more detailed list of trends that are mentioned in the books, articles and (policy) papers that we have scanned, are recorded in the second column of the matrix.

2

Outcomes per trend

2.1 Information and communication technology (ICT)

2.1.1 Introduction

Information and communication technology already have had, or are presumed to have had, a considerable impact on academia. Analysts, however, have quite different expectations regarding the speed of change, to what extent it will have an impact on all academia, and to what extent it will impact all elements of academia. Below we summarise the main findings from the literature, and discuss critical issues.

2.1.2 Expectations regarding teaching and learning

There is consensus on the positive impact of information and communication technology (ICT) on higher education. ICT simply enables the rapid exchange of information and knowledge; it makes education in principle more flexible; it allows for learning anywhere and anytime, and thus may increase access to education. The technological possibilities (still increasing, e.g. wireless applications) further accelerate the use of ICT. In addition, ICT fits the requirements of the general idea of the Knowledge Society, including attention to continuous learning in an environment that requires the continuous updating of knowledge and skills. The period of anxiety regarding the downsides of ICT (the lack of 'live' interaction between teacher and student, presumed to be indispensable for academic learning) seems to be beyond us.

2.1.3 The future

Most publications that look into the future of academia in relation to ICT pay attention to education. As has been said, the overwhelming majority of the

analyses point at the profits of ICT. This does not imply that ICT is accepted and implemented across the board in all (types of) higher education institutions. Disciplinary differences, institutional decision-making structures (weak versus strong corporate power, see e.g. Müller-Böling, 1997) and financial conditions account for the variety in the level of implementation. Below, we reflect on some of the most interesting issues in the literature.

2.1.3.1 Competition with private providers

Some analysts express (either implicitly or explicitly) a fear that the traditional providers of higher education will not be able to compete with the private sector regarding the use of ICT. From a strategic perspective, quite a number of higher education institutions search for allies (mostly within the higher education systems, but sometimes also in the private sector of business organisations and industry) in order to be able to withstand competitive pressures (see e.g. the developments in the Netherlands regarding the Digital University, but also similar examples can be found in the UK and the US).

2.1.3.2 Strategic implementation choices

Related to the issue of competition and network formation, is the choice (see also below on research) decision-makers at different levels of the higher education institutions face e.g. regarding investments in ICT-based education as well as regarding the technological infrastructure. At this moment, it is rather unclear whether ICT-based education is efficient or will be efficient in practice in the near future. Even if ICT-based education would prove to be more efficient, the amounts of money involved to reach the objectives are considerable. Assuming an overall efficiency gain, it still is not yet exactly clear which particular solutions (the use of specific courseware, combining traditional learning and on-line learning, etc.) are most effective and efficient. There is a large variety of ICT solutions, which are not easily comparable in terms of conditions, execution and impacts. In addition, many institutions that are assumed to be examples of best practices are often still in developmental phases where crucial decisions regarding institution-wide implementation are still to be made.² In all, it is a period of uncertainty for many higher education institutions.

² See e.g. M. van der Wende, E. Beerkens, B. Collis, J. Moonen, H. Leemkuil (1999), *The use of information and communication technology in higher education. An international orientation on trends and issues*. Enschede: CHEPS/TO, or P. Boezeroy, E. Beerkens, B. Collis, J. Huisman, J. Moonen (2001), *Impact of the Internet project: the Netherlands and Finland*. Enschede: CHEPS.

2.1.3.3 Disappearance of face-to-face teaching and learning

Despite the support for ICT in higher education, most analysts agree that the traditional pattern of face-to-face teaching and learning will continue to exist. Many value the existence of the traditional forms of education, and some maintain that these are essential to academia. The dual mode university³ may be a feasible answer to the challenges of the future, but it does not imply that there is no room at all for extremely 'traditional' and 'virtual' institutions (e.g. Renwick 1996).

Trow (1997) elaborates on the question whether and how ICT should be used in different types of institutions. He expects that in elite institutions ICT will primarily be used in addition to traditional ways of education. Given the scale of elite education, it is unlikely that teachers will find commercial software that smoothly fits the traditional courseware. It requires a strongly motivated teacher to use ICT in elite institutions. The use of ICT will be costly, but ownership will also remain in academia. Mass education is probably more open to fuller implementation of ICT, given the efficiency gains and the applicability of commercial software.

2.1.4 Expectations regarding research

Surprisingly, not that much has been written about information and communication technology and the future of research in academe. One explanation is that the focus of the writings on this issue is predominantly descriptive. A second explanation is that most contributions deal with the "how to" of ICT and research. A good example of a descriptive publication is the OECD's (1998) document "The Global Research Village". The report describes the state of the art regarding the communication among academics, the access to scientific information, the use of scientific instruments, electronic publishing, and the education and training of students. Undoubtedly, there is a growth of collaborative cross-border arrangements between researchers, the accessibility of databases has improved, there is progress in the speed of computation, and there is a growth in the application of electronic journals. At the same time, the rich variety of approaches across the disciplines and the types of institutions must be mentioned. The report concludes that there is a huge variety of ICT use and impact across the disciplines (e.g. physics and chemistry versus the humanities). A second conclusion is the inconclusiveness regarding the improved productivity and efficiency. Potentially, ICT offers substantial opportunities, but the question is yet difficult to answer. Much has to

3 Daniel, J.S. (1996), *Mega universities and knowledge media. Technology strategies for higher education*. London: Kogan Page.

do with the necessary large-scale investments and trial-and-error efforts, whereas it will take some time before the profits can be measured. The OECD recommends that governments should play an active role in providing an adequate regulatory framework and give attention to ICT needs of those involved in higher education.

2.1.5 The future

Regarding the use of ICT in research, there are hardly any controversies. Most contributors see benefits in using ICT, for it will make research faster and more international, make communication easier, and – possibly – yield benefits in terms of an efficient use of resources, databases and infrastructure. The following issues seem relevant to reflect upon.

2.1.5.1 The reliability of electronic sources

The paper world used to be rather reliable. Many journals and books have been 'checked' by academic peer review. This does not imply that in the past mistakes or fraud did not take place, it simply implies that there used to be and will be in the future a form of internal quality control of scientific publications. The reliability of electronic sources is – from an academic point of view – more doubtful. The main reason for this is that anybody with sufficient skills to deal with the internet, is able to put information on the world-wide web. This information will obviously vary in the level of reliability. A peer-reviewed electronic journal will be as reliable as a paper journal, but what about the reliability of personal web-sites, or web-sites that do not mention the sources of the information? The challenge is there to use up-to-date data of the internet, neglecting scientific reliability and/or possibly committing plagiarism. That the latter issue is serious, can be illustrated by the development and application of plagiarism detection software.⁴

2.1.5.2 The availability of knowledge

Closely related to the previous point is the fact that academic knowledge used to be relatively inaccessible for laymen. In order to fully understand this knowledge a relevant training in the discipline as well as information on relevant sources seemed to be conditional. With the arrival of the internet, information (as well as knowledge) more readily became available. This, among other things, implies that knowledge no longer is the sole domain for academics and that academics may

⁴ Young, J.R. (2001), The cat-and-mouse game of plagiarism detection, *Chronicle of Higher Education*, 6 July 2001, p. A26.

have to compete with other knowledge 'traders' that – particularly in the domain of applied research – challenge the academics' monopoly.

2.1.5.3 Investments in ICT infrastructure

The usefulness of ICT is taken for granted, but the issue of the necessary investments to reach the situation in which the benefits can be reaped, has been dealt with to a much lesser extent. The ongoing improvements wished for require a serious consideration of the technological infrastructure at academic institutions. If academics want to benefit from the 'blessings' of ICT, academic leaders should carefully decide – given the size of the investments and given the uncertainty involved regarding the correctness of the decision – about the necessary investments in computer infrastructure and software (see also Duderstadt, 1997).

2.1.5.4 Unbundling the university

The increasing use of the ICT may lead to or contribute to an unbundling of the university. Unbundling refers to the separation of the formerly unified tasks of teaching and research in one person. It also refers to the same phenomenon at higher levels of the organisation: the combination of research and teaching under one roof (see also Schimank and Winnes, 2000). Third, unbundling may refer to the strengthening of interorganisational network ties, possibly weakening organisational coherence (see e.g. Berkhout 2000). Finally, the disciplines may react in different ways to the challenges of ICT, possibly bringing along a watershed between those "into ICT" and those refraining from ICT. Note that ICT will probably be not the sole force leading to unbundling, but it is considered an important factor. Assuming that ICT for research and teaching are different things and require different skills and assuming that the ICT functions are not decoupled from the academic teacher, it may be that the Humboldtian ideal of unity of teaching and research (in one person) is no longer tenable (it may be tenable within one department, however).⁵ In addition, it may be too costly for an academic institution to 'virtualise' both research and teaching. The academic institution is therefore challenged to rethink how to reconfigure its faculty and departmental roles. In addition, efforts are expected to maintain the organisational coherence, if staff members – as a consequence of ICT – feel more at ease in their (virtual) international networks than in their departmental contexts.

⁵ Paulson, K. (2002), Reconfiguring faculty roles for virtual settings, *Journal of Higher Education* 73(1), 123-140.

2.2 Marketisation and the changed role of government

2.2.1 Introduction

One of the main areas of changes is often labelled with the slightly opaque term 'marketisation'. This label is unclear because it embraces different coinciding and often interactive developments. The following analysis builds upon the literature in this area, particularly on literature that focuses on recent developments and future expectations. When the label 'marketisation' is unpacked it becomes clear that the literature is actually talking about several developments. Among these developments, usually closely related to the changed role of the government are:

- the spread of a market discourse;
- the massification of higher education;
- the increasing number of private providers of higher education and research;
- the rise of a global market for education and research.

Marketisation can be seen, in the first place, as a growing importance of the economic, neo-liberal, discourse, and in such a discourse terms like efficiency, effectiveness and new-public management become more and more important.⁶ Governments all over the world have adopted this rhetoric, which can be traced back to the idea of new public management that developed in the eighties in the United States⁷ (and to a lesser extent the United Kingdom). Although, sometimes, existing practices are reinterpreted and relabelled in accordance with economic discourse, often this changed discourse has had an impact on public management.

In higher education the move towards new forms of public management is not only caused by the (international) spread of management theories. It is also a result of the process of massification of higher education. The shift from elite to mass systems of higher education means that new forms of system and institutional management need to be found that can effectively and efficiently cater for more students, more diverse students and more demanding students. One of the ways in which governments have reacted to this is through the introduction of

6 See for example K. Grit (2000). *Economiseren als probleem: een studie naar de bedrijfsmatige stad en de ondernemende universiteit*. Assen: Uitgeverij Van Gorcum.

7 See for example D. Osborne and T. Gaebler (1992). *Reinventing government. How the entrepreneurial spirit is transforming the public sector*. Reading, MA: Addison-Wesley.

markets in higher education. Basically, governments have attempted to confront the, still public, institutions of higher education with incentives that are not unlike those of the market. While the massification of higher education is frequently related to teaching, the introduction of market-like incentives has affected research as well. Research output is subject to quality assessment in many countries now. A larger share of the research money is distributed through research councils, where institutions have to compete for research funds. Moreover, as a consequence of restricted public funds contract research for third parties has become an important source of funding.

In addition to public institutions entering into different relations with states and markets there is an increasing number of privatised, formerly public, higher education institutions as well as private (for profit) institutions that compete on national markets for higher education and research (Altbach 2000; Newman 2002; Kwong 2000).

The final often mentioned 'marketisation trend' is the growing importance of an international market for higher education. Due to general processes of globalisation, e.g. increased global mobility, the spread of English as a lingua franca and ICT/ distance learning, higher education, as well as research, is more and more internationally marketed (Duderstadt 1999-2000; Middlehurst 2000).

2.2.2 Consequences for academia

Unsurprisingly, with the number of developments included, the introduction of markets in higher education has a variety of consequences for universities.

In terms of relations with governments, universities are now confronted with increased output steering, lump-sum funding and attempts to strengthen the relation between higher education institutions and their environment, i.e. students, industry etc (Richardson et al. 1998). This development has longer-term implications for research. For one thing, institutions need to be able to satisfy multiple stakeholders, not just the state but also research councils and a host of different private parties (a diversified funding base; Clark 1998). This means that the management of research institution becomes more complicated. Moreover, if universities increasingly need to earn their money on markets, the content of research may be increasingly applied at the cost of more theoretical work. The latter is frequently mentioned as a major threat, in particular by academics, though other stakeholders such as industry and national governments appear to realise the importance of basic research, too (for innovative purposes).

The increasing number of private (research) institutions in combination with the fact that universities are earning a larger share of their money from contract research for third parties means an increased competition. This has consequences for the way in which research institutes must operate, which may be increasingly business-like. This may conflict with the public interest that universities are serving. How should private and public interests be balanced in a partly privatised university system? (Newman/ Couturier 2001) From a business-like perspective, for example, universities or their contractors may want to patent (or at least not freely distribute) the results of research, in which case these results are not benefiting the public interest. This development creates problems in the field of quality control as well. Private (for profit) higher education institutions operate with considerable autonomy in most countries, simply because they receive little public funding and the government lacks steering mechanisms. But since knowledge has important public benefits, there is a definite public interest in overseeing these institutions. How much autonomy should private higher education have? Should quality be controlled? Should quality be measured as relevance or academic standards? Can quality control be left to the regulating forces of the market? (Altbach 2000)

International markets for higher education have become important, and are likely to further grow in importance. In teaching international student mobility has increased and there is a growing competition for top-level students among different national top-level universities. Since top-level students are of essential importance for the future of research in a country this development has longer-term consequences for research as well. In the second place, increasingly as a consequence of globalisation, higher education institutions are moving to foreign-markets, either through building local campuses, through distance education or through research contracts with foreign parties. This might create a situation in which higher education institutions must compete for market shares on this international market or restrict themselves to being local or regional providers of higher education and of research (Goedegebuure & van Vught 2000). Globalisation is also a driver for international co-operation, as universities create large consortia that provide education and research on a global scale (Middlehurst 2000).

2.2.3 Possible policy options

These changes and their consequences listed above need to be addressed by national and institutional policies. The authors included in this study provide a

range of policy-advice. With regard to the relations between the state and higher education institutions, the reviewed literature indicates several issues that may have an impact on the future of research. The issues listed here are related to the role of governments.

- States should require a better flow of information and a greater degree of transparency.
- States should reduce bureaucracy and put frameworks in place that stimulate institutions to take into account public demands.
- States should provide incentives for the use of technologies.
- States should require the measurement of learner outcomes.
- States should design financial aid packages that balance the desire to reward student merit and the stimulation of participation by low income and less advantaged students.
- States should stimulate institutions to be entrepreneurial (Newman 2002).

Regarding the consequences of international competition:

- States should prevent themselves from falling behind international peers by providing extra money and more performance stimulation;
- states should enable the creation of private institutions to create competition and increase volume;
- states should stimulate life long learning;
- states should choose priorities carefully, it is impossible for governments to meet all demands, therefore they need to select according to societal relevance;
- states should take into account that a world-wide shift from fundamental to applied research may deplete the sources of fundamental research, international co-ordination of research funding for fundamental research may prevent this (Pomp 2000);
- ICT can reduce costs and can make distant markets available, but high investments are necessary, to share costs, international coalitions of universities are developing and will develop even more in the future. The international developments and increasing importance of markets require a changing role of the state, towards a more facilitating role (Goedegebuure & Van Vught 2000).

2.3 Globalisation, internationalisation and regionalisation

2.3.1 Introduction

In many of the studies globalisation and internationalisation are mentioned as important external developments for the future of academia. The key issue in all these publications is that the universities' organisational environment will move from the national to the international level. For those who consider universities as scientific organisations and science as an international activity per se this might seem 'business as usual'. However, this neglects that even as a scientific organisation, academia has a national identity in many respects (such as national regulations, national funding, nationality of students and most employees, language, history, inter-university competition, quality control). We will address the following aspects with respect to globalisation and internationalisation of academia in general, and academic research in particular:

- the internationalisation of teaching;
- the consequences of a global economy for the roles and functions of the university;
- the internationalisation of research policies;
- the changing role of national governments;
- new spaces for regional policies.

Some of these aspects are linked to specific stakeholder positions. The idea of competition between nation states or between the economic regions (e.g. US, Europe and Japan) is more often mentioned in policy documents than in other documents. By and large in an analogous way, the idea of Europeanisation is elaborated upon by some academics and European bodies, but is hardly discussed by e.g. national bodies. For them Europeanisation might seem to be a given or to be just part of the wider pattern of internationalisation – despite their own role within the Europeanisation process.

There is a difference in emphasis between studies focusing on the educational function of universities and studies focusing on the research function. The first studies mainly emphasise globalisation in relation to ICT and stress the opportunities of a global market for universities as such. The latter group of studies tend to emphasise the changes in the research system, of which academia is a part, but have not paid much attention to the specific consequences for universities as a

research organisation. On two issues the two perspectives overlap: on the role of the university in a global economy and on the changing role of the national government.

According to most of the authors, the factors point towards diversification of academia and the emergence of excellent universities within Europe. Almost all studies concentrate on the winners of the international competition. Only a few authors seem to realise that winners imply losers as well, but none elaborate upon the specific future of these losers (e.g. Huisman et al. 2001; Wissenschaftsrat 2000).

2.3.2 Internationalisation of teaching

Internationalisation of higher education is linked to two other main trends. First, to the development of distance education through ICT. This allows academia to develop courses for an international audience and to establish international contacts with students and alumni from different backgrounds. Most importantly, it gives them the opportunity to offer courses beyond the boundaries of the campus location. The result of 'borderless education' is that universities can compete for students at a global level.

The second trend is the 'privatisation' of universities. Here privatisation refers both to the commercialisation of existing practices ('academic capitalism') and the introduction of new, private providers of educational services. The global competition is not just one between 'ordinary' universities (as it used to be in many countries and where competitors are known), but also between universities and corporate organisations from elsewhere (see also the section on marketisation). To some authors this new competition will force universities to enter into international coalitions as well as create a wide arrange of types of universities – especially if globalisation is combined with ideas of the knowledge economy with its new learning demands (e.g. Goedegebuure and Van Vught, 2000; Mason, 1998)

The scenario study by Huisman et al. (2001) shows that 'real' globalisation and internationalisation of higher education may have far-reaching consequences, more than most studies indicate. Post academic teaching can 'easily' be internationalised without challenging the current national identities of the academia, but internationalisation of bachelor and master education will likely imply other changes too. It may cause changes in national finance systems (nation states will be less likely to see higher education as a national public good if students and graduates become more mobile) and in accreditation and regulations (e.g. mecha-

nisms of quality control may radically change). The scenario study shows that the organisational difficulties related to internationalisation may also feed back into the process and block further developments in the near future.

2.3.3 Globalisation and the role of the university

Within the reviewed literature, economic globalisation has paradoxical consequences for universities. On the one hand, as part of globalisation, national governments, but also national interest groups such as industrial organisations open up national economies to international competition. The Netherlands, UK, Germany, Europe, and the US are pictured as competitors comparable to firms on a market. Within this inter-national competition universities are regarded as key players in the national innovation systems; first, in their role as inducers of new innovations, and second as one of the prime levers by which governments can improve "their" innovation system. Related to this argument is the point of view that academic research should be part of innovation processes and should be closely linked to other economic actors (OCV 1996; DTI 1999; Commission of the European Communities 2000, 2001). This would imply that national actors, including the national government, have a clear interest to protect and invest in (basic) research.

On the other hand, some authors realise that with globalisation, universities may become less dependent on national initiatives. Researchers and graduates, for instance, may increase their level of mobility, or national public investments in academia may decrease (by and large a continuation of the trend of the previous decade). The market of private funding for university teaching and research may increase and universities could be both tempted and forced to increasingly shift their focus towards applied research. Only through internationalisation of the coordination of basic research funding, investments in basic research can be secured and universities – if internationally excellent – can maintain their dominant role in scientific knowledge production. The argument is elaborated by Pomp (2000), but the implication of the trend, that is, international competition and diversification of academic research profiles, is mentioned by most of the other studies.

2.3.4 The European Research Area

The emergence of the European Research Area (ERA) is the most concrete attempt to design appropriate institutional structures for the internationalisation of (academic) research in Europe. According to recent decisions of the European Commission, the ERA will be realised in three ways. First, integration of European research through the establishment of networks of excellence, integrated projects and EU's participation in research programmes of Member States. Secondly, by "structuring" the ERA through co-ordination of activities in research and innovation, human resources and mobility, use and development of infrastructure and development of science/society interfaces. Thirdly, by strengthening the co-ordination and collaboration between research policies and programmes of national and international scientific organisations and Member states.

Although policy and academic studies alike embrace the idea of the European Research Area, little is known about the specific outcomes of these measures. Looking at underlying factors inducing the Europeanisation of academic research, conflicting tendencies become visible. Underlying factors that are mentioned in the reviewed literature are:

1. The emergence of a European political system, which, at least in the mid-term, will be based on negotiations between national policies, but increasingly dominate these national policies themselves and develops its own dynamic. National policies will probably become less important for Europeanisation, but in many policy sectors European policy is likely to create space for regional policies and regional differences.
2. National innovation systems are likely to be stirred up by ongoing globalisation of economic activities and this implies decreasing importance of national policies.
3. The development of innovation policies in settings with multiple actors and with a range of arenas, instruments and policies. As this range is different per country and region, the relations with the European level may differ as well. Guiding principles like the subsidiarity principles do not give a clear guidance for balancing governance responsibilities. The result is a development of multi-level governance, which is not well structured. The future of such multi-level government is uncertain (see also Kuhlmann 2001; Van der Meulen and Shove 2001).
4. The extension of the European union with ten new members will imply greater diversity and a need for better articulation of objectives, ambitions and implementation of STI policies in Europe

5. Pressures to develop a policy for the European science base, which implies that in the near future one can think of one or more independent European research councils (Europolis 2000; Pavitt 2000).
6. COST, Eureka and the Framework Programme may become obsolete, because the administrative structures are not functioning well. These structures seem poorly connected with each other and with national research and innovation policies (Georghiou 2001).

Considering these underlying factors, one should not be surprised that the present multiple governance system might be continued, either as a real market driven system or as a co-ordinated research area.⁸

Despite uncertainty about the outcomes, most studies agree that universities need to develop new institutional forms within the European Research Area, but they do not clearly indicate which ones will be successful (Europolis 2000; Wissenschaftsrat 2000). In a recent European study on institutional innovations in research systems no correlation has been found between institutional innovation at the organisational level in the academic sector and participation in research at European level.⁹

2.3.5 Changing role of national and regional governments

A common theme within the studies on internationalisation of academia is the position of national governments regarding university, science and innovation policy. Most studies take for granted that the role of national governments will, or has to change. As academia diversifies and internationalises, the interests of national governments in the universities' performances might decrease (because the *national* impact becomes less clear). In fact, current funding and regulations might need to be restructured to allow academia to internationalise.

Interestingly, two of the scenario studies that are based precisely on the issue of the relationship between internationalisation and national policies, indicate that the combined effect of the two forces may also have different outcomes than a diversification and competition at an international level. Huisman et al. (2001)

8 See also: Hackmann, H. (2000). A Comparative Analysis of Research and Technological Development Policies. *Discussion paper for OSF Workshop National sovereignty and International dependency*, University of Twente: 37; and Dresner, S. and G. N. Gilbert (2001). *The Dynamics of European science and technology policies*. Aldershot, Ashgate.

9 Pohoryles, R., S. Cvejtic, et al. (2001). *Final Report: Internationalisation of Research: Institutional Innovation, Culture and Agency in the Framework of Competition and Co-operation*. Vienna, ICCR, www.iccr.co.at.

focus on the co-ordination of higher education and in addition to a market driven diversification-scenario. They foresee the possibility of a co-ordinated diversification in which the development of missions for academia are still structured by national policy making and of a return to a stronger shared idea of *the university*, which concentrates on its core task of academic education and research.

The other scenario study (Rand 2000) foresees similar possible futures as a result of the interaction between national and international science policies. But the outcome of these interactions will depend on whether governments take up a regulating or a facilitating role and whether international co-ordination succeeds or not. Market driven diversification is then a result of ongoing internationalisation with facilitating governments. But equally possible may be that national and supranational governments (and perhaps even regional ones) may become more directive and increase their co-ordination efforts and intend to structure the development of academia. The resulting model may look like the German system, with its shared responsibilities between the Federal and regional governments. This model performs well in certain aspects, but has difficulties to implement institutional innovations (Wissenschaftsrat 2000).

The emergence of international policy bodies, in particular at the European level, and the diminishing role of national governments, creates space for regional policies. According to some, if academia has any geographical identity, this identity will be regional and not national. One should add that the definition of 'region' is not precise and varies in studies from the scale of a large city, with local technology parks as related phenomenon to the scale of German Länder, which equals that of the small European countries. The OECD study (1999) on the regional function of the universities argues that in fact this role exists already, and that universities should add it explicitly to their mission. The concurrent development would be that regional authorities develop more explicit policies focused on their academia.

2.4 The network society/economy

2.4.1 Introduction

The network economy is a rather vague concept that is used loosely by many authors. Basically, three underlying factors seem to be driving the rise of the

network economy. First, the fact that investment in R&D has become of fundamental importance for the competitiveness of highly developed countries and firms in those countries. Wages are simply too high, compared to lesser-developed countries, to compete on the prices of products.¹⁰ Consequently, production processes have been reorganised. Secondly, the fact that investments in R&D are costly means that increased specialisation of R&D within states and companies is necessary. Countries as well as firms need to strategically choose their areas of strength in R&D and invest in those areas¹¹ (see also policy initiatives in Sweden and Norway). These specialisations have contributed to the establishment of networks. Thirdly, since technological innovation is often the result of multi-disciplinary research, networks need to be established in which joined R&D is possible. These types of co-operation are facilitated by the development of information and communication technologies. ICT makes communication, for instance among academics, in whatever institutional setting, easier, creating a growth of collaborative arrangements. ICT also facilitates the access to scientific information, with the possibility of shared use of databases (OECD 1998).

The combined effects of these driving forces is an increased interest of both governments and companies in R&D, the need to identify (national) strengths and the creation of networks between firms, universities and governmental agencies in which multi-disciplinary R&D can flourish. This is basically the network economy.

2.4.2 Many questions for universities

Most of the authors that are dealt with in this study do not refer to the above-mentioned analysis. Their contribution can be interpreted as more or less specific answers to some very fundamental questions that these developments pose. Questions of how higher education institutions should position themselves in the network economy. The first set of questions the contributions seek to answer is that of a changing organisation of research within universities. What does it mean for a university if only certain centres are part of a nationally identified strength and others are not? How can universities create multi-disciplinary networks for research within themselves? What part do academics play in loosely coupled networks? More specifically, what do these networks which are less formal than the

¹⁰ Porter, M.E. *The competitive advantage of nations*, New York: Free Press, 1990

¹¹ Oerlemans, L.A.G. *De ingebedde onderneming. Innoveren in industriële netwerken*, Tilburg University Press, 1996.

rather rigid, discipline-based faculty structures mean for the academic profession and academic management of universities?

The second set of questions revolves around the increased importance of links between universities and industry. How should universities react to the growing number of providers of knowledge outside the traditional academia? Should universities compete, co-operate or both? Also, what are the effects of the fact that both co-operation and competition often drive universities outside the public domain? How does this development influence state-university relations? Moreover, the increased competition and the informality of many networks will create greater uncertainty in the university environment, how should these institutions deal with this uncertainty?

2.4.3 And some partial answers

2.4.3.1 The organisation of research inside universities

One of the areas in which the network economy affects the university is through the organisation of research. Academia itself is confronted with the ongoing specialisation of research as well as with the growing notion that the most innovative research is performed in an inter- and multidisciplinary context. Specialisation suggests that research should be organised in small pockets of excellence, the need to interdisciplinary co-operate means that these small centres need to be connected over the fences of their original discipline (Berkhout, 1998). In the coming years, the tension between specialisation and integration will increasingly come to the fore. The drive towards 'being excellent' calls for specialisation, whereas at the same time an increasing pressure to contribute to solve societal problems requires integration and the co-ordination of various disciplines.

This tension of specialisation vs. co-operation requires a new perspective on what university leadership should be about. The days of dull routine administration have gone; visionary leadership guiding porous institutions will be essential. The organisational borders of universities have always been permeable, but usually in rather formal ways across disciplinary-based lines. In the years ahead it seems that the loss of formal and stable patterns, at least to some extent, enhance the managerial complexity of organisational borders that become porous in many respects. Moreover, in combination with other main trends (globalisation and marketisation), "new" issues to be dealt with by institutional policy-makers come to the fore such as intellectual property rights and patents. Take, for instance, the "Trade Related Aspects of Intellectual Property Rights" (TRIPS) which is

another worldwide trade agreement that addresses trade liberalisation (but separate from the GATS). Careful monitoring of such agreements seems to make sense; the consequences for academia are not yet clear.

This is not a problem that can be solved simply by de-centralisation, to make universities more adaptive, as Richardson (1998) suggests. For one thing, it is questionable whether decentralisation would not simply mean a greater importance of academic traditions instead of greater adaptation. Also, decentralisation may very well lead to fragmentation, which is contrary to the idea of integration and coherence. Centralisation, to create more integration within the institution is not very helpful either. Attempts to centralise may first of all be blocked by academics wishing to maintain their professional autonomy. Secondly, centralisation may be too rigid to manage the flexible networks as Berkhout (1998) mentions. In general, the question of what the network economy means for university management has not been sufficiently addressed in the literature and will definitely need further exploration.

2.4.3.2 Links with industry

Changes in the organisation of research are of course not a purely internal phenomenon. Another development is the development of a growing number of other providers of knowledge and education outside the university. For the same reasons that were listed above, it is frequently mentioned that it makes sense for universities to co-operate with these new providers (Nicol 2000). This process is part of what Gibbons (1997) has described as the shift from a mode 1 to a mode 2 university. Outside partners, especially industry, bring into these networks not only a different disciplinary focus, but a new focus on the application of the developed knowledge as well (UNICE 2000).

There are also other more practical reasons to co-operate with other research institutions, both academic and non-academic ones. The investments that are required to engage in cutting edge research, especially in the natural sciences and engineering are sometimes tremendous. No single institutional actor can invest so much single-handedly; for this reason alone, alliances, joint ventures and forms of co-operation are inevitable (Galvin 1996). More in general this is true for the large investments in ICT that many universities face (Goedegebuure & van Vught 2000). As a consequence university may increasingly be part of the network economy, with its fluidness, instability and uncertainty.

A third element in this development of university – industry relations is what sometimes is referred to as the knowledge society. If knowledge is becoming a prime production factor in the economy than universities become an interesting

partner for industry (Galvin 1996). Positive as this may look, the rise of the knowledge society also poses threats to the university. The fact that knowledge is marketable and that there are now more places where knowledge is created and transmitted means that universities are facing increased competition (Welle-Strand 2000). Apart from co-operating, universities also need to position themselves in a 'knowledge-market' developing, at least as part of their output, research for which there is demand, at competitive prices.

In all, it implies that in a competitive world there are likely to be winners and losers. A network economy demands flexibility. If traditional universities are not able to increase their level of flexibility, they will have a hard time of it. Some authors are more optimistic than others are in this respect. They argue the universities have established an excellent record of adaptation and survival; there is not much reason to believe that universities will not be able to keep this record.

2.5 The knowledge (driven) society

2.5.1 General changes

Within most discussions on the future of academic research, as well as on the need to adapt to the knowledge society, there is reference to changes in the knowledge production. "Mode 2" is clearly the shared reference. Even those that do not agree with the analysis of Gibbons et al. (1994), hold the opinion that the traditional academic mode of knowledge production is challenged. The debate on the knowledge society and the role of the university therein, is, however, broader than the "Mode 2 thesis". Analyses and opinions particularly differ on the consequences for the role of the university and the organisation of academic research. The notion of a knowledge society itself is closely linked to recent developments in higher education. We will mention some of these links in an enumerative way.

- The massification of higher education has increased the academic capacities within society and has increased the capacity of non-academic institutions to adopt scientific knowledge and use it to their own ends (the 'scientification of society'; Enders 1999).
- On the one hand, this has increased the potential value of university research, as there are more potential users who are willing and able to pay.
- On the other hand, "society" has developed the capacity to critically assess the value of university research, scientific knowledge and new scientific develop-

ments (Enders 1999). These concerns are reflected in fields such as environment, health, ethics and others into fast developing fields of research. Another indication is that in many countries, research programmes on genomics have research lines on the ethical, legal and social implication (ELSI) built in within the overall programme.

- Another consequence of massification has been that many research-trained employees are working outside the university and the knowledge producing capacity of other organisations has been increased (Gibbons et al. 1994).
- This implies that the possibilities for universities to collaborate with non-academic institutions have increased. Likewise the natural and engineering sciences found epistemic counterparts in industry and government laboratories, social sciences have them in government, public services and government bureaux like statistical agencies and the like. The result is transdisciplinary knowledge, which is less codified and circulates often through informal channels, but its empirical and theoretical foundations, as well as its performance capacity in the contexts of applications, certainly assures that it contributes to the development of knowledge.
- Another related consequence is that universities have lost their monopoly on (scientific) knowledge production (Gibbons 1997; Enders 1999) and that through heterogeneous collaborations its boundaries have become permeable. In a way, the university has dissolved into society.
- Within university *research*, a concurrent trend is the development of trans- and interdisciplinary fields, because of the inclusion of more professionally oriented higher education, and
- the scientification of technological research or the technologicalisation of science has created the possibility to establish strong roles of universities in innovation processes and policies (cf. Triple Helix thesis) (Rip 2001; Etzkowitz and Leydesdorff 2000).
- Both developments imply that universities increasingly develop knowledge within the context of application. Applicable knowledge production has increased for other reasons too, such as financial and social accountability reasons (see for example the section on marketisation).

Because of the intrinsic relationship between the development of the knowledge society and the university, it is difficult to disentangle the consequences for the future of the university. The knowledge society is not an external trend that impacts upon the university but a phenomenon co-evolving with it. The assessment of possible consequences significantly differ; some see a prosperous future

for universities in a knowledge society in which knowledge is the most important strategic resource, whereas others believe that universities will slip further and further into the improper world of academic capitalism, in which academic values and norms have been traded for a calculating sense of standards. We will elaborate upon these divergent views in the next subsection.

2.5.2 The epistemic role of the university

There is no knowledge society without academia, and academia cannot be thought of outside the knowledge society. However, with the traditional, modernistic role of universities as a referent, authors project different futures and core tasks for the post-modern university. Some authors emphasise the competition with other institutions and the loss of the monopoly of universities. They see a booming variety of competitive knowledge providers such as virtual universities, corporate universities, media organisations, consortia, strategic alliances, as well as a blurring divide between private and public institutions (e.g. Middlehurst 2000; Futures Project 2000; Salmi 2001). To them the knowledge society challenges the university to go back to its core function of leveraging educated highly qualified people and its critical role in democratic society (Delanty 2001; Florida 1999).

However, most studies realise that the new mode of knowledge production is firmly rooted within academic institutes, and that the future of academic research will depend on the response of academia to the new opportunities of the knowledge society. A specific response, often supported by related changes in university and innovation policies, is the emergence of entrepreneurial activities within universities, which have evolved in many countries out of different national academic structures (Etzkowitz, et al. 2000) The key question still remains whether universities fully orient themselves toward this commercialisation and become 'entrepreneurial universities' (Clark 1998) or consider these activities still as an add on to its basic functions.

In their book *Re-thinking Science*, Nowotny et al. (2001) also develop the consequences of new knowledge production for the university. To them, the crucial issue for universities is how a university can cope with the conflicting needs to define a core, set priorities, create effective management and to de-institutionalise itself to become an open organisation, flexibly responding to the needs of the knowledge society. They give little guidance, but refer to virtual universities, corporate universities, and "primitive" universities based on networks of researchers, teachers and students are mentioned as possible models.

Within the sea of change, they also pinpoint two stable functions for the universities. First, the education of researchers, for which it has a monopoly. Secondly, to be the generator of cultural norms for a society, which might be more than ever procedural and less substantive. Nowotny et al. (2001) consider that such procedural norms may also be a possible base for the creation of knowledge within the future academe, "*instead of detailed methodologies*".

In addition to organisational aspects of future academic research, the dissolution of academic knowledge production into societal knowledge production has epistemic dimensions¹² (Rip 2002). Within environmental research new practices of certifying the transdisciplinary, policy oriented knowledge have been developed, e.g. by the IPCC. In many other instances, the quality of knowledge in society is still unclear. A crucial issue for the development of good practices is that the new knowledge production partly learns from traditional science about the importance of "controlled conditions", but accepts the heterogeneity of knowledge and the importance of new stakeholders.

2.6 Socio-cultural and demographic trends

2.6.1 Introduction

First of all, we notice that both socio-cultural and demographic trends are not frequently mentioned compared to other trends such as ICT, networks and the like. There are not many stakeholders holding strong opinions about socio-cultural and demographic trends with respect to the future of academia.

The socio-cultural issues that are mentioned at times are the individualisation (or atomisation) within society, the scientification of society, consumerism, the changing demands and shifting socio-economic pressures (increased disposable incomes lead to new patterns of consumption), the changes in working life, and a society that increasingly demands accountability and 'loses' trust (that is, the professionals' activities are not always taken for granted). Demographic trends that have been found in the reviewed literature are the ageing of the labour force, both at the upper and lower end (that is, 'massive' retirements and a scarcity of youngsters). Moreover, the increasing diversity of the population has been

12 Ravetz, J. (1999). "What is Post Normal Science?" *Futures* 31(7): 647-653; Ravetz, J. and S. Funtowicz (1999). "Post-Normal Science – an insight now maturing." *Futures* 31(7): 641-646

mentioned. Some of these issues are linked to other trends. Consumerism, for instance, is often mentioned in relation to “marketisation”, whereas changed patterns of accountability and trust are connected to changed patterns of coordination ('markets') or to a network society.

Many socio-cultural trends seem to be related to teaching and education. Most consequences of socio-cultural trends for the future of research and science are indirect. The atomisation of society, including 'calculating citizens', for instance, may put public expenditures under pressure. Publicly funded research, usually hardly visible for the public at large, will not easily get rewarded in a society in which individuals are used to and able to pursue their own (economic) interests. If public funding is under siege, brave (national) governments are needed to protect basic research.

The latter is, by the way, one of the countertrends of marketisation (see also subsection 2.2). Several stakeholders ask for investments in this area of the public sector, though part of it may be political rhetoric (DTI 1999; Joint manifesto of VNO-NCW and others; Unice 2000; CPB 2001). The argument is that governments, even in a more market-oriented higher education, have a particular role concerning basic research. Basic research is generally considered to be a 'public good' (in economic terms), that is, it will not be produced in social desirable quantities in market conditions (if it is produced at all). It means that other allocation schemes are required to produce such goods. Traditionally national governments take care of the provision of these goods (i.e. basic research).¹³ National governments serve – theoretically – the common interest, and the public will appears not to prioritise basic research. In other words, considering the expected socio-cultural developments, a declining support for basic research looks likely.

2.6.2 Socio-cultural trends and the academic profession

The social-cultural developments that are mentioned in the reviewed literature may have serious consequences for the academic profession itself. At the end of the day, the scientification of society is likely to increase the pressure on the rather exclusive position that professionals held for a long time. There will be an increasing loss of prestige of professionals, not only in higher education, but elsewhere too. Enders (1999) mentions this in one of his scenarios where he speaks of depro-

¹³ It is not clear at what level such activities will be allocated in the future (e.g. Europolis 2000). See also the section on internationalisation.

fessionalisation and marginalisation. In his eyes professionals might become knowledge workers. More or less the same point is made by Middlehurst (2000) who projects a shift in the concept of professionalism. She argues that in the future status must be constantly earned and legitimised by professionals; trust is no longer a given. Increased accountability and demands for transparency of results demystify science and its prime workers.

In keeping with other trends referred to in this study, the academic profession will change. Professionals are expected to become multi-skilled. They have to be able to work in multidisciplinary teams ("mode 2"). Collaboration ('networks') instead of individualistic modes of operation become dominant. Consequently, professionals will meet more 'different' people with completely different backgrounds than they used to (Ronayne 1999) (see also section 5.4 on networks). Business ethos and practices might become more acceptable in higher education (Kwong 2000), or at least less reprehensible.¹⁴ The traditional home base of academics (the department or discipline) may fade; Fekete (2001) speaks, for instance, of (research) clusters that may arise and fade depending on circumstances. Put succinctly, according to these views the academic profession with its traditional values and norms will erode.

The above arguments suggest a kind of dismantling of professional power inside organisations. Richardson (1998) provides a counter argument. He argues that greater complexities and dynamics in higher education (and science) require more de-centralised systems in which universities are made more responsive and accountable to the needs of society. And this de-centralisation gives in his eyes more authority to the professionals. This argument may hold some truth for those who argue that information and knowledge will become the key strategic sources in the future society (e.g. Duderstadt 1997; Florida 1999). And this knowledge and expertise is possessed by professionals. It is well known that this dependency on knowledge provides professionals with a power base, in particular in combination with the demographic trends discussed below. According to these views, professionals will be accepted with open arms. Thus, the academic profession looks likely to change, but the professional's part is not played out.

¹⁴ See also the final section of Harry de Boer and Jeroen Huisman (1999) "The new public management in Dutch universities, in: D. Braun and F-X Merrien, *Towards a new model of governance for universities? A comparative view*, London: Jessica Kingsley.

2.6.3 Demographic trends and human resources management

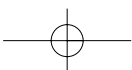
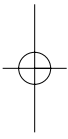
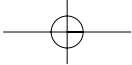
The demographic trend of ageing (both increasing numbers of retirements and decreasing number of youngsters) is not often mentioned as a major trend but it is clear that it may cause serious problems in academe (some exceptions are the Dutch ministry of OCW (2001), Council of the European Union (2001)). In the long run, shortages of highly qualified researchers may stagnate the advancement of the knowledge society.

Ageing is directly linked to the academic profession. The limited amount of 'available' youngsters interferes with the growth of an academic workforce, especially if young people seem not to be very interested in having an academic career.¹⁵ These capacity problems get worse if at the same time the present academic labour force is ageing. Strangway foresees, for instance, a loss of expertise when a relatively large number of highly qualified researchers retire in a short period of time. And of course ageing will contribute to a tight labour market; there will not only be serious competition for financial resources but for human resources as well. As a consequence of this, reward structures are likely to change (e.g. Middlehurst 2000). On the other hand, the tidal wave of retirements may create opportunities to realise fundamental changes in higher education institutions (Stangway), and may create opportunities for young talent to start an academic career.

If the expected demographic trends take place, the question of who produces new knowledge becomes a strategic one. A not mentioned, but possible development might be the recruitment of staff from elsewhere (in substantial numbers). In a global economy and with increasing numbers of foreign students, the arrival of 'academic guest workers', or 'academic nomads' may become a reality.

In one way or another human resources management and development will grow in importance as a policy area in universities and other research organisations. Not only attracting new talent but also keeping and pampering of existing staff becomes a strategic issue for research organisations in the coming years.

¹⁵ See, for instance, K.M.P. Brouwers, H.J. van Driel en A.M.J. te Peele (2001) *Jonge academici in professionele organisaties*, Zoetermeer, or the Werkgroep Plan van aanpak voor het wetenschapsbeleid (2000) *Talent voor de toekomst, Toekomst voor talent*.



3

Final considerations

In this final chapter we formulate some general conclusions (section 3.1) and reflect on the main findings (section 3.2). The first section concerns a general reflection, including a review on the role and positions of stakeholders. In the second section we allow ourselves to step somewhat away from the actual findings and ponder a number of relevant questions for discussing the future of academia.

3.1 A general reflection

This study clearly indicates that despite its modest scope, academia's future will be exiting, complicated, uncertain and challenging. There will be substantial changes in and around academia, even if only half of the trends described and analysed in this study become reality. Substantial changes, however, or even crises, are not new to academia. The winds of change, sometimes of hurricane force, have frequently occurred. Until the present day, universities, traditionally one of the homelands of academia, have shown a remarkable capacity to adapt to a variety of changes while maintaining their basic characteristics. This, however, should not lead to the conclusion that universities have not changed at all. On the contrary, today's universities significantly differ from their ancestors, and so will their successors.

Some of the issues raised by the authors in the reviewed literature are enduring themes in higher education and science policies. Several of these issues ultimately deal with the paradox related to the nature of universities: resisting change and preserving enduring values while undergoing constant transformation. Some stakeholders, especially those that stress the universities' contribution to the nation's welfare, exert pressure on universities to adapt to continuously changing circumstances. Others, frequently found in the world of academe itself, are convinced that the conservation of tradition, culture and citizenship is one of the fundamental missions of universities in society. The enduring themes one can think of in this context are: what is the place of academia in the nation, is the university an institution for stability or change, should society determine the type of knowledge which should have priority in universities, and if this is the case, should

this be co-ordinated by government or by the market?¹⁶ Many authors reviewed in this study touch upon these themes, and by raising these questions, differences in opinions are visualised, as can be read in the summaries, the matrix and the previous analyses for each trend.

3.1.1 The role and position of stakeholders

From the literature review and the analyses per trend it becomes clear that analysts differ in opinion e.g. regarding the precise speed and magnitude of the impact of the developments at hand. Nevertheless, there seems to be considerable agreement on the general developments taking place and, equally important, their presumed impact on academia. The various stakeholders (national agencies, academics and professionals, supranational bodies, institutional leaders and managers, national governments, industry and others) more or less seem to accept the developments taking place, and appear to prepare for the consequences. There is a bit more variety within the group of academics, which shows both more explicit positive and negative reactions to the developments and shows more heterogeneity in the expected general consequences. This, however, also partly can be due to the relatively large number of academic writings in our sample.

When the analysts go into more detail in specific areas (the pros and cons of information and communication technology, the relation between teaching and research, the regional role of universities, etc.), views start to diverge. In general, internal stakeholders (academics and institutional managers) appear somewhat more concerned about the disadvantages of the developments, implementation difficulties of new programs and technologies, organisational strategies to be decided upon and of the costs involved. National governments also tend to be concerned about implementation of policy issues and the attached short and long term investments. Relative outsiders (supranational organisations, business and industry) seem less preoccupied with the day-to-day practice and the related investments. Their general concern appears to be with the overall need for a flexible and adequately trained workforce (employability) and investment of academia in both basic and applied research. We stress that the different accents of the

¹⁶ Cf. G. Neave (2000). Introduction. Universities' responsibility to society: an historical exploration of an enduring issue. G. Neave. *The universities' responsibilities to society. International perspectives*. Oxford: Pergamon.

stakeholders and the different perception of concerns do not lead to clearly different views on the future of academia. In addition, only few of the analysts take into account all possible developments and consequences for academia. Many stick – understandably – to a restricted number of evolutions and ramifications.

3.2 Organisational change in academia

In this final section we reflect on the findings in a different way. Whereas we summarised the outcomes per trend in the previous sections, here we willfully take another angle on academia and highlight issues that cross-cut the trends. The issues to be discussed in this section should be considered as subjects for debate on the future of academia, particularly with respect to universities as organisations. We do not intend to cover all relevant subjects. We address those that more or less are evident from the sections on the trends. As such, our reflection is not meant to rephrase specific findings, but rather to raise relevant questions and to dwell on certain outcomes. The overarching point of departure for this section is that, by and large, academia for centuries has been able to carry out its main functions and has – mostly in an unproblematic way – integrated new functions. Most of the analyses in this chapter assume that the present and future developments in the context of higher education will considerably impact academia. Two elements of these developments stand out: the changing mix of stakeholders in higher education and the (presumed) accelerating pace of change. The combination of these elements require those involved in academia – either (supra)national policy-makers, institutional leaders, students or academics – to reflect on the future. We do not, however, suggest that academia has to change per se, but that those preoccupied with academic matters have to think about whether change is inevitable, possible, needed, or not.

3.2.1 Differentiation at the system level

The higher education landscape in many (Western European) systems seems relatively ordered. Of course, higher education institutions differ in size, mission, range of disciplines, etc., but still the range of institutions seems clear and conveniently arranged, even in presumed diverse higher education systems such as the American system with more than 3,000 institutions. Outstanding characteristics that distinguish institutions relate to the status of the institution and/or the fact

whether the institutions have developed a considerable basic research mission. The literature on the future of academia indicates that chances are high that there will be much more variety in the landscape in the future. There are opportunities (challenging or not) to aim at – to put it in economic terms – different target groups, different products, different functions, etc. Institutions may focus on different clienteles (the traditional school-leavers, life-long learners, adults, employees, etc.), on different missions (the classical university, the entrepreneurial university, the service university, etc.), on different levels (regional, national, international), and using different technologies (traditional settings or more flexible approaches, like distance and virtual education). In addition, whereas universities were often considered “stand-alones”, the present tendency to form coalitions, networks and consortia indicates that the future organisations may look very different from the present ones. Even if modest changes take place in the constitution of the landscape, policy-makers and institutional leaders will continuously be confronted with the question of whether the whole system still fulfils the requirements, and respectively whether the individual institution can still find and maintain a position in the system.

3.2.2 Differentiation at the organisational level

If universities integrate new functions and/or become part of broader networks or consortia, this may have a considerable impact on the internal organisation. Traditionally, the concept of the university has been that many disciplines are gathered under one roof and that the creation and refinement of knowledge (research) and the transmission and transfer of knowledge (teaching) should be integrated within the academic organisation. Whereas a certain coherence was and still can be presumed – at the level of faculties or departments – in the university (although communication and integration across the various disciplines was already considered problematic since Snow's 1959 'two cultures'), it may well be that the future tasks diverge and that future quality requirements challenge the logic of continuous integration of new tasks: it may lead to the unbundling of the university. This can have profound consequences for the cohesiveness of the organisation. These consequences can be of a different nature. First, it may well be that the unity of functions that have been considered ultimately connected under the roof of the university cannot be persevered. Even the unity of research and teaching may be challenged, for the different types of research (basic, applied, mode 2, government-funded, contract) and teaching (professional, academic, young

adults, mature students, virtual or traditional) and the complexity of these tasks cannot be integrated within one organisation. Second, a similar argumentation can be applied to those actually involved in the research and teaching process: will it be tenable to have an organisation in which all staff members can – and actually do – perform the broad range of teaching and research activities, or are there pressures to come to a new division of labour? Solutions to these challenges have to take into account the level of integration one wants to achieve within the organisation, which reward and accountability mechanisms should be in place, and what mix of co-operation and competition within the organisation is necessary. Of particular concern is the coherence of the academic profession: if academics perform rather diverging tasks, will it be possible to maintain common standards regarding e.g. quality assurance in teaching and research, the certification of solid knowledge and a proper recruitment of new staff?

3.2.3 Excellence and diversity

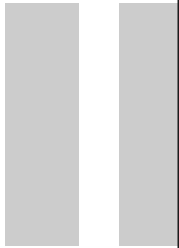
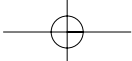
The developments of recent and coming years might – according to many analysts – imply an emerging or increasingly competitive environment. In such a competitive environment each institution has to find or create a ‘niche’ in the market to be able to continue a sustainable position in the landscape. In a competitive environment striving for excellence appears to be a favoured strategy. Please bear in mind that creating niches and striving for excellence are not the same phenomena. Moreover, whereas this all seems a rational choice process, we stress that finding and creating niches or becoming excellent may happen ‘accidentally’ or may happen in less straightforward ways. Three elements of the development towards excellence and diversity are noteworthy paying attention to. First, more or less implicit in many of the expectations – particularly of governments – is the fact that the creation of excellence can be achieved without (extra) investments. If this is the assumption, then one should take into account that there also could be places where performance takes place at a lower quality level. In other words: if some organisations will be winners in a competitive environment, there also must be losers. Surprisingly, not much is written about these losers and the implications of having winners and losers. Second, a common expectation is that organisations in a competitive market will try to develop a unique profile. However, there is evidence – particularly in higher education systems – that the dynamics within education and research systems may lead to other results. A particularly relevant dynamic is that successful organisations (or even

perceived successful ones) tend to lead to emulation: if organisations perceive peers to be successful, they may be challenged to copy the practices of those peers. Here, a possible friction between excellence and diversity comes to the fore, which has to be dealt with in an adequate way. Third, another tension between excellence and diversity comes to the fore when talking about judgements on excellence in a diverse system. The present-day quality assessments follow a fairly homogeneous logic, firmly rooted in 'traditional' academic standards. Given the fact that it can be expected that the homogeneity of tasks will decrease and different stakeholders will set different standards, it can be questioned to what extent unambiguously excellence can or should be determined.

3.2.4 Role of universities in the knowledge society

The analysis in this chapter has evidenced the ubiquity and dominance of the economic perspective (and rhetoric) on the role of higher education in the future society. Keywords in the debates are: innovation, competition, utility, societal relevance, knowledge production, sustainable development, privatisation and market mechanisms. In this context it will not be surprising that many ideas about the future of academia relate to the future of technology and sciences. The future of the humanities and the social sciences seems to be somewhat underexplored.

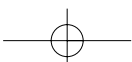
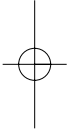
An important yet somehow neglected aspect relates to the role of universities in society. The emphasis on the economic role makes analysts to some extent blind to important roles that universities have had over the past centuries: to be institutions aiming to carry out science without obvious benefits for society in the short run ("curiosity driven research"), to perform a cultural role in society and to contribute to good citizenship. Particularly those concerned about the chances of survival of these roles maintain that trends like globalisation, neo-liberal thought and the stress on the economic role damage or will damage the core business of academia. The assumption is that new stakeholders become influential or even dominant regarding the choices of research topics and the way research is carried out, which is at odds with the traditional critical, but objective role of the academic. To put it slightly differently, academic freedom has never been unconditional, but what will be the conditions in the next decade? And who will determine these conditions? The main question might be not so much how realistic these doom scenarios are, because universities have a long – and quite successful – history of adaptation to new conditions. The real question could be how to organise university systems and institutions to successfully combine both the traditional academic and the economic functions that academia is required to fulfil.

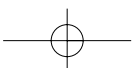
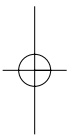
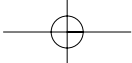


On Looking through the Wrong End of the Telescope

Being sundry observations of the State of Academia
in the 21st century from an historical perspective

Guy Neave





Introduction

Of the many techniques that go to make up the Historian's craft, the telescope has little part. This is a pity because the telescope performs a number of useful services to the storm-tossed mariner and even more so to the star-crossed astronomer. To the first, it assures him of landfall and sometimes alerts him to the presence of rocks, shoals and the looming peril of a lee shore. It provides then a point of reference. To the second, it gives him clues about the ultimate origins of the surrounding Universe and, mayhap before the titanic events that unrolled uncounted aeons ago, a more metaphysical appreciation of the irrelevance of his personal existence.

This useful instrument has other functions, however. If, by sheer perversity, one chooses to look through the wrong end, the telescope may serve to extend distance, though at the price of greatly reducing the size of the image. The observer suddenly acquires a broader vision, a bird's eye view not just of the object of his previous interest. He also catches sight of others in its neighbourhood. Instead of being devoured by the detail, he is confronted with a context, wider, more all-embracing. In short, and to mix the metaphors still further, if one is to see the wood, rather than the tree or even the twig thereon, the telescope is more useful by far when the wrong end is applied. To have that broader perspective, is sometimes both necessary and fruitful.

This essay provides an historical perspective on some of the issues raised in the main report, presented to the AWT by CHEPS on 'Academia in the 21st Century'. As such, it explores in a rather longer chronological framework certain issues and the concepts arising from them, which are seen as key elements in shaping the future of the 'Academic Estate' in Western Europe amongst which the notion of 'unbundling' and 'alternative providers'. The main thesis developed is that both concepts, whatever their current application, are in effect, part of a rather deeper-rooted and long term dynamic by which higher education has long adjusted to change in what today would be termed 'the external environment'.

Applying an historical perspective to the current concerns of higher education policy does not always guarantee a metaphysical reassessment by the policy maker of his part in the great scheme of things. It may, however, restore a certain perspective, if not always a sense of proportion. Certainly, History on its own cannot prioritise between individual trends and developments. What it can do is to examine the origins of their emergence, how long they persist or, alternatively, vanish from sight. It may plot the unsung and unpublicised alternatives,

(Rothblatt, 1998) why they were discarded and, for those retained, their eventual outcome. It provides a broad setting in which contemporary issues may be situated. It does so in a way which hopefully winnows out those themes that are recurrent from those which are essentially pioneering or innovative by their own nature. It allows us to suspend belief rather than being dragged under by the accompanying rhetoric, by changes in language and obscure terminology, by the use of analogues and shifting paradigms which the 'boosters' of particular 'hand-me-down' solutions inevitably use to justify the labelling of old wine in new bottles and their selling, sometimes unwittingly it should be said, as new and fortifying beverages. Likewise, it allows us to exercise a similar detachment vis à vis their opponents who, naturally, look upon such instant remedies with distaste and contumely, as fashionable, futile and enfeebling. The historical perspective ought then to strengthen our resistance to the merely plausible.

Continuity and change

The *problematique* of continuity versus change is, of course, not the exclusive concern of the historian. Nor ought it simply to be regarded as an abstract analytical category. For whilst the policy-maker is certainly taken up with finding 'solutions' to 'problems', it is a very different matter to be faced with a recurrent problem than it is to be faced with one which is wholly and utterly new. The recurrent problem – the abiding issue – poses questions of a very different order. Why has it re-emerged now? In what way does it reflect the inadequacy of previous attempts to solve it? What may one learn from the previous attempts? What does their seeming failure tell us about the behaviour of the institutions entrusted to carry it out? – about the instrumentality designed to implement it? Or for that matter the basic assumptions built into earlier remedies? Last but very far from least, is the formidable possibility that some 'abiding issues' remain with us for the simple reason that they are not capable of being solved permanently. Faced with this nightmarish possibility, 'abiding issues' assume another quality. They appear and reappear almost as temporary agreements spatch-cocked together, valid for the circumstances in which they were forged but with very little hope of their holding together when the march of progress is resumed – or falters.

Certain abiding issues

Before setting some of the issues raised in this report in a temporal perspective, it is as well to give some operational expression to the term 'abiding issues'. The elements included are not comprehensive. They are given simply to get a purchase on certain dimensions, which have largely shaped academia in the past and

continue to do so at present. They count however, amongst the perennial aspects that underpin both the particular characteristics of individual systems of higher education, which define its place, purpose, the values it is held to uphold and its responsibilities to the community as indeed, the nature of that community itself, whether national, local, ethical, industrial or commercial. Equally abiding is the question of the 'ownership' of individual establishments, and, no less important, the ownership of what is produced therein, whether courses, programmes, research findings. By extension therefore, the question of by whom and how 'relevant knowledge' is defined remains central to positioning academia in the broader social fabric as it has always done. Who defines knowledge largely determines the 'pertinence' of the academic undertaking and thus whether its claim to 'centrality' finds echo in external society. Finally, there is the issue of access – that is, how many, under what conditions of preparation and with what level of certified knowledge should the individual have experience of higher learning?

A few salient features

Still, it is as well to remind ourselves first, of the sheer scale of change in higher education over the past half century and second, the very radical recasting in the role of academia as the vehicle of change itself. Of the 650 universities, extant in Europe – defined *sensu lato* – in 1985, more than two thirds achieved that status over the course of the previous 25 years. (Neave, in press) Furthermore, the upgrading of non university establishments to that status has continued since, with the incorporation of British Polytechnics into the university sector in 1992 and the creation of University Colleges in Sweden in the course of the same decade. Other systems have continued to add to their stock of universities, though at a more relaxed pace than the frenzied decade from 1965 to 1975 when almost half the Western European 'stock' of universities existing in 1985 achieved that heady standing. It is, of course, only fair to point out that the rhythm of institutional creation, whilst slackening off in the EU, moved over to Eastern and Central Europe and Russia from the period 1992 onward. (Filipov, forthcoming)

The second pointer to the speed of change is simply, the proportion of the appropriate age group now attending higher education in Western Europe. Whilst few can equal the 47 percent cited for attendance in France's higher education system, nevertheless it is a fact that in Western Europe, a higher proportion of the age group now attends higher education than was admitted to academic general secondary schooling – Lycée, Gymnasium, Grammar School – forty years ago.

This scale of change, we tend to take for granted. We take it as a natural and acquired condition whereas it is, very certainly from a quantitative standpoint

alone, a very radical development indeed, one of the greatest social achievements of the 20th century (Kerr, 1964) and a turning point in the history of the university in Europe. From a technical standpoint, the advent of mass higher education in Western Europe dates from around 1972 – France being the first system to exceed 15% of the age group attending.¹ Arguably, the intellectual break point came somewhat earlier, towards the late 50s in England and Sweden, when the decision was taken to expand the nation's places in higher learning. (Neave, 1972) This break point took shape by conferring an additional mission upon the university – a mission that had two elements in it. On the one hand, higher learning was now directly associated with the pace of economic change and development whilst on the other, assigning to higher education a 'redistributive role' which, effectively cast it as an instrument for equalising educational opportunity by drawing deeper on the reserves of talent, a task which, by definition, lay beyond the capacities of the elite university.

Whether from the standpoint of policy-makers, leadership and 'stakeholders', (Neave, 2002) part of today's shared credo takes for granted that it is both desirable and natural for higher education to be responsive to change. Indeed, if we take a crow's eye view over the past four decades or more, the constant and essential thrust behind higher education policy has been precisely both to accelerate the pace of change and, as a corresponding task, to create those conditions that enable the individual establishment, not to mention the basic units within it, to meet, rapidly and effectively, the shifts and vagaries in the demand coming from the labour market. No less significant, however, was a subtle and pervasive shift in mental set which re-defined some of the functions of the university vis a vis change itself. We will discuss this later in that section which deals with the two complementary notions of 'accommodation' versus 'change' which were discussed and their implications analysed by institutional leadership in the mid Seventies. These two notions are central to our understanding of both earlier interpretations of the university's responsibility to society as they are to setting present day trends in a broader context.

What we tend to forget, however, because it is part of what Peter Laslett (Laslett, 1986) once described as 'A World that is Lost', is how radical these notions were when set against the 'reconstructed' elite university which emerged from the ruins

¹ The 15 percent of the age group marking the boundary between elite and mass higher education we owe to the American policy analyst, Martin Trow (1974) *Towards Mass Higher Education*, Paris, OECD. 2 vols.

of World War 2. By stating things thus, I am not denying the centrality of higher education to the polity. On the contrary, much of the ensuing half century has been taken up with negotiating and adjusting the terms under which higher learning retains that centrality even though the spirit of the times placed very different constructions upon what had priority.

Periodicity

Indeed, one may, if one is so minded, divide the chronology of the past half century, like Julius Caesar's description of Gaul² into three parts. The first, lasting from 1945 to around 1958 in the case of Sweden³ or 1961 in the case of Britain⁴, marks a period of reconstruction around the time-honoured mission which, beginning with the early 19th century in the shape of the Humboldtian reforms in Prussia and the French creation of the Imperial education system, associated the university with meritocracy, with the modernisation of government, the upholding of the historic professions involved in the administration of law, health and public order. The second phase began around 1960. It turned around the democratisation of access to higher education, and added to the university's basic mission the function of offsetting or compensating social disadvantage, with the development and up-skilling of sub professions. More to the point, the second period saw the university as a positive instrument for mobilising both economic and social change. The third phase which, with the advantage of hindsight, may be identified with the period from the early Eighties depending on the particular system involved. In effect, it reversed the relationship of the university to the economy whilst hiving off the mission of 'redistributive justice' to certain forms of 'alternative providers' in the shape of distance teaching systems, running in parallel.⁵ The university was thus construed, not as a mobilising agent of social change, so much as the

2 *De Bello Gallico*, book 1.

3 The Swedish 1958 Commission on Higher Education was the first move in that country which had been engaged in broad-ranging educational reform since 1940, to tackle higher education. It introduced major reforms to the academic estate, largely in anticipation of expansion at university level. One of its key recommendations, subsequently acted upon, divided academia into two strata between those whose task would be wholly taken up with teaching with a second 'Order' of those holding research degrees, destined to be the cutting edge of the research system and who also formed the future cadres from which the Professorate - in the European sense of the term, not the American - would be drawn.

4 That year saw the publication of the Robbins Report, which recommended the doubling of numbers in higher education by the end of the decade. (Cmd *Report of the Prime Minister's Committee on Higher Education under the chairmanship of Lionel Robbins*, London HMSO.

5 Amongst the European systems which saw the growth of various forms of Open University were Britain, the Netherlands, Spain, the (then) Federal Republic of Germany entre autres. For this see Sarah Guri Rosenblit *Distance Teaching and Campus Universities: tensions and interactions*, Oxford, Pergamon for International Association of Universities

recipient of, and its corresponding responsibility to be respondent to, market driven demand.

Reviewing the notion of change and its implications

Chronology and the essential characteristics that changes in system mission and institutional response imposed upon it are, however, only the surface features. Equally significant was the debate that such re-ordering of priorities stimulated amongst university leadership, a change urged on by the very considerable instability and uproar which massification posed to established power and authority in the university world and which the prospect of 'uncoupling' between the university and its historical outlets in the form of the 'fixed price labour market' – public service – posed amongst students. Here was a theme that, in varying forms, was to dominate the university world over the ensuing thirty years, namely should the university seek to integrate current policies with those that had gone before? (Neave, 2000, pp.22-25) Or should it turn resolutely towards the future? Put dramatically, the debate which university leaders faced throughout the Seventies – and beyond – was whether higher education should accept the demands of external society on the latter's terms? Or should it seek to impose its own order and to reinterpret such external demands, assimilating them at its own pace?

This was no small issue since it brought into opposition two very different visions of the university's place in society, as an agent of cultural continuity and political socialisation on the one hand – a vision that was consolidated in the course of the 19th century – and as an instrument for improving the Nation's economic stance in an arena where the international dimension came increasingly to dominate.

Unbundling

One of the more confusing tendencies in higher education policy today comes with the forging of a terminology which, like every terminology, serves as a species of intellectual short-hand for highly complex processes. This is a natural part of scholarship and so long as it serves to advance our understanding by developing the basis of a common conceptual vocabulary, it is itself a sign of advance. Still, there are risks in this form of nominalism even if, as the Midrash pointed out, the naming of the beasts of the field and the fowls of the air was one of the first and most important tasks the Almighty set Adam. (Neave, 1998) In short, if labelling is primordial – which it is – it is also risky. Perhaps the prime of these risks in coining the 'happy phrase' or the felicitous term, is the impression that, since the term itself is new and striking, so the phenomenon or constellation of phenome-

na, which it regroups in a new conceptual set, are themselves new. This is not always the case and most certainly not when we subject the notion of 'unbundling' to the searching light of historical analysis.

As it is used today, the notion of 'unbundling' describes a multi-level process of rationalisation and reorganisation in the various key functions of teaching, learning and research. Despite the apparent technical neutrality of the term, a neutrality that is acceptable only because it evacuates from it the human consequence of what is entailed, unbundling has very far reaching consequences indeed and that on three levels at least.

Three dimensions

The first involves redefining the basic work undertaken by the individual academic, and in particular, to the splitting off of such functions as research management, international relations, guidance counselling into specialised, self standing activities which, once part of academia's usual responsibilities, are in process of migrating into the purview of professional administration or student support services. There are further pointers in this direction which some have noted in connection with distance teaching universities. In this specialised sphere, changes in the transmission of knowledge inject into academic work and production specialists previously only indirectly associated with the fundamentals of academic work and who are now brought in to undertake its presentation, diffusion. (Guri-Rosenblit, 1998) and even selling. In this sense, unbundling may be viewed as redefining academic work, subjecting it to a new division of labour, the industrialisation – some might say 'proletarianisation' – of an estate long characterised by a mode of working akin to the artisan.

The second turns around the re-ordering of the relationship between teaching on the one hand and research on the other, and to this extent the ending of the organic ties which have distinguished the European university from other forms of higher learning for almost the past two centuries. Unbundling in this sense involves a further and as yet indeterminate stratification between those institutions where both flourish and those where only the former is to be found. It is perhaps best described as 'structural unbundling' and, initially, is driven in no small part by governments, through performance-related evaluation and research funding policies.

The third level of this process bears down on the individual institution in the form of a further species of specialisation, itself the likely outcome of the decision to

concentrate the individual establishment around its sources of strength on the one hand and cutting back on areas or fields deemed to be sources of weakness on the other. Thus, 'unbundling' bids fair to introduce a further degree of stratification between institutions of higher education over and above the dichotomy of 'research' or 'non research-based' universities. As such, it appears as a major departure from what is termed in American jargon as 'comprehensive universities'. That is, as Chekov once remarked acidly, universities which cultivate all the faculties – including stupidity. (*l' Université cultive toutes les Facultés y compris celle de la Bêtise!*) Since the decision on which Faculties shall be favoured and which shall be left to wither on the vine, is largely a matter for the individual establishment, one might describe it as 'voluntary, curricular' unbundling.

The archeology of a concept

One of the most interesting aspects implicit in general concept of 'unbundling' is its apparent unwillingness to admit that to 'unbundle' presumes that one has 'bundled' in the first place. And in the second place, to recognise that previous bundling might itself, within the canons of its day, represent an earlier form of 'unbundling'. If this is so, then it would suggest that, perhaps unbeknown to them, the students of unbundling have, in effect, lit upon a very old dynamic that has, once again, emerged in a modern context. Or, to nuance matters slightly, that the predicted consequences for the future subject profile and balance of higher education systems which such factors as heightened competition, marketisation and the rise of new means of diffusion and communications represent, serve to impart a new visibility to – and very certainly, a new awareness of – such a dynamic, a visibility all the more evident for the speed of its development and its 'compactness' in time. Information technology then is the handmaiden to 'unbundling'. It draws our attention to it almost as a 'second order phenomenon' which emerges from our concern with the impact that 'marketisation' and 'new technologies' appear to hold in store. If, however, we focus on unbundling as an historical phenomenon, then clearly, competition, marketisation etc are simply the vehicles for its present-day revival – or variation. They are not its creator. On the contrary, unbundling – or for that matter, 'rebundling' – may be construed as part of a more enduring mode of adaptation with examples in earlier times and in other circumstances.

Bundling

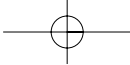
Such an interpretation becomes eminently sustainable once we pose the question what it is that is being 'unbundled'? From its earliest times, the university 'bund-

led together' two very specific functions, the handing down of revealed knowledge and the socialisation of the younger generation into the social order such knowledge upheld. The organisational form through which these functions were carried out – the academic Guild – save with respect to certain legal privileges which learning enjoyed as part of a medieval triplex ordo of Pope, Emperor and Learning (de Groof, Svec & Neave, 1998, p.14) mirrored very closely that other basic arrangement for skilled productive labour, the medieval Guild system.

The well-known aphorism of the one time President of the University of California system, Clark Kerr, that the university is one of the few Western institutions to have survived in recognisable form over the ensuing eight hundred years, (Kerr, 1964) poses the question 'How did it do so?' And one of the answers is that it accommodated to changes in knowledge, the rise of new intellectual perspectives – for instance, 16th century Humanism on the one hand and the rise of scientific knowledge on the other precisely by 'bundling' these new perspectives into the basic functions and responsibilities the academic guild assumed.

A classic illustration of 'bundling in' may be seen in the Humboldtian university itself by including research as one of the university's obligations with the correlative development of the 'research seminar' and the laboratory as new loci of knowledge production as opposed to knowledge transmission. Indeed, if we re-interpret the Humboldtian imperative of research in today's terminology, as a 'new form of useful knowledge', then it is equally possible to see its advent and subsequent spread beyond its country of origin to such systems as the United States (Gellert, 1993) Britain (Kogan & Henkel, 1994) and France (Neave & Edelstein, 1993) in the course of the 19th century, as an 'un-bundling' of higher learning's prime obligation to transmit acquired knowledge by teaching alone.

'Bundling in' brought two other features in its train. It extended the basic feature of teaching which, in the original Guild model, rested on a close 'Master/apprenticeship' mentoring, to advanced learning. Likewise, it introduced a new organisational complexity by adding a species of 'instructor' class – docenten, wissenschaftlichen Mitarbeiter on the one hand. It also established – at least in the German setting – Research Institutes which were personally tied to the individual chair-holder and which, sometimes served as intermediary for privately undertaken research contracts.



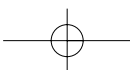
Other examples

There are, of course, other examples of 'unbundling' which acquire a new significance, once we begin to explore the historical antecedents of this notion. Amongst the clearest examples, though obviously outside the Western tradition, occurred in the higher education system of the one-time Soviet Union. Though serving a command economy, the creation of specialised institutes of higher education, directly and intimately tied in with a particular branch or sector of the economy, with training its future personnel may be seen as one of the first examples of 'unbundling' at system level in the history of the 20th century university as well as the first example of linking higher learning explicitly to economic reconstruction.

What follows from examples such as these is that 'bundling' as an historical phenomenon is driven primarily by changes in knowledge itself, and by the particular manner in which the university organised itself to accommodate or to assimilate this new responsibility. By so doing, it gives rise both to new fields of academic endeavour and new organisational forms to sustain them. The distinguishing feature between the historical version of the process of 'bundling' and – 're-bundling' – from its present day counterpart, lies precisely in the accelerating pace of change on the one hand and the change in scale on the other. In evidence, one has only to dwell for a moment, on the time taken for the modern 'research university' to take root in the major systems of Western Europe – by contrast with the speed at which 'unbundling' has evolved over the past three decades.

Unbundling: forces other than the market and competition

If we hunt for the more spectacular examples of 'unbundling' within this more recent period it becomes apparent that neither marketisation nor, for that matter, competition may be seen as the unique driving forces of the process. Quite on the contrary, the more outstanding examples of this general dynamic have been the direct result of government intervention intended to alleviate some of the more intolerable pressures that massification brought in its train. There is a second observation and it has to do very particularly with one form of likely outcome, which the contemporary students of 'unbundling' attribute to market and competition. Namely, the erosion of the comprehensive university under the press to meet external demand and to generate revenue. In effect, the most outstanding example to date of 'unbundling' occurred in France in the immediate aftermath of 1968. The fragmentation of the ancient Sorbonne and its subsequent division into fourteen individual universities, designed to place a '*cordon sanitaire*' around



the 'serious' Faculties – law, physical, exact and biological sciences – a pattern subsequently replicated in most of the major urban universities of that country – demonstrates very clearly that 'unbundling' as a strategy and as an historical development would appear very much to be influenced by the context or the particular referential system within which its analysts work. For it is very obvious whilst they may entertain occasionally a comparative dimension, it is rather to underpin the similarity of the emerging trend than to verify the contextual variations in which such a trend is located. Or, for that matter, whether earlier examples are to hand which obey a different rationale than simply the rise of academic entrepreneurialism.

Alternative providers

One of the key aspects in leveraging change is the belief that 'alternative providers' will, if main stream provision continues its obduracy, step in and through a more efficient delivery of courses, and by an ability to meet highly individualised demand, become a more appropriate channel to furnish the needs of the 'Knowledge Society', and to do so rapidly and effectively. (De Vijlder, 1996)

There are, of course, many reasons for contesting the precision of the adjective 'alternative'. In effect, under this generic term, many different versions of 'learning system' flourish. Each has very different implications for main stream higher education. (Tschang & della Senta, 2000) Current debate about the pros and cons of 'Open Universities', 'Enterprise Universities' or 'Virtual Universities' tends to dwell upon the importance of communications technology as a way to speed up the delivery of services, to maximise individual choice and to give greater opportunity for the individual to determine how, when at what pace he or she will 'consume' learning, all of which are held to mark a new stage in the liberty of 'learning for Everyman'. All this is very strange when such developments are placed against parallel trends in the 'classic' sector.

Contrary policies

Here, on the contrary, the past three decades have seen, in those systems where historically the pace of learning was primarily determined by the student himself – viz. Denmark, the Netherlands, Sweden and Germany – great pressure to persuade students to complete their studies within the time the Legislator formally stipulated, either by the introduction of financial penalty or by the curtailing of study duration and sometimes both. Interestingly enough, such closer control over study duration, and in others the introduction of continuous assessment or credit unit schemes,

amplifies the drive towards greater control over individual performance the better to ensure greater efficiency in terms of student output and public return on monies invested. These measures are the outcome of national policy which, very often in the same land, encourages the development of 'alternative modes'.

The dichotomy between student centred and student paced learning on the one hand and the tightening public control over the 'frame factors' of learning on the other, is perhaps one of the more remarkable contrasts between the two systems. Presented in these terms, such a difference probably represents a more essential distinction than the present one where the prime area of difference between 'mainstream' and 'alternative' modes of transmission is constituted by large-scale dependence on 'learning systems' based on information and communications technology by the latter, and the reliance by the former on multiple technologies – some of which date back to Guttenberg, if not earlier still.

New technology and learning theory

There is, however, another aspect and it too is worth noting. If 'alternative providers' break with the centuries-long condition of physical presence to accompany the act of learning, they also break with an equally fundamental dimension of learning. That fundamental holds learning to be a social process which, whilst it imparts knowledge of a cognitive nature, also involves the social and affective as well. The tradition of 'residentiality' – that is, the deliberate physical separation of the learner from his background as a necessary accompaniment of 'enculturation' into higher learning and into the social responsibilities it implied for the future citizen and leader in public life – has certainly been weakened as much by the rise of urban universities as by their subsequent massification. (Rothblatt, 1998) Whether such weakening amounts, as some claim, to the virtual abandonment of the university's responsibility in the domain of socialising the individual into the *Res Publica*, replaced instead by an underscoring of specific operational skills related to occupation⁶ rather than to citizenship, is debatable. (Rothblatt, 1996) Yet, the

6 The re-focussing of the curriculum around occupational skills and what may be seen as 'occupational socialisation' has many examples. One of the more interesting, precisely because it neither minces words nor hides its purpose, is the British 'Enterprise Initiative', launched in 1992 to introduce 'the culture of the firm' and entrepreneurial values into the undergraduate experience. Whilst this development certainly reflects the growing power of external interests - or a certain section of 'Stakeholder Society' - to mould higher learning to its own specific requirements, it is also, by the same token, a fundamental re-definition of the community to which higher education is responsible. Such a definition moves away from a community defined by proximity or shared ethical values towards one defined by the nature of the work the individual undertakes. (for an outsider's view on an equivalent process in the Netherlands see Neave, 2001.) When one considers that over the past 20 years or so, marked reduction in the average working week, and thus the relative detachment of citizen identity from the work place, this is certainly a paradoxical situation.

adaptation of teaching and learning techniques to an intellectually broader constituency has been one of the major issues, though often side-lined, during the early days of the transition to mass higher education in Europe, a concern often presented in terms of 'Hochschuldidaktik' in the early Seventies.

Individualised learning: a benefit bestowed?

The rise of 'alternative providers', however, poses four square the issue of whether 'learning in isolation' is in reality, more effective in terms of cognitive acquisition than 'collective group-based' learning. It also has repercussions in another area, namely the implications it may hold for social cohesion amongst technically competent individuals whose skills have been developed in social vacuum. The separation of knowledge transmitted from the social experience incorporated in 'grouped' learning is not just a breakpoint in the history of pedagogy. It also raises a far wider-ranging question, that of social cohesion, solidarity and community awareness in the Knowledge Society itself, just as it raises the question of which community and how defined such a socio-technical construct should serve. It remains a moot point whether such individualisation of skills acquirement, detached from the collective experience of learning, might itself accelerate social fragmentation, a vision of Society in which Everyman is knowledgeable but unconcerned about his neighbour's lot or condition.

That said, whilst the rise of 'alternative providers' poses fundamental questions about the nature of academic work, and the further potential for fragmentation between those who develop new knowledge, those who package it, those who transmit it, not to mention the equally vexed issue of ownership, commodification and the notion of knowledge as a public good,⁷ the concept of 'alternative providers' also opens up interesting perspectives in the historical domain as well.

One of the more powerful arguments wielded by the supporters of 'alternative providers' and even the students of ICT, is that technologically-based mass learning systems recast the abiding issue of access to knowledge. And, more to the point, that the sources of this 'reforming impulse' are all the more powerful for being located outside mainstream higher education. One may, if one is so incli-

7 Attention is beginning once again to focus on that other abiding issue as to how far higher education should be considered to be a 'public' or a 'private' good. This too has its historical forebears though they tended to draw a rather more rigorous line and, moreover, applied it to 'learning' rather than to higher education conceived as a service. Today, it is the economists who have inherited from their monkish forefathers the age-old issue whether learning is driven by '*amor scientiae*' or by the eternal bottom line, '*amor pecuniae*'.

ned, debate whether such a reform entails a change in the nature of the knowledge transmitted or in the nature of the process of transmission itself, its technicity and the organisational consequences both bring in their train. Much of the debate inclines towards the latter. And much heat has been generated about the benefits that result from dissolving the university's monopoly over access to higher learning. This is an important point as much for its ideological symbolism as in the barely disguised criticism that mainstream provision is not as responsive to social still less to technological change as today's society apparently requires.

Earlier parallels

If, however, we take a rather longer-term perspective, we come across a number of interesting parallels and very particularly when we examine earlier precedents which, from time to time, challenged the university's status as a purveyor of 'recognised knowledge'. These parallels bear remarkable similarity in the challenge they posed, both in respect of 'new and relevant' knowledge and for the fact that functionally speaking, they were to all intents and purposes, providers alternative to the university. An especially striking example of this development is to be found in 16th century Portugal in the shape of the so-called Navigation Schools, a very practical example of technological innovation (trans-oceanic shipping) posing new demands for the dissemination of 'relevant knowledge'. Another occurred slightly later in the shape of the Ritterschulen in early 17th century Germany, establishments grooming in courtly manners, riding, the handling of sword, pike, musket and other refinements of military mayhem.

The ephemeral and the enduring

Clearly, in terms of specialised learning, the university did not exercise a wholly exclusive monopoly. But precisely because the university is unique in its historic continuity, we tend to concentrate our attention upon it, often to the detriment of 'alternative' providers, many of which, like the Navigation Schools and the Ritterschulen, were passing and ephemeral. Ephemeral though they were, it is nevertheless possible – though at the price of blatant anachronism – to see in them an essential and early form of 'response to market demand', a century and a half before Adam Smith and the Wealth of Nations. Temporary though these two illustrations were, there were others, which had major consequence for the type of knowledge the university was later to dispense. Whilst, this second strand of 'alternative providers' did not necessarily involve either students or teaching, they were for all that, of immense significance in that gradual and century-long shift in the basis of knowledge from being based on 'revelation' to becoming

grounded on the principles of observed and replicable analysis – perhaps the single most important development that marked the earliest origins of the modern university and, by the same token, the ultimate demise of medieval Scholasticism.

Some clues to this historical watershed are provided in the writings of the Israeli sociologist, Joseph Ben David. (Ben David, 1977) Ben David's principle concern lay not with 'alternative providers'. Rather, he focussed on the conditions, social, political, cultural and 'professional' that contributed to the emergence of modern learning systems in Britain, France, Germany and the United States from the seventeenth century onwards. It is, however, a short step and one easily taken, to interpret the advent of what Ben David termed 'specialised professional schools' which emerged, often in opposition to the classic university, as an historical counterpart of today's 'alternative providers', above all in Britain, Prussia and France. (Ben David, 1977, p.12) Amongst the key institutions that may be regarded as functionally equivalent to 'alternative providers', one may count the British Royal Society, founded in the mid 17th century, the various Schools of Mining (Bergakademien) in Germany and the French Ecole des Ponts et Chaussées, founded during the second half of the 18th century under the auspices of the Physiocrat, Turgot. (Dakin, 1957)

"There was a strong belief in the applicability of science, especially to medicine and engineering, and selecting the administrative elite through an education that conferred specific technical qualifications in fields relevant to their work seemed to be more equitable than selecting them according to university degrees testifying to some general learning of doubtful relevance to the task." (Ben David 1977, p.12)

The echoes are curiously modern. However, there remains a fundamental difference between the prototypical version of 'alternative providers' two to three centuries ago and their present day heirs. For whilst the former differed from the historic university in the type of knowledge their proponents hoped they would convey, the latter are distinct less epistemically than in the techniques and media of delivery.

Common links between past and present

Even so, two common characteristics are shared between earlier 'alternative providers' and their present-day descendants. Both developed outside the university. Both reflected that condition of intellectual mobilisation to which, with certain exceptions, Scotland being one, the Netherlands another, the university of the day remained largely unheeding. Nor was this intellectual effervescence confined

to bodies which, like the British Royal Society, enjoyed official sponsorship and recognition. It was equally evident in less glorious groupings – in France, the ‘new’ knowledge took root in various provincial *salons* and academies and in Britain, in the Birmingham Lunar Society and certain Dissenting Academies. (Ben David, 1977) Their role in the development of applied sciences bears a certain kinship with that monument to the applied and mechanical arts which was to emerge a century later in the American Land Grant Colleges.

Such initiatives were to be of enduring significance. They stood at the point of coalescence in a pattern of reform that was to last throughout the 19th century and beyond. Such a pattern of reform involved two distinct processes, both of which are, effectively, part and parcel of what we have termed ‘system accommodation’ and which we have analysed earlier in the shape of ‘bundling’.

Bundling-in resuscitated

The first of these turned around ‘institutional bundling in’, perhaps better described as ‘peripheral accommodation’. It took the form of establishing specialised institutions on the edge of existing provision. Typical of this manner of proceeding were the various Engineering Schools, the Technische Hochschulen in Germany and their counterparts in those systems for which Germany served as a point of reference – Denmark, the Netherlands, Sweden inter alia. Parallel developments can be seen in other ‘subject domains’ – Agriculture and, somewhat later, Teacher Education.

The second variation involves what may be termed ‘curricular bundling in’. It sees mainstream institutions taking over and introducing the once ‘marginal’ field into their own programmes and courses.

This long-term view on the process of ‘accommodation’ yields a very different perspective on the early stages in the drive towards mass higher education. In essence, once one takes into account the difference in scale, the reforms implemented at system level – which is simply another way of designating the process of ‘scaling up’ – it is clear as the day is long that the strategy of expanding the non-university sector during the mid Sixties onward in Britain, France, the then Federal Republic of Germany and Norway merely reiterated that self-same process of ‘peripheral accommodation’ that had long existed only this time in a highly compacted time frame.

Strategic intent, 'peripheral accommodation' and alternative provision

Not only was the 'non university sector' conceived as an 'alternative to the university'. It was also held to be more 'efficient' by dint of direct and explicit ties between programmes and the labour market, by its shorter length of studies (although this was not the case either in Britain or in France). Yet, this modern version of 'peripheral accommodation' or 'institutional bundling-in' differed from its predecessors in one significant respect. It was not conceived as a strategy, like John Donne's New Found Land, 'sufficient unto itself'. On the contrary, just as higher education in general was tied into social and economic transformation, so these 'alternatives' were themselves seen in certain quarters as accelerating the general pace of change. In short, the strategy which, in earlier times, had been part of 'institutional accommodation' itself mutated and took on a dynamic dimension. Equally significant, such a mutation, it was believed, would not be confined to the 'alternative sector'. It would, through the impact of competition and, hopefully, by the threat of diverting student demand away from the university, force the latter to adopt a new flexibility. In fine, the strategy of 'alternative provision' rested upon an explicit theory of competitive emulation that would serve to force the pace change in the university. (Brosan & Robinson, 1970)

In higher education policy, even when historically interpreted, it is rare indeed that one theory is sufficient to envelop what subsequently takes place. Thus, it can be surprising to no-one that the hypothesis which viewed the 'institutional alternatives' of the late Sixties and early Seventies as the competitive handmaidens of change should be subject to other interpretations – and consequences.

An alternative interpretation

Another perspective may be entertained and whilst it applies to precisely the same strategy, it lays a very different role and weight upon 'alternative provision'. Such a perspective does not deny the significance of 'alternative forms'. What it does do, however, is to see them as experimental, as a 'testing ground' for the mainstream rather than as an enduring counterpart to it. Viewed from this angle, 'alternative' institutional forms have one significant function. They serve to evaluate the potential – and the effectiveness – of whatever claims are made on behalf of the innovations they represent. And, no less important, they can do so, theoretically at least, because in their very quality as innovative bodies, such 'alternatives' – whether 'institutional' or in their less hard and fast manifestations as 'systems of dissemination and transmission' – are often uncluttered by the weight of establis-

hed practice, whether this practice be curricular, presentational or, for that matter, organisational.

There is sufficient evidence to show that curricular innovation, launched in the 'non-university' sector is subsequently taken over by their university counterparts. (Furth, 1998) To cite but one instance, the new combination of degrees – for instance, Engineering combined with a modern language – once the hallmark of the one-time English polytechnics – has been assimilated to advantage by the British university sector. Certainly, the same evidence demonstrates the *bien fondé* of the thesis of competitive emulation as it does of the innovative role of 'institutional alternatives'. But it does so precisely because there has been sufficient time and evidence to show that the 'experimental' and the potential have justified empirically and in practice the claims originally made on their behalf. And that they are transferable or generalisable beyond the 'experimental' conditions under which they were first launched.

Sundry considerations in guise of a conclusion

In this essay, we have sought to trace the long-term development of higher education by exploring two concepts currently held to apply to higher education in its present state. Bundling – or for that matter unbundling – and 'alternative providers', however, can be shown with profit to be illustrative of some of the basic dynamics in the historical development of higher education. Such an observation in no way diminishes either the impact or the potential consequences that change in techniques of transmission and the way the academic labour force may have to be 're-organised' if 'alternative providers' are to become 'enduring providers'. Yet, there is a lesson we may retain from this brief excursion into concepts that have, as yet, to be pursued in greater depth. It must surely be that there is no guarantee of the present species of 'alternative providers' necessarily becoming abiding forms of higher learning as opposed to ephemeral versions of the same. In this domain, the ephemeral has had its part no less than that which turns out to encapsulate those often unpredictable conditions, which make for enduring change. If no-body forgets the Royal Society, very few indeed remember the Ritterschulen.

It is a banality of the worst kind to say that what determines both the permanent and the ephemeral is the passing of time. It is just as true to say that earlier 'alternative providers' functioned in a world when the adage 'Time is money' was far less appropriate than it is today. This is very easily demonstrated if we follow the

various stages in establishing, for example, Engineering Sciences in France. Whilst the first civil engineering establishment – the Ecole des Ponts et Chaussées – was founded under the Ancien Regime and its military counterpart, the Ecole Polytechnique in the dying days of the Revolution in 1796, only in the early 20th century did Engineering develop a solid base in higher education with the creation under the Loi Astier in 1924 of the Ecoles Nationales des Sciences de l'Ingénieur. This indeed was progress *au pas de Senateur* in which the importance of innovation could in part be judged by its ability to endure, that is, to maintain its 'pertinence' over time – in short, its intrinsic sustainability.

The phenomenon of the assertive trend

If we examine the evidence accompanying today's 'rise of alternative providers', one is immediately struck by the fact that much of it corresponds to what might be qualified as 'the phenomenon of the assertive trend'. That is to say, the ascribing to various alternative forms – many of which have yet to prove the durability of the 'model' they are held to incarnate – of the capacity to handle what are perceived as current and always pressing 'needs' which, equally inevitably and as a second part of the argument, existing provision either has not or, because it has not, is for that reason deemed to be unwilling, to contemplate and, to take on board. Yet, rarely is the current volume, numbers of these new forms of institutions, still less their proven capacity to undertake these 'pressing missions', provided in empirical, verifiable and objective information. Still less do we know whether the innovations – organisational, presentational, pedagogic – are replicable outside their 'forms of origin' without further ado or adjustment.

More often than not, the mere existence of specific examples of 'alternative providers' is held to be part of a trend, often with very little attention paid either to its extent, still less to its momentum, save to say that it is 'everywhere present' or, phrase hideous in the extreme, 'on the cusp of being everywhere' – a rare example of metaphysical optimism. Thus, one new form is hawked about as the 'shape of things to come'. It might indeed be. But it is useful to know how far such specific forms have come from the time they were first identified. This is necessary if only to be able to estimate the most elementary of all aspects as to their possible significance – namely, whether they command any credibility through emulation – in short, that we have some pointer to their 'seriousness' and their competitive potential in terms other than mere panegyric. It is all very well to identify a trend. It is better by far to have evidence of its strength – or its fragility. Unfortunately and all too often, that such bodies are to be found on the landscape of higher

education, is held to be proof of their capacities to discharge that range of functions their supporters ascribe to them. Thus, the existence of such bodies is its own proof of their *bien fondé*. Yet, as gardeners and medical doctors know full well, one swallow does not make a summer – any more than one swallow makes an alcoholic!

John Milton and the principle of caution

Still, the drive to licentious extrapolation continues. From the 'phenomenon of the assertive trend' springs the next part of the exercise – that is, the extrapolation to meet 'future needs'. To this, the cautious would note that until the prototypes and 'singletons' have given proof of their ability to do what logical extrapolation and assertive imagination ascribe to them, it is exceedingly unwise to build a policy where, to parody the 17th century English poet, John Milton, only Angels – or consultants – have dared to tread. Constructing policy around the merely plausible violates the elementary principle of caution.

Yet, if there is one lesson an historical excursion into 'alternative providers' tells us, it is that their sheer existence amounts to little more than higher education's equivalent to the Scottish legal verdict, 'Not proven'. Of course, unless failure is immediate and indecently spectacular, the ephemeral cannot conclusively be identified either, just as, under the pressure to 'be flexible' and to 'respond' to 'society's demands', it is difficult indeed to identify that particular 'solution' which may become 'permanent'. And yet, never has the pressure to embrace the 'plausible' assumed such heights as it has today.

A new obligation for the evaluative state

In a curious manner, the appeal of 'alternatives' cannot but be fuelled by the steady thrust that evaluation, quality assessment, and the new instruments of public purpose has brought to bear on main line provision. (Scheele, Maassen & Westerheijden, 1998) This is not to deny – very far from it – the persuasive weight for self-improvement which comes with such procedures. The revealing of shortcomings, of less than optimal practices, of the potential for institutional adaptability is with us and very likely will remain so. And a powerful tool it is too, in urging institutions and their inmates on – sometimes at a pace uncomfortable to those who have to devise ways of adapting to a world that is changing.

Still, it is more than a little strange that the claim to possess the potential and the appropriate organisation to deal with new demands of higher education by new

means, seems to confer upon those 'alternative forms' what can only be described as a species of immunity from precisely that enhanced public scrutiny which is part of today's usual lot for 'main stream providers'. It is, at the very least, singularly perverse to suspend doubt and disbelief about claims that remain as yet to be substantiated, whilst refusing the benefit of the doubt in the case of those forms of higher education which, over the past three decades, have without a shred of doubt, contributed very substantially indeed to raising the general level of education – and standards of living that follow – amongst their prime stakeholders – the citizenry of the nations for which they were created.

There is, on the contrary, a very excellent case to be made in favour of extending that self-same rigorous scrutiny which governments, anxious to secure efficiency and to reduce the burden upon the public purse, set down on 'mainstream providers'. There would seem to be a certain equity, and most assuredly a public interest, to do so and this time very precisely to dwell on those whose claims to do all this and more, have yet to be born out. Such an exercise may in truth provide a more objective basis for 'main line provision' to decide which of the promising new modes are more than plausible, which have real, effective and proven potential and which are the perfervid products of 'fads', enthusiasm and special pleading. At the moment, the individual university is unlikely to be able to do this adequately on its own and with sufficient expedition. And, who knows, uncompromising assessment of the potential to which such 'alternative providers' lay claim, may indeed contribute to foreshortening the time required to assimilate their more valuable experiments into the extended range of new techniques and methods which main stream providers have taken on throughout their history.

The ultimate virtue of friars and futurologists

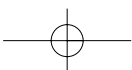
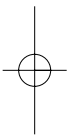
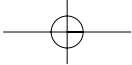
In higher education policy, just as in navigation, using the wrong end of the telescope can sometimes render a service. By clapping our eye to the front piece, we can make out our course – back tracking to where we have come from. By dint of knowing what our path has been to get where we are at present gives us a new set of bearings. To be sure, how we got here is not necessarily comfortable, still less easy. But knowing what we have done to get here at very least, ought to give us some confidence in what we have achieved and in our ability to have overcome those difficulties that lay in our path. And that, in its turn, should reinforce that quality which stood as the ultimate Virtue for Friars and Futurologists alike. Such a quality has a very respectable antiquity. It is Faith 'to boldly go where no man has gone before.'

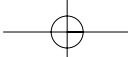
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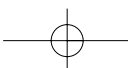
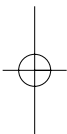
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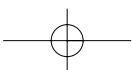
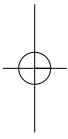
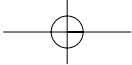
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APPENDIX





Appendix 1: Summaries

Academia in the 21st century

A collection of books, articles, and policy papers have been consulted to present a state-of-the-art of future visions regarding academia. In this appendix, summaries of a part of this collection of documents can be found. The documents are grouped by stakeholder.

1	National agencies and advisory bodies	91
1.1	Centraal Planbureau (2001). <i>Higher education reform: getting the incentives right</i> . Den Haag: SDU, CPB/CHEPS: 158.	91
1.2	Overlegcommissie verkenningen (OCV)(1996). <i>Een Vitaal Kennissysteem; Nederlands Onderzoek in Toekomstig Perspectief</i> . Amsterdam: OCV.	91
1.3	RAND Europe (2001). <i>Visies op de toekomst van het wetenschappelijk onderzoek</i> . Leiden: RAND.	92
1.4	Pomp, J. M. (2000). "Diversiteit in de mondiale kenniseconomie." <i>Trends, dilemma's en beleid. Essays over ontwikkelingen op langere termijn, SCP/CBP: 75-101</i>	93
1.5	Wissenschaftsrat (2000). <i>Theses for the Future Development of the System of Higher Education and Research in Germany</i> . Cologne: Wissenschaftsrat.	95
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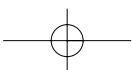
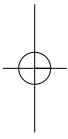
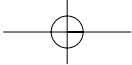
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- 2.41 Roberts, P. (1999). "The future of the university: reflections from

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2.42	Schimank, U. and M. Winnes. (2000). "Beyond Humboldt? The relationship between teaching and research in European university systems. <i>Science and Public Policy</i> 27(6):397-408.	139
2.43	Trow, Martin (1997). "The development of information technology in American higher education." <i>Daedalus</i> 126(4): 293-314.	139
2.44	Welle-Strand, A. (2000). "Knowledge production, service and quality: higher education tensions in Norway". <i>Quality in Higher Education</i> , 6(3): 219-230	140
2.45	Whitty, G. and Sally Power (2000). "Marketization and privatization in mass education systems." <i>International Journal of Educational Development</i> 20(2): 93-108.	141
3	Supranational bodies	142
3.1	Caracostas, P. and U. Muldur (1997). <i>Society, The endless frontier</i> . Luxemborg, Office for Official Publications of the European Communities	142
3.2	Council of the European Union (2001). <i>The Concrete Future Objectives of Education and Training Systems</i> [cited. Available from http://europa.eu.int/comm/educa.pdf].	142
3.3	Commission of the European Communities (2000). <i>Making a reality of the European Research Area: Guidelines for EU research activities (2002-2006)</i> . Brussels: 22+ annexes.; and	143
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3.5	OECD (1998). <i>University research in transition</i> . Paris: OECD	144
3.6	OECD (1998). <i>The Global Research Village: How Information and Communication Technologies Affect the Science System</i> . Paris: OECD.	145
3.7	OECD (1999). <i>The Response of Higher Education Institutions to Regional Needs</i> . Paris: OECD.	146
3.8	Salmi, J. (2001). "Tertiary Education in the 21st Century: Challenges and opportunities." <i>Higher Education Management</i> , 13(2):105-129	147
3.9	World Bank (1998/99). <i>World development report. Knowledge for development</i> . Oxford: University Press.	148

4	Institutional leaders and managers	149
4.1	Alva, Jorge Klor de (1999). "Remaking the Academy in the Age of Information." <i>Issues in science and technology</i> (online), winter.	149
4.2	Berkhout, A. J. (1998). <i>De universiteit van de 21e eeuw. Multidisciplinaire wetenschap in een flexibele netwerkorganisatie</i> . Delft: TU: 1-20.	150
4.3	Klerk, L. F. W. de (1999). <i>Op weg naar de 21ste eeuw: van academia naar nutsschool?</i> Tilburg, University Press.	151
4.4	Fekete, A. (2001). <i>Vision of The Future for the University of Sydney</i> . (http://www.cs.su.oz.au/~fekete/future-uni.html).	151
4.5	Goedegebuure, L. and F. van Vught (2000). "Monsters, markten en mondialisering: uitdagingen voor de universiteit." J. Hopstaken en J. de Haan, <i>Gejaagd door de winst: op weg naar marktgericht hoger onderwijs</i> . Amsterdam: Hogeschool voor Economische Studies.	152
4.6	Ronayne, Jarlath (1997). "Research and the New Universities Towards Mode 2." <i>ATSE Focus</i> jul/aug(98).	153
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4.8	Thorens, Justin (1996). "Role and Mission of the University at the Dawn of the 21st Century." <i>Higher Education Policy</i> 9(4): 267-75.	155
5	National governments	156
5.1	Department of Trade and Industry (1999). <i>Excellence and opportunity. A science policy for the 21st century</i> . (DTI)	156
5.2	Ministerie van OCW (2001). <i>Grenzeloos Leren; Een Verkenning Naar Onderwijs En Onderzoek in 2010</i> . Zoetermeer	158
5.3	<i>Norway: Academia 21st Century</i>	158
5.4	<i>Sweden: Academia 21st Century</i>	159
5.5	Swedish Ministry of Education and Science (2000). <i>Research and Renewal, Summary of a Government Bill. 1/3</i> .	159

6	Industry	160
6.1	Everhart, T.E. (1996). "Investing in Technological Leadership." <i>The Bridge</i> 26(3&4).	160
6.2	Galvin, R.W. (1996). "Trends in Engineering and Science: An Industry View." <i>The Bridge</i> 26(3&4).	161
6.3	Nicol, R. (2000). "The Future of Research - Collaboration." <i>BT Technology Journal</i> 18(1).	161
6.4	UNICE (2000). <i>Stimulating Creativity and Innovation in Europe; the Unice Benchmarking Report 2000</i> . UNICE.	161
6.5	--- (2001). <i>Investing in Knowledge</i> . Joint manifesto of VNO-NCW, KNAW, WO, TNO and VSNU.	163
7	Other	163
7.1	--- (1997). "The Knowledge Factory. A Survey of Universities." <i>the Economist</i> .	163
7.2	Euroscience (1998). <i>The Future of Young Scientists in Europe</i> . (draft) Euroscience work group.	165
7.3	(--)(2000). <i>Policy for Higher Education in a Changing World. Future Policy Scenarios</i> . The Futures Project.	165
7.4	--- (2001). <i>Privileges Lost, Responsibilities Gained: Reconstructing Higher Education. the Futures project</i> : Columbia University Teachers College.	168



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National agencies and advisory bodies

1.1 Centraal Planbureau (2001). *Higher education reform: getting the incentives right.*

Chapter 8: The Dutch HE system: options for policy-makers.

In this final chapter the authors, after an analysis of funding systems in a number of countries (e.g. Australia, Denmark) offer several policy options for the Netherlands. The underlying idea being that HE is not a public good, but a private good with potential external benefits. The idea therefore is that governmental subsidy is only in order if it leads to positive externalities that would not have been realised otherwise. Externalities come in several kinds, positive effects for the economy and culture and social equity. In all other cases governmental money is better spend elsewhere.

From this perspective the authors come to the following set of policy-options:

- Replace part of the public subsidies to the HE sector by private contributions;
- let student debt repayments be based on an automatic income-contingent repayment scheme, where minimum monthly instalments increase with income;
- permit institutions to set their own tuition fees within some price range specified by the government;
- permit institutions to select a certain percentage of their students (as a pilot study);
- provide public support to Master programs in those disciplines from which substantial spillovers to society can be expected;
- strengthen the link between research funding and research performance;
- carefully stimulate universities to recognise the commercial value of research results and to implements a patenting and licensing policy.

1.2 Overlegcommissie verkenningen (OCV)(1996). *Een vitaal kennisstelsel; Nederlands onderzoek in toekomstig perspectief.*

The key question of this report that is based on explorations of separate fields of research concerns the kind of research and knowledge system needed in the Netherlands. They stress that a vital knowledge system requires an intensive mutual relationship between science and society. Strategic co-operation among institutions is also important. Points of departure for such co-operation are self-governance (including the other side of the same coin: increased accountability), differentiation and stressing distinctive features. These are important points

because of economies of scale and because of required multidisciplinary, both in science itself and in societal 'problems'.

The report mentions four trends or main themes: 1) information and communication in a knowledge society, 2) the pursuit of a vital and sustainable economy, 3) internationalisation, including regionalisation, and 4) improving the quality of life.

Then the report discusses some particular fields of science, including concrete recommendations for each field. This will be left aside in this study at issue.

1.3 RAND Europe (2001). *Visies op de toekomst van het wetenschappelijk onderzoek.*

MOCenW commissioned RAND Europe to develop a number of scenarios for Dutch research in 2008. Although the main report contains interesting elements, we concentrate on the four scenarios. In these scenarios a number of demographic and economic background factors are fixed: positive migration balance, ageing population, a restricted shortage of researchers, GDP > 500 billion Euro, growth GDP is 2,5% per year, investments in R&D > 12 billion Euro, investments in R&D 2,5% of the GDP (1% government 1,5% business and industry).

Research the Netherlands Inc.: The government facilitates research and allocates resources based on performance indicators (publications, citations, number of graduates, number of PhDs granted, patents, peer review) and does not interfere at the institutions' level regarding the contents of research. Research institutions co-operate in a competitive environment. Researchers work together in teams and are collectively responsible and accountable. Contract research increases in size, basic research decreases. Although the Netherlands aspire to an excellent role in the knowledge economy, international competition makes it hard to achieve this ambition. Improved terms of employment commit the researchers to 'their' institution. Many multidisciplinary teams work together on research themes.

Following the footsteps of Van Leeuwenhoek: The government is directive and purposive and allocates resources based on research priorities (basic research). Consequently, the government is also concerned with the contents of research at the institutions. Researchers are individually responsible and accountable. Basic research through research councils increases at the cost of other basic research. Although the Netherlands aspire to an excellent role in the knowledge economy, international competition makes it hard to achieve this ambition. Improved terms of employment commit the researchers to 'their' institution. Research is carried out within the traditional disciplines, experiences with multidisciplinary research have been unsuccessful.

Champions' Leagues of Research: The government facilitates research and allocates resources based on performance indicators (publications, citations, number of graduates, number of PhDs granted, patents, peer review) and does not interfere at the institutions' level regarding the contents of research. Research institutions co-operate in a competitive environment, market competition increases as well as public-private co-operation. The size of basic research decreases, European flows of funds and flows of funds from business and industry increase. European integration and co-operation increase, mobility of staff and students is high. Regarding terms of employment, differentiation occurs between institutions. This also partly explains differences in the level of satisfaction of (young) researchers. Research is carried out within the traditional disciplines, experiences with multidisciplinary research have been unsuccessful.

Co-ordinated Advanced European Science Area for Research: European and national governments purposively work together. Europe tries to combat the unnecessary fragmentation of research and the diverging national policies. The focus is on multidisciplinary research teams directed towards societal problems in international strategic alliances. Increasingly, public and private organisations work together. The size of basic research decreases, European flows of funds and flows of funds from business and industry increase. European integration and co-operation increase, mobility of staff and students is high. Regarding terms of employment, differentiation occurs between institutions.

In particular attention is paid to the contextual factors: internationalisation, the role of government (national and European) and markets, and funding mechanisms. These contextual factors also play a dominant role in the eventual scenarios, for these differ in the level of (inter)national co-operation and competition, the shifts in the flows of funds and the role of governments.

1.4 Pomp, J. M. (2000). *Diversiteit in de mondiale kenniseconomie.*

The author states that welfare in the knowledge economy depends for an important part on education, science and technology. In each of these areas government plays an important role: the knowledge economy requires a knowledge policy. The author sketches several trends in the context of Higher Education that have an impact on those areas.

- Growing individualisation makes greater diversity important, economies of scale become less important. It also leads to less willingness to redistribute incomes; therefore prevention of social inequality through education becomes more important.

- ICT changes the context of many jobs, experimenting with new forms of education is important. ICT makes it easier to measure and process performance indicators.
- International mobility makes it more difficult to keep highly trained people in the country and thus for example to maintain a progressive tax system. This again makes education important as a means to prevent large social inequalities. To keep universities interesting for excellent researchers more diversity and stronger incentives for quality are important.

These trends lead the author to several policy suggestions (here only education and science are listed, since they are important in the context of the AWT-project.

In terms of education:

- Prevent falling behind international peers, extra money and more performance stimulation;
- admitting private Higher Education institutions to create competition and volume;
- stimulate life long learning;
- choose priorities carefully, it is impossible for governments to meet all demands, therefore they need to select according to societal relevance.

In terms of science:

- specialisation: international mobility may put pressure on the egalitarian Dutch system, greater autonomy, selection, tuition fee differentiation and distributing research funds according to performance;
- internationalisation: a world wide shift from fundamental to applied research may deplete the sources of applied research, international co-ordination of research funding for fundamental research may prevent this;
- knowledge creation and diffusion: applied research is important and should be co-ordinated through the market, fundamental research remains important and its results should be freely available. Governments should therefore restrict applied research at universities to protect fundamental research.

Evaluation from the perspective of our theoretical framework

This contribution focuses on the context of HE institutions and develops a few policy-options governments have to deal with the trends in this context. The author claims that individualisation; ICT and internationalisation have an important impact on education and science. In the field of science this leads him to suggest: more diversity, more stress on small but excellent research institutes, more international co-ordination of funding and more stress on diffusion of knowledge. In the field of education he suggests more funding, more use of performance indicators, more stress on life long learning and a more careful choosing of priorities.

1.5 Wissenschaftsrat (2000). *Theses for the future development of the system of higher education and research in Germany.*

This document follows up a series of "system evaluations" by the Wissenschaftsrat of different key elements in the German research system: the evaluations of the Blaue Liste Institutes and the GrossForschungsEinrichtungen in 2000 and those Fraunhofer Gesellschaft and the Max Planck Gesellschaft in 1998-99. As a result of these evaluations, and other discussions the Wissenschaftsrat, an advisory body with membership from Federal government and the *Länder*, comes to the conclusion that reforms and financial support of a far higher order are necessary to exploit the potential of the higher education and research system. The three main changes the Wissenschaftsrat think are needed are:

1. An orientation more to possible applications of research and better linkages between teaching and practice. Increase of resources therefor should be used for general cross-institutional application oriented programmes and for developing the research base at *Fachhochschulen* ("universities of applied sciences"). Currently, universities in Germany have in some areas a monopoly on teaching, although many of their students would profit from a more applied orientation. Like in engineering in those fields it should be the *Fachhochschulen* that educate the lion's share of the students. Only in humanities, where teaching and research are necessarily intertwined, the universities are the only place for higher education.
2. Stronger internationalisation of the German system of higher education and research, especially for the humanities and social sciences. This should be supported by transnational institutional structures, such as one at European level for the promotion of pure research independent from the Commission. Pure research implies here both knowledge and application oriented pure research in all fields of science. The subsidiarity principle implies that not just that regional and national academic spheres should be strengthened but also that joint European activities should be developed. At the European level program definition and execution should be separated in order to decrease administration costs.
3. Better use of information and communication structures., to raise international presence and develop virtual centres.

This can be done according to the Wissenschaftsrat if:

- The institutions for higher education raise their profile and create more defined missions. This explicitly implies that parts of the institutions that do not comply with the mission should be closed. Allocation of funding should be based upon the actual activities and performances within the missions;
- the mobility of academics and students should be increased, and international

- experience should be a prerequisite for appointments at senior positions;
- institutional competition (within and between institutions) is increased to counteract current functional differentiation in the German higher education and research system. Funding should be linked to clear incentives for acquisition;
- different institutions co-operate more closely, and the concentration of different academic institutions at one site should be stimulated and rewarded;
- academic institutions increase their capacity for self-organisation and governments should withdraw themselves from controlling higher education at a detailed level. Instead the government should develop clear processes of evaluating research and teaching;
- the unity of research and education should be renewed and universities must become "academic organisational centres", which implies that they should realise some of the institutional differentiation which has developed up to now outside their walls. Instead of organise the unity at the level of the individual researcher, institutes should develop organisational forms in which the unity is maintained;
- private higher education institutions can be interesting partners for public institutions and sites of innovation, but the state should guarantee public access to public institutions to those that have shown to have the right capacities.

2

Academic / researcher / professional

2.1 Altbach, P. C. (1999). *Comparative perspectives on private higher education.*

The author claims that private HE is one of the most dynamic and fastest growing segments of post-secondary education at the turn of the 21st century. This is due to the unprecedented demand for HE and the inability or unwillingness of governments to provide Higher Education. The rise of private HE is the consequence of two developments, new private institutions of HE are established and public institutions are, wholly or partially, privatised.

While private HE is growing worldwide, there are major variations. Most western European countries are still dominated by public universities (95% of the students study in public institutions). Significantly it is in Eastern Europe and the former Soviet Union where private HE has really taken off. In the United States many of the most famous universities are private, but 80% of the students are studying in public universities. In comparative terms private HE is most powerful in

Asia, in countries like Japan, South Korea, the Philippines and Indonesia 80% of the students studies in private institutions. Latin America traditionally has a private sector dominated by the church, but in the past several decades a secular private sector has come up catering for a majority of the students.

The growing trend of private HE raises a few issues that need to be discussed. The author raises these issues:

- How should private HE be funded? Most private institutions depend fully on tuition fees, which raises problems in terms of planning and control. Most private institutions (apart from established elite institutions) do not have much of a safety net. As the private sector grows there will be debate whether private institutions should have access to government funding programs for research, student aid, construction and the like;
- private institutions seek to fit into the academic system of a nation because their survival depends on being able to attract students. Especially in the developing world almost all of the newer private schools rank toward the bottom of the academic hierarchy. This is due to the time it takes to built an academic reputation, the applied nature of these private institutions and their limited budgets. Even among the newer institutions there are exceptions, mostly due to a combination of large financial resources and skilful leadership. On the whole this raises the question of whether private institutions and the academic system are compatible on a large scale;
- private HE operates with considerable autonomy in most countries, simply because they receive little public funding and government lacks steering mechanisms. How much autonomy should private HE have? Should quality be controlled? Should quality be measured as professional relevance or academic standards?;
- HE delivers a unique product: knowledge and the credentials to work with it in modern societies. At the same time HE improves the human resources needed for societal and economical growth. What should be the public responsibilities of private Higher Education?

The author raises the issue of the growing importance of private Higher Education. This is a development both in the context and within the organisations of Higher Education. Firstly, in the context, in so far as it creates a market for Higher Education. Secondly, a change inside the organisations of research and education, in the sense that these organisations become private institutions. The development leads to questions of funding, quality assessment and the public responsibility of private institutions.

2.2 Barnett, Ronald. (1997). *Beyond competence*.

Barnett argues that both the concepts of academic competence (the traditional view on the university's role in knowledge acquisition and transfer) and operational competence (introduced in the new discourse on the economic function of higher education) are not meeting the requirements of the future. The reason is that the world and its future are unknowable in several senses: e.g. knowledge is socially reflexive (epistemological instability), scepticism of the hegemonic claims of particular frameworks and professional expertise, there are only a few incontestable secure knowledge claims. This implies that there should be a third way:

	Operational competence	Academic competence	Life-world becoming
Epistemology	Know how	Know that	Reflective knowing
Situations	Defined pragmatically	Defined by intellectual field	Open definition (multiple approaches)
Focus	Outcomes	Propositions	Dialogue and argument
Transferability	Meta-operations	Meta-cognition	Meta-critique
Learning	Experiential	Propositional	Meta-learning
Communication	Strategic	Disciplinary	Dialogical
Evaluation	Economic	Truthfulness	Consensus
Value orientation	Economic survival	Relative strength of discipline	The 'common good'
Boundary conditions	Organisational norms	Norms of intellectual field	Practicalities of discourse
Critique	For better practical effectiveness	For better cognitive understanding	For better practical understanding

This new conception looks neither to traditions of cognition nor to given situations requiring identified skills. Instead, this conception recognises a world in which all bets are off, and where the only means of effective survival is for us collectively to go on reviewing the world we are in and refashioning it and ourselves in the process. The refashioning will include considerations of what it is to know and to live effectively in the world. No consensus is assumed on any matter, but for meaningful dialogue to take place there would need to be some agreement on elementary rules of rational engagement. Beyond that, the world would result from our collective engagements with each other and in the context of our collective understanding of the world.

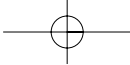
2.3 Clark, Burton R. (1998). *Creating entrepreneurial universities: organisational pathways of transformation.*

Clark describes how five enterprising universities in Europe transformed themselves between 1980 and 1995 to exercise more initiative and become more independent. In the introduction and the final chapter he puts forward more generalised concepts. Point of departure in his analysis is that he sees an imbalance between demand and response for universities: demands on universities outrun their capacity to respond. The mentioned demand pressures are: more students, and more different types of students, seek and obtain access; more segments of the labour force demand university graduates trained for highly specialised occupations; increased expectations from HE (e.g. governments expect more at lower cost per unit); and, most important of all, knowledge outruns resources (no university can control knowledge growth). The scale and scope of just the temporary knowledge base is unbelievable. These four broad streams of endless demand converge to create enormous demand overload. Universities are caught in crossfire of expectations. And all the channels of demand exhibit a high rate of change.

How can demand and response be brought into reasonable balance? And the national level (system level) this is primarily done by differentiation. One way to cope with the growing imbalance is the (spontaneous) creation of different types of universities. The differentiation response, according to Clark, finally comes down to the individual university. But as knowledge outruns resources, then a university basic departments are under even greater pressure to commit to specialities that differentiate them from their peer-discipline departments at other universities. And what happens among departments and faculties radiates upward to intensify the need for entire universities to differentiate themselves in niches of knowledge, clientele and labour market linkage. But it may imply that the imbalance only deepens.

At the end of the day it makes sense to give universities a substantial amount of institutional autonomy to deal with this imbalance. In order to be successful you have to develop entrepreneurial leadership to go along with institutional autonomy. Clark describes a governing concept with five elements that should establish, or maintain, successful institutions:

- A strengthened steering core: 'strong' executive leadership for greater systematic capacity to steer themselves;
- the enhanced development periphery: a matrix-like structure with significant emphasis for contract research, contract education and consultation;
- the discretionary funding base: universities have to build a diversified funding base to construct a portfolio to share rising costs ('diversity in funding');



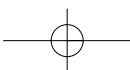
- the stimulated heartland: the schizophrenic university: entrepreneurial on the one hand, and traditional on the other. Input and maintenance of traditions academic values and expertise continues to be essential;
 - the entrepreneurial belief: one must develop the idea, beliefs, culture, identity and saga about the own institution (the corporate identity become important).
- An entrepreneurial achievement of distinctiveness serves internally to unify an identity and thereby, ironically, to rebuild a sense of community. There may be continue fear that a traditional academic community will be fragmented if entrepreneurial behaviour takes over. However, diffuse in structure and fragmented in intent, traditional European universities have had little or no common symbolic and material integration. What integration they have had is steadily eroded by increasing scale and scope. Collective entrepreneurship overcomes their scattered character, leading toward a more integrated self.

2.4 Coffield, F. and B. Williamson. (1997). *Repositioning higher education.*

The challenge for HE is not just an economic one. Next to a general (in fact traditional) commitment to education, research and critical scholarship, there is a need to develop strong defences against the forces and values that erode democracy. The task is to play a part in building the kind of society which achieves a high quality of life for all its members in ways which are consistent with the care of a sustainable natural environment and a stable order of international relationships. We have to imagine a society whose HE institutions contribute to the wider goals within the public realm and whose own systems of management reflect the values of a civilised and democratic society.

HE institutions should:

- be structured to nurture, examine critically and promulgate the values of a democratic society (truthfulness, objectivity, freedom of thought and expression, personal integrity, honesty, democratic ways of working);
- facilitate the lifelong education of all citizens in the service of democracy;
- remain accountable bodies in the public realm, serving legitimate and agreed public goals;
- require a strong international outlook. They have to be simultaneously local and global in their intellectual reach;
- promote forms of learning which are themselves inter-disciplinary and which enable students to be aware critically of the basis of all claims to knowledge and truth ;
- be accessible on a lifelong basis to all those who can benefit from it;



- not be constrained by the geography of their position or the time frames of an ecclesiastical calendar;
- reflect in the structures of their own management the moral purposes for which they exist;
- nurture within themselves and justify publicly a climate in which the unthinkable can be thought, in which research and scholarship of a completely non-utilitarian kind can be undertaken and where the search for knowledge can be celebrated as an end in itself;
- resolve the contradiction between dependency on specialised bodies of knowledge to which only relatively few people have access and access for citizens and consumers to knowledge to make informed choices and to keep modernity going.

Concrete contributions of the universities are: defend critical, basic research and scholarship; articulate, promote and defend their commitment to democratic values; innovate outwards through active, committed engagement with the needs of the localities and the regions; generate more income to reduce dependency on state funding; open up the curriculum to enable more flexible forms of study exploiting new information technologies and placing much greater emphasis on helping students to acquire a knowledge of how to learn; strive for much higher involvement of staff and students in university's decision-making processes; and develop better mechanisms of strategic planning to anticipate change (instead of short-term and reactive planning).

2.5 Delanty, G. (2001). *Challenging knowledge, the university in the knowledge society*.

In this book Delanty describes the development of the university as a key institution of modernity and assesses the what he calls the 'crises of the university' in relation to globalisation and the change of the nation state, development of the information society, the changing relations between capital and knowledge (industry and university), and the relation between teaching and research. To him the university is not just an education and research institute, but a site where knowledge, culture and society meet. In this function the new identity has to be sought: as a site for reflexively constituted knowledge and as a site for developing (technological) citizenship. As such it deviates from contributions from the sociology of knowledge that emphasise the usability of current academic knowledge as expertise and innovation source. (Mode 2, Triple Helix).

The book is based on insights from sociology of knowledge, social theory of modernity and the debate on the university and thus bridges different perspecti-

ves on the role of knowledge and the university. The combination of perspectives enables Delanty to look at the academic knowledge not just as 'science', but also as part of the Western culture. The starting observation is the crises of the idea of the modern university, because of the changes in the social contract between state and university, the key role of knowledge in society, the spread of knowledge throughout society and the democratisation of knowledge. The university has lost its prominent position and seems to become just another institution in society, indicated by the increasing bureaucratisation as well as capitalisation of teaching and research. Contra this post-modern analysis, Delanty develops an alternative role. First as a site where different kinds of knowledge come together that are reflexively communicated and were possible combined. In this way it can recapture the public discourse, and develop a second key role for the knowledge society, that is the development of technological citizenship. For this new role the university has to develop new links (1) with society, (2) between the sciences, and (3) with the state.

The full argument rests on an historical analyses of the role of the university in the development of modernity (Chapters 2-4), the cultural role of university in developing critical and new cognitive models (Chapters 4-6) and analysis of the consequences of marketization of the university (Chapter 7), globalisation (Chapter 8) and post-modernity (Chapter 9).

2.6 Duderstadt, J.J. (1997). *The future of the university in an age of knowledge.*

There are – according to the author – four trends converging in the final decade of the 20th century: the importance of knowledge as a key factor in determining security, prosperity and the quality of life; the global nature of our society; the ease with which ITC enables the rapid exchange of information; and the degree to which networking replaces more formal social structures.

These trends challenge universities. It challenges them to rethink their fundamental roles of creating, preserving, integrating, transmitting, and applying knowledge. The role of transmitting knowledge for instance may change from classroom instruction to digital teaching and learning, with – consequently – changing roles for faculty members (from teacher to designer of learning processes). The role of creating knowledge may change from a disciplinary perspective to a perspective driven by societal problems and relevance. The preservation of knowledge changes from the traditional library function to a wide variety of digital technologies.

The trends and changing roles may change the HE enterprise; a new paradigm may emerge.

The following elements are discussed:

- unbundling: universities are under increasing pressure to spin off or sell off or close down parts of their traditional operations in the face of the new competition;
- from cottage industry to mass production: being used to one-of-a-kind cottage industry, universities may have to get used to "packaging" educational content for mass audiences. It may be that universities have to outsource the production and distribution to the entertainment industry (for their experience in reaching mass audiences);
- Restructuring: some universities may dissolve, other may merge, others may be taken over and still others will work together in network structures.

Some operational-technological issues for the university in the future are the investment in computer networks; an open eye for a diverse technology infrastructure (not focusing on one or two vendors); answering the question what should be provided by the university and what is the responsibility of the members of the community; answering the question to what extent the university should assist the student in acquiring the necessary hard- and software; and answering the question to which extent the evolution of ICT should be carefully coordinated and centralised or whether thousand flowers should bloom decentrally.

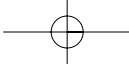
The real challenge is not the technology as such, but rather imagining and creating digitally mediated environments for the kinds of lives that we will want to lead and the sorts of communities we will want to have (the author cites MIT dean of architecture Mitchell's book "City of Bits"). Experimentation seems to be the adequate answer to the challenges.

In the future the following themes will likely characterise the HE enterprise in the years ahead: lifelong learning, a seamless web, asynchronous learning, affordability, interactive and collaborative working, and diversity of services.

2.7 Duderstadt, J. J. (1999-2000). *New roles for the 21st-century university*.

Duderstadt mentions a couple of powerful drivers for change:

- the age of knowledge: key strategic resource is knowledge itself (i.e. educated people and their ideas) Knowledge is inexhaustible; the more it is used, the more it multiplies and expands;
- demographic change: US population becomes increasingly diverse;
- globalisation;
- post Cold war world: much (US) research in the past was driven by the arms race;
- market forces: competition for students, faculty and resources.



The perspective of a market-driven restructuring of HE as an industry, although perhaps both alien and distasteful to the academy, is nevertheless an important framework for considering the future of the university. Universities will have to learn to cope with the competitive pressures of this market place while preserving the most important of their traditional values and character.

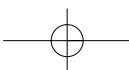
Faulty feels increasingly stress, fearing a decline in public support of research sensing a loss of scholarly community with increasing disciplinary specialisation, and being pulled out of the classroom and the laboratory by the demands of grantsmanship. Even the concept of HE is challenged, as society and its elected leaders increasingly see a college education as an individual benefit determined by values of the marketplace rather than the broader needs of a democratic society.

Although universities teach skills and convey knowledge, they also preserve and convey cultural heritage from one generation to the next, perform the research necessary to generate new knowledge, serve as constructive social critics, and provide a broad area of knowledge-based services to society. This, however, is according to Duderstadt, a "doom scenario". Yet there is a far brighter vision for the future of higher education. There are a number of themes that almost certainly will factor into some part of the HE enterprise:

- Learner-centred; universities must become more focused on who they serve; transformation from faculty-centred to learner-centred institutions;
- affordable; universities must become far more affordable, providing education opportunities within the resources of all citizens;
- lifelong learning;
- interactive and collaborative learning techniques (pedagogy) effectively reach the plug-and-play generation of the digital age;
- diverse: increasingly diverse population with diverse needs and goals;
- intelligent and adaptive: knowledge will increasingly foster the construction of learning environments that are not only highly customised but adapted to the needs of the learner.

The market place seeks low-cost quality services rather than prestige. It could be that the culture of excellence, which has driven the evolution of and competition among research universities, will no longer be accepted and sustained by the public. Although this shift from prestige-driven to cost-competitive driven may broaden the mission and capacity of many colleges and universities, it could do so at the expense of the excellence of the nation's very best institutions.

Knowledge will be the most valuable resource of the country. It might be conjectured that a social contract based on developing and maintaining the abilities and talents of all people to their fullest extent could well transform schools, colle-



ges, and universities into forms that would rival the research university in importance. Thus, the 21st-century analogue to the 19th century Land-grant University might be termed a “learn-grant” university, designed to develop human resources as its top priority along with the infrastructure necessary to sustain a knowledge-driven society.

Clearly, HE will flourish in the decades ahead. In a knowledge-intense society the need for advanced education will become ever more pressing, both for individuals and society. Yet it also is likely that the university as it stands today will change in profound ways to serve a changing world. The real question is not whether HE will be transformed, but rather how and by whom. If the university is capable of transforming itself to respond to the needs of a culture of learning. Then what is currently perceived as the challenge of change may become the opportunity for a renaissance in HE in the years ahead.

2.8 Enders, Jürgen (1999). *Crisis? What crisis? The academic professions in the knowledge*

Enders is concerned about the future of the academic profession, which is uncertain at present given all the change in and around higher education. There is, for instance, the long-standing secular trend towards a ‘knowledge’ society, a ‘highly qualified’ society, a society of ‘life-long learning’ or an ‘information’ society. The changing nature and role of knowledge in society seem to be accompanied by changes in HE (that are frequently conflicting):

- A decline in socio-economic status of HE alongside with the expansion of HE and the ‘scientification’ of society;
- the growing importance of scientific knowledge and highly qualified expertise is accompanied by a loss of exclusiveness as far as the role and centrality of HE and the academic profession are concerned;
- the growing importance of scientific based knowledge on society is accompanied by most ambivalent expectations as regards its impact on future developments;
- the academic profession is among the first global players.

Enders portrays four scenarios for the academic profession:

1. One might hope that the scientification of society will strengthen the academic profession in its function as the cutting-edge profession, not only providing the knowledge and skills on which advanced societies depend but also serving as a kind of role model of rational and disinterested discourse for highly qualified expertise. In this context, the academic profession might be characterised as the axial profession training, socialising and selecting other professionals, as

- well as supplying them with research-based knowledge for their career.
2. The academic is endangered to lose its key position and leadership role within HE as well as for further development of society. Privileges will be lost, traditional notions of control will be undermined. Managers of institutions strengthen their impact on outcomes and procedures. Deprofessionalization, bureaucratisation and marginalisation are frequently used terms.
 3. The university as an old-style professional and collegial organisation will be transformed in the context of a post modern society, and scenarios of the academic profession as a role model or as academic workers would probably be regarded to be old-fashioned. Main functions will be reinterpreted: teaching might put a growing emphasis on social or even life skills and academics will rather function as interpreters of truth as a relative concept. Research tends to be organised as a non-hierarchical, pluralistic, trans-disciplinary, fast changing and socially responsive activity.
 4. The university will become a marginal institution, even in a knowledge society. Academic professions will become, at best, an antiquity when they retain fixated in traditional characteristics and images of their job role. The 'post-societies' might be better served by other institutions and the academic profession might lose its central role as a main contributor of the cultural contribution, the creation of new knowledge and the training of the young generation of those who will run future societies.

2.9 Etzkowitz, H. and L. Leydesdorff (2000). *The dynamics of innovation: from national systems and "mode 2" to a triple helix of university--industry--government relations.*

In this article the Triple Helix model of university-industry-government relations is elaborated. The essence of the model is that the interconnection between dynamics in industry, government and science has resulted in a layer of tri-lateral networks and hybrid organisations that itself is in permanent transition but also permanently challenges the three founding systems of this layer. Any relation between two of the three subsystems, e.g. through science policy, university policy, university-industry interactions, government industry policy, can become under pressure of the third actor and transformed. Communications and negotiations between institutional partners generate an overlay that increasingly reorganises the underlying arrangements. The institutional layer can be considered as the retention of a developing system: that is through institutionalisation specific outcomes of the communications and negotiations are stabilised and at least for

some time structure further development. Consequently, transformations of innovations systems (national, sectoral, regional, etc.) can be analysed in terms of (neo-) evolutionary mechanisms in which both historical interorganisational innovation patterns and pressures from new technologies are important.

Analytically the Triple Helix model, which in itself is abstract, provides for a richer explanation of "Mode 2", because in addition to the short term history and phenomena related it also describes underlying dynamics.

This has several implications:

1. Arrangements between industry and government no longer need to be conceptualised as exclusively between national governments and specific industrial sectors.
2. The driving force of the interactions can be specified as the expectation of profits, and thus the dynamics in terms of (quasi-) markets
3. The foundation of the model in terms of expectations leaves room for uncertainties and chance processes;
4. The expansion of the higher education and the academic-research sector has provided society with a realm in which different representations can be entertained and recombined in a systematic manner. The university can function as a laboratory of knowledge intensive developments.
5. The model explains why all sort of tensions in the relations between the three spheres, and within each of the spheres need not to be resolved – e.g. Mode 1 and Mode 2 can within the model live perfectly together, and at the research performance level often do;
6. The exchange media between the three spheres, the economic expectations, the theoretical expectations and the assessment of what can realised within geographically and institutional boundaries, has to be combined: the helices need to be able to recursively communicate each others codes.

Thus, the authors claim that within this new model, universities research functions as a locus in the "laboratory" of such knowledge-intensive network transitions. Instead of working on the "Endless Frontier", they are part of an "endless transition" in which basic research is linked to utilisation through a series of intermediate processes. However, despite emphases on the knowledge production role of the university in Triple Helix studies, the authors stress that the real comparative advantage of universities is their educational role. Through the educational role the universities, more than other knowledge generating organisations, are able to develop cumulative research programs and act as a continuous source of new human capital and innovation.

2.10 Etzkowitz, H., A. Webster, et al. (2000). *The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm.*

In a comparative study on the emergence of the entrepreneurial university and future of the university, Etzkowitz et al. analyse the future of the university in terms of the new Triple Helix. The Triple Helix model conceptualises the transition of the research system in four processes: (1) a transformation of practices within university, industry and government (the three constituencies in the model), (2) a transformation of the relationships between these three helices, bringing them closer together, (3) the creation and institutionalisation of trilateral interfaces, networks, hybrid organisations etc. and (4) the recursive effect of this new layer on the three constituencies themselves and the wider society. The fourth process implies that new types of organisations can develop within each of the constituencies, of which the entrepreneurial university is an example.

Specifying the four processes for the university may result in:

- a) internal transformation through a reinterpretation of traditional roles and tasks, e.g. through applying research and teaching tasks for economic activities (commercial laboratories, consultancy);
- b) stabilisation of trans-institutional arrangements, creating new opportunities and rules of conduct for university researchers in fund raising and exploiting knowledge;
- c) changing balance of centralisation and decentralisation, implying that central stimuli for entrepreneurial activities are decentralised when they become widely accepted by the university community;
- d) the creation of a wide arrange of new trilateral arrangements and new organisational forms within or linked to the university.

Etzkowitz et al. describe the emergence of the entrepreneurial university within very different research systems, US, UK, Japan, Latin America, France, Germany, and conclude that this new species has strongly anchored itself at a global level. The implication for the 21st Century university is that economic development becomes part of its mission and organisationally it has to develop new organisational structures in which disciplinary departments are mixed, one find interdisciplinary centres and space for new activities. The precise form is unclear apparently, as the authors expect a continuous invention of new roles and relationships and thus a university sector in a continuous state of transition.

2.11 Core group Europolis, (2000). *New ways for science, technology and innovation policies in the European geographical area.*

The EUROPOLIS project held three workshops on science, technology and innovation policies in Europe. In its summary and recommendations document the core group of the project concludes that Europe is in need of a fundamental debate on STI policies. (1) Allocation of responsibilities between regions, nations and European level is unclear. Regional and local innovation networks should be the responsibility of regional authorities, national and European level authorities shift and share responsibilities towards R&D for public priorities; (2) future problems in health, food security and safety, and sustainable development creates differ in nature from past. They ask for demand driven, multidisciplinary R&D efforts, and close linkages between research and civic society. (3) The European level will be increased by ten new members, implying greater diversity and a need for better articulation of objectives, ambitions and implementation of STI policies in Europe. Rather than foreseeing the consequences for academic research, the document concludes with seven recommendations on how science, technology and innovation should be governed.

1. Institutions at the basis, like university hospitals and companies are key to train people and assist innovation. They need to be more autonomous, diverse and internationally oriented. In the knowledge society they can become "footholds for the exploitation of knowledge" by being at the crossroads of regional and global flows of knowledge, people and money. By being entrepreneurial and responsive to outside demands, they will develop institutional diversity. For universities this implies varied balances between teaching and research. The creation of European Centres of Excellence is tempting but dangerous, as their is a risk that the CoE's will not be a result of a dynamism, but of bureaucratic comprises that divide the pie equally.
2. Contractual or more generally market-type relations are fine but should be within limits. Sufficient and stable funding for basic and university research is needed.
3. A policy for the European science base is needed, which implies that in the near future one can think of one or more independent European research councils. The need for European co-ordination of large facilities for science is emphasised.
4. Innovation policies should be oriented to develop well-functioning regional innovation system. In addition a diverse set of innovation instruments at the European level is needed, including a new patent system, stronger regulatory framework, direct stimulation for SME's and indirect stimulation through fiscal means etc. for other companies.

5. Development of two way communications between the science, public authorities, regulatory agencies, public interest groups and industry on science, technology and society.
6. A redesign of the Framework Programme into one programme with four parts. One on furthering innovation concentrating on SME's and regional innovation systems. A second part on the science base. A third one concentrating on training and human capital formation. A last but not least one part on R&D activities for public, European level policies.
7. For the new countries, a specific programme should be build that helps them to catch up.

2.12 Florida, Richard (1999). *The role of the university: leveraging talent, not technology.*

Florida argues that universities might be in serious danger if they are simply regarded as sources of technology. In the past decades research centres were designed to attract corporate funding and technology transfer offices were started to commercialise breakthroughs. There is always a fundamental tension between the pursuit of eminence and the need for financial resources. These days universities might have gone too far in their relationships with industry, which may hamper the advance of knowledge (secrecy, embargoes). Because of the establishment of the new economy, or knowledge society, universities should be far more important as the nation's primary source of knowledge creation and talent. Smart people become the most critical resource to any economy. In the new economy, ideas and intellectual capital have replaced natural resources and mechanical innovations as the raw material of economic growth. The university becomes more critical than ever as a provider of talent, knowledge, and innovation in the age of knowledge-based capitalism.

Policymakers have to understand that universities do not operate as simple engines of innovation. They are a crucial piece of the infrastructure of the knowledge economy, providing mechanisms for generating and harnessing talent. Once policy makers embrace this view, they can begin to update or craft new policies. University-industry relations shouldn't be stopped of course, but we must support the university's role in the broader creation of talent.

2.13 Georghiou, L. (2001). *Evolving frameworks for European collaboration in research and technology.*

In a partly historical, partly forward looking paper on three European organisations for collaborative research and development, Eureka, COST and the

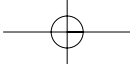
Framework Programme, Georghiou, makes some specific proposals on the new European RTD policy. He argues that the three programmes have become obsolete, especially because the administrative structures are not functioning well, and because of their mutual relationships (or non-relationship) and that with national research and innovation policies. The urgency for a new policy will be even greater when internationalisation of industry, the new national innovation policies focussing on a network economy and the enlargement of the EU are taken into account.

Georghiou recommends for future RTD policy at the European level to consider research policy as part of innovation policy and aim at a better co-ordination of the 95% of the public funding outside the Framework Programme and within national discretion. This can only be done if a "variable geometry" is accepted and current co-ordination frameworks of COST and EUREKA are reformed for this task. The proposed framework is summarised in five points:

1. Set research policy in the context of a broader European policy.
2. Shift the main emphasis of European policy to co-ordination, with support of a lion's share of the Framework Programme.
3. Ensure that remaining parts of the FP are closely connected to the Commission's own policy.
4. Integrate COST and EUREKA and use them for co-ordination of innovation policies.
5. Create ample space for bottom up decision making, accept variable geometries and compensate risk of these by separate cohesion policies.

2.14 Gibbons, M. (1997). *Factors affecting the balance between teaching and research in the universities of the twenty-first century.*

Gibbons suggests that the current mode of knowledge production at the leading edges in the sciences, social sciences and humanities is changing dramatically. This development is being driven as much by the internal dynamics of knowledge production as by government policy and by the demand for competitiveness. A traditional, university-based mode of knowledge production, characterised by a linear model (mode 1), is being complemented and to some extent supplanted by a new type of knowledge production (mode 2), that is characterised by knowledge produced in the context of application, transdisciplinarity, heterogeneity and organisational diversity, enhanced social accountability, and broadly based systems of quality control. Mode 2 requires the universities, particularly in regard of research, to come to grips with a new pattern for the social distribution of knowledge production, especially the fact that they are no longer either the sole or even the primary institutions on the cognitive landscape.



Underlying carriers for change:

- governmental policies aiming at creating specific research universities;
- the collapse of the resource base for research (restrictions on budgets; more competitors);
- the shifts to applied science, reflected in rapid growth of university-industry research centres;
- the stimulation of technology transfer, universities as key players in regional development;
- students seem to have lost interest in studying science.

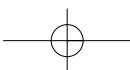
The changes reflect a breakdown in trust between universities and their environment. There is more pressure to make universities more socially accountable. In the years to come, there will be a need to build a new social contract between science, the universities and society (government). Moreover, there is a massive increase in demand both socially and economically for specialised information of all kinds.

The consequences of these changes are that universities are threatened to continue to function as a central institution in the development of science and basic research. Most universities are built upon a model of knowledge production that has a disciplinary basis. The discipline defines what shall be counted as 'good science'. But this disciplinary-based system will come under pressure more and more.

In mode 1, problems are set and solved in a context governed by the discipline; in mode 2 knowledge is carried out in a context of application. Mode 1 is disciplinary; mode 2 is transdisciplinary. Mode 1 is characterised by homogeneity; mode 2 by heterogeneity. Organisationally, mode 1 is hierarchical and tends to preserve its form; mode 2 is more heterarchical and transient. Mode 2 is more socially accountable and reflective as mode 1. Mode 2 includes a wider, more temporary, and heterogeneous set of practitioners, collaborating on a problem defined in a specific and localised context.

Mode 2 is marked by:

- an increase in the number of potential sites in which knowledge can be created (not only universities, but non-university institute research centres, government agencies, industrial laboratories, think tanks, consultancies, and in the interaction of all of these);
- the linking of sites together in a variety of ways – electronically, organisationally, socially, informally – through the functioning networks of communication;
- the simultaneous differentiation, at these sites, of fields and areas of study into finer and finer specialities.



In this context, flexibility and response time are the crucial factors, and because of them the types or organisations used to tackle them may vary greatly. Mode 2 research groups are less firmly institutionalised; temporary work teams and networks related to dissolving problems. Although problems may be transient and groups short-lived, the organisation and communication pattern persists as a matrix from which further groups and networks, dedicated to different problems, will be formed.

Mode 2 knowledge is thus created in a great variety of organisations and institutions, including multi-national firms, network firms, small hi-tech firms based on a particular technology, government institutions, research universities, laboratories and institutes, as well as national and international research programs. In mode 2, additional criteria (of quality) are added through the context of application that now incorporates a diverse range of intellectual interests (via the discipline) as well as other social, economic, or political ones: e.g. questions such as 'will the solution, if found, be competitive on the market?', 'will it be cost effective?', 'will it be socially acceptable?' This broadening implies that 'good science' is more difficult to determine.

It is likely that mode 1 and mode 2 both will exist, but it depends on the responses of the institutions that are currently supporting mode 1 and on the social diffusion of mode 2. Universities may embrace two distinct but interacting structures; one which supports research and another which supports undergraduate training. Organisationally, universities that wish to continue in research will need to become porous, to build partnerships, and to participate more fully with other knowledge producing institutions wherever they may be located. If knowledge production at the leading edge has the attributes of mode 2, then universities will need to become more permeable as institutions. They will require revolving doors, allowing some academics to leave and others to enter.

2.15 Gibbons, M., C. Limoges, et al. (1994). *The new production of knowledge: The dynamics of science and research in contemporary societies.*

Within most discussions on the future of academic research, as well as on the need to adapt to the knowledge society, there is reference to changes in the knowledge production, with "Mode 2" as the overall label. In their book on modes of knowledge production Gibbons et al. claim analytically that a new mode of knowledge production has entered the academe and normatively that universities should embrace this mode of knowledge production. This form of knowledge production they call Mode 2 as opposed to the academic knowledge production that developed within universities and institutes for basic research. This mode 1, or the

Endless Frontier regime was supported by an increase of institutional funding of the academe and by the specific 'bottom up' practices of research agencies. Gibbons et al. specify four characteristics of the new mode of knowledge production.

1. Knowledge is produced in the context of application. Within the well-funded academies the idea of 'pure science' developed referring to a form of knowledge production that was undirected by practical applications. In the eighties the idea of pure science lost its prominent place. That is not to say that applied sciences took over, but that with the development of new fields of research (biotechnology, material sciences and micro electronics; but also environmental research, health sciences, etc.), new funding practices and new sponsors, the idea of strategic science emerged. Strategic science became a label for basic research undertaken in areas directed by a strong sense of the possibility of applications. The practical use of basic research was not any more considered as a serendipitous outcome but a became almost directly linked to specific research trajectories.
2. Knowledge develops through circulation of knowledge claims within and certification of these claims by specialists and practitioners within epistemic communities. Within the traditional academe these epistemic communities are strongly focussed on their own discipline and drove its development. In the new mode, the contexts of applications induce much more heterogeneous epistemic communities in which a diverse range of specialist exchange findings and insights and develop transdisciplinary knowledge. The transdisciplinary knowledge is less codified and circulates often through informal channels, but its empirical and theoretical foundations, as well as its performative capacity in the contexts of applications, certainly makes it a contribution to the development of knowledge. Examples in this respect are the environmental sciences and information and communication technologies. Within ICT developments are so fast that a competitive position depends on the access to informal epistemic communities and traditional trajectories for codification take too long. Environmental sciences are typical in the way the policy and science have been bridged and institutionalised in for instance the Intergovernmental Panel on Climate Change, which developed its own practices to review the state of the environmental knowledge in relation to political issues.
3. Transdisciplinarity evolves better if organisational boundaries become flexible and permeable. The organisational base of the new mode of knowledge production is characterised by heterogeneity and diversity. Universities and basic research institutes are only one possible site for mode 2 knowledge producti-

on. As important are those organisations that traditionally are more focussed to application and within the new knowledge production regime, find a way to improve their position. Industrial laboratories, think tanks, consultancies, government laboratories take part in the development. Trans-institutional collaborations develop for specific projects and programmes to exploit the complementary nature of the capacities of these diverse institutions. Clearly, the new communication and information technologies have facilitated these new collaborations to a great extent.

4. The new mode of knowledge is firmly rooted within the academic institutes, which to a different extent have responded to the new challenges and stretches out the environment of these institutes. First of all in its focus on application, as we mentioned above. But also in the concern about societal issues – reflected in the translation of concern about issues like the environment, health, ethics and others into new fields of research. Likewise the natural and engineering sciences found epistemic counterparts in industry and government laboratories, social sciences have them in government, public services and government bureaux like statistical agencies and the like. An indication is that in many countries, research programmes on genomics have *within* the programme research build in on the ethical, legal and social implication (ELSI) of the area.

The analysis of Gibbons et al. is related to the development of universities in two ways. First of all, the academy, despite its traditional structure and proverbial resistance to change, were among the sites where this new knowledge production emerged. More over, according to Gibbons the change of the higher education sector in the seventies towards massification of higher education and, consequentially, of research has been one of the driving forces behind the development of 'Mode 2'. The massification of higher education forced the universities to broaden their scope of view from the traditional academic professions and careers to a much wider range of societal functions. New courses had to be developed and existing courses had to become more flexible and respond to the diversification of student's expectations. More students implied also more research funds and more accountability. New departments, and even new universities, had to find niches within the existing academic landscape and became sites where new forms of education and of knowledge production could be organised. In this respect it is worthwhile to recall that although universities are among the oldest institutions of our culture, at present the total number of universities is characterised by a large number of small and medium sized institutions with low scientific research orientation and low scientific research productivity.

2.16 Horst, Han van der (1997). *Will the university make it to 2084?*

Universities have survived for centuries. They have survived important changes such as the introduction of print and the industrial revolution. Will they however survive the most recent revolution: the dawn of information and communication technologies?

The author compares the recent trends with those at the time of the introduction of (book) print. The latter process, although revolutionary for it changed the way students and professors learned and communicated, was much more gradual than the present revolution. The present revolution is explosive, for the massification of HE since WW II and the equally explosive growth in human knowledge.

The new technologies enable students and teachers to communicate released from the bonds of time and place. The new technologies will play an important role in the 'traditional' degree programs, but also in specific courses for those enrolling HE as adults and those combining work and learning. At the same time the fast developments require those setting up programs to rethink the rationale behind the programs: it's no longer applicable knowledge that should be taught solely. Students should learn how to maintain their level of professionalism themselves.

In the future, the university's contribution should be the academic approach, the scientific method, concentration on frontline research and scholarship. In this sense they should be what they always were: a community of scholars. But at the same time the university should constantly interact with its surroundings, to be able to know what products and services to offer (meeting real demands of the future). In this respect the university should redesign itself: a little renovation is not enough.

2.17 Huisman, J., D. Westerheijden en H. de Boer (2001). *De tuinen van het hoger onderwijs; Scenario's voor 2010*

This publication is based on a Delphi study on the future of HE (in the Netherlands) and expertise of CHEPS. It describes three scenarios labelled: The French Court Garden, the Polder Garden and a Nature Garden. Two dimensions are distinguishing the three scenarios. The first one is the degree of order and structure in the garden, and the authors assume that the more the government acts as a gardener, the less diversity and excellence there will be. The other dimension is the degree of openness of the (national) system. The French Court Garden is the most structured and closed one, the Nature Garden the most diverse and open one. In addition, the scenarios contain elements such as demographic developments, economics and information technology.

The scenario's primarily look at the organisation of HE at a system level (with quite some attention to the accreditation), but with some references to the organisation of research in this system. For our project I highlight the latter.

The French Court Garden: In this scenario, the universities have developed like US research universities, which are smaller than current ones and more specialised. Because of a strict accreditation system non-academic education has gone from the universities. Resulting budget cuts and on going greying has forced universities into concentration and specialisation. The specialisation allows universities to be excellent in a European perspective.

The Polder Garden: In the Polder Garden, there is some (negotiated?) differentiation of universities and polytechnics into four groups: 5 traditional research universities, 10 new research universities grown out of universities which merged with polytechnics or developed in another new way, 11 former polytechnics that have adopted (applied) research tasks, and 9 polytechnics without any research task. For the educational tasks universities compete. Research is organised in a few graduate schools, dominated by the 5 traditional universities. Financing of basic research is unclear.

The Nature Garden: Universities and polytechnics have developed into HE institutes of a diverse nature. Two traditional universities are still recognisable, but in the globalised network economy a lot of other kinds have developed. National research councils have merged at the European level, but for basic research national governments have established new traditional ones, within Academy-like organisations.

The possibility of scenario does indicate that the authors identify changes in the garden of HE of which the future is uncertain. The authors say the role of national government and internationalisation to be the two main factors for the development of higher education. Less national government and more Europeanisation results in more differentiation and excellence (and probably poorness). This dynamic is elaborated for developments in education profiles and seems to be primarily based on the way accreditation is organised. Different accreditation systems determine opportunities and constrains for the development of universities as HE institutes.

For research, the publication is less explicit. The organisation of academic research seems to be a derivative of the organisation of education. If university education is well structured and organised, research is. If education shows diversity, so will research.

2.18 Johnston, R. (1998). *The university of the future: Boyer revisited.*

Rita Johnston discusses the evolution of the modern university (in the UK) in terms of the struggle for dominance by each area of (US) scholarship, as defined by Boyer in 1990 (but these ideas are relevant for other countries as well). Boyer identified and distinguished four key roles: *scholarship for teaching*; *scholarship for discovery*; *scholarship for application*; and *scholarship for integration* (making connections between knowledge and models from different disciplines and within the wider context). Johnston convincingly argues that all four areas of scholarship are still necessary and remain the core business of universities.

The first paradigm (teaching) lasted from the Middle Ages until the 19th century, the second (discovery) lasted from then until the 1960s, the third (application) barely lasted three decades. The rate of change increases exponentially and must be considered as constant. Although, in the intelligence based, electronically mediated, global economy of the future, universities will require additional managerial and technological functions, these should not distract us from the core business that universities have always been in, that is scholarship. We need to maintain the priorities for the professoriate for the reasons Boyer gave us: discovery to avoid stagnation, teaching to avoid discontinuity, application to avoid irrelevance and integration to avoid pedantry. As she concludes: "The university is surely the gene pool of ideas from centuries of intellectual activity. The full intellectual diversity of the inheritance must be treasured, much as rare breeds centres are now being set up for plants and animals to ensure sustainable bio-diversity."

Another interesting development that is according to Johnston taking place concerns the evolution of the UK unitary HE-structure. There are two (compatible) trends, she argues: on the one hand, greater distinction between institutions within the university system and, on the other, greater collaboration between individuals and departments.

2.19 Judson King, C. (1998). *Sustaining the research mission of the university of California.*

This article first describes the **research environment** in California (brief overview of national and state funding,). In particular, a) declining federal funding of research (in the sense of a lower percentage of institution's total research budget funded by federal sources), b) (state) demands for relevance c) national trend toward an increase in private investment in university research.

A few aspects of the **institutional context** for research (institutional response to the environmental conditions outlined above) are outlined. In particular, institutions have: a) sought to stimulate industry-university co-operation (mainly by

means of a specific funding from the state of California, covering overhead costs and encouraging private funding), and b) tried to document the effect of university research on the state economy (by studying patenting and the flow of graduates, and by mapping the location of young enterprises-proximity to the campuses).

Another aspect of the institutional context, which is described, is the institution's ability to plan or co-ordinate research. Three aspects are highlighted: a) an institution's ability to decide on the (broad) subject areas in which professors will be hired, b) the ability of institutions to band together to try to influence the federal research agenda, c) the ability of institutions to stimulate disciplinary interaction across the California system (9 campuses)-in some subject areas this has brought about real co-ordination (dividing up the sub-disciplines across the different campuses, collectively discussing future research directions), and in other subject areas the focus is more on research interaction.

Concerning the **interaction** between the environment and the institution(s): a) there is a financial impact--the scarcity of research resources has an impact on the institution which is trying to maintain and/or develop its research programs, and b) in terms of answering demands for research relevance, institutions may improve their position by actively seeking to show the (regional economic) benefits of research.

The article very much focuses on management strategies for adjusting to the economic barriers or demands from the environment, and as the main problems are considered to be financial ones, it can be considered to be written from an economic perspective (more or less, although political aspects are touched on as well).

2.20 Kuhlmann, S. (2001). *Future governance of innovation policy in Europe -- three scenarios.*

Kuhlmann (2001) systematically develops scenarios for European governance of innovation policy.

He creates three scenarios:

1. A scenario which pictures a increasingly centralised an dominating European innovation policy, in which the role of the national state is stepwise taken over by the European Commission, intermediary bodies like research councils and innovation agencies act on a European scale (either through collaboration/merger of existing once or development of new bodies) and research performance institutes become European (esp. TNO-like organisations).

2. Another tendency in geographical scales of governance is in the direction of decentralisation and regionalisation, and typical for the second scenario. In this scenario the enlargement of the EU and the complexity of governance, has created spaces for diversity, which are filled in by regional policies. The decentralisation is enforced by the inability to co-ordinate those differences and co-ordination is replaced by competition between the regions. Those regions and small countries, which started earlier on with investments in science, get their returns.
3. The third scenario is not just an in between scenario, but one that continues current European policy making practices, which are from a policy theoretical framework, innovative but not well-understood. This scenario suggests that "Europe" co-evolves at regional, national and European level into an effectively working multi-level, multi-actor constellation. Within this scenario, mediating bodies have a crucial policy role and their success will depend on their ability to facilitate negotiations, contestations, the exchange of strategic information and act as platforms where different interests aggregate. Because of the *géométrie variable*, the level by which actors are connected into certain developments differs widely from actor to actor and from field to field.

The strength of the article is not just in the three scenarios, which are – also in the article – just sketches of what might be possible. The strength is in the analysis of the underlying factors shaping future European innovation policies.

1. The emergence of a European political system, which at least in the mid-term, will be based on some sort of national policy. Subsequently, Kuhlmann assumes that even when integration continues or regionalisation will flourish, national policy making remains in one or another way important.
2. The development of national innovation systems, which are stirred up by ongoing globalisation of economic activities. As a result more and more firms, and especially large ones that used to dominate national innovation systems, are less and less rooted in national innovation structures. As a result the role of national policies in relation to corporations is diminishing.
3. The development of innovation policy making in multi actor settings. Historically, the scope of innovation policy has increased and developed innovation policies are characterised by the formation of a range of arenas, instruments and policies. As this range is different per country and region, the relation with the European level differs as well, and guiding principles like the subsidiarity principles do not give a clear guidance for balancing governance responsibilities. At the European level, this creates space for a range of innovation policies.

4. The result is a development of multi level governance which is not well structured and which future is unknown.

Summing up these different shaping factors result in conflicting tendencies, which are elaborated in the three scenarios. In its concluding section, Kuhlmann argues that the first scenario will probably fail because of resistance of strong national bodies and the impossibility of centrally steering complex innovation patterns. He finds the second scenario more probable, although the scenario bears strong risks that some regions and countries really will fall behind. Currently the third scenario seems most probable, and at least the way the European Research Area is elaborated by now, it suggests a co-evolution of what Kuhlmann calls "postnational" political and innovation systems towards centrally mediated policymaking. The impact of the Europeanisation on academic research is not discussed explicitly

2.21 Kwong, J. (2000). *Introduction: Marketization and privatization in education.*

This editorial states that universities are both private and public institutions. This poses special problems for their relation with the state and their management. There is a trend to view universities more from the private perspective, the so-called Marketization of education. Marketization, here, refers to the adoption of free market principles in running schools: e.g. cutting production costs, abandoning goods not in demand, producing only popular products and advertising products. Most of these activities are performed as consequences of the cuts in public spending which these institutions have witnessed in the past twenty years. Alongside these free market practices schools have also retorted to making money in other ways: sponsorship by firms, exclusive access to the campus for certain firms for a fee, investing endowment money and even running their own firms. Privatisation is also a trend, privatisation is different from Marketization, the latter is the adoption of free market activities, and the former is the transfer from ownership or administration to private hands. Privatisation can be seen in the contracting out of support services, but more saliently the rise of for-profit universities. Although there is a trend towards privatisation, government regulates these for-profit schools often intensively.

The growing Marketization of HE has several effects. For one thing business ethos and practices are becoming more acceptable in education, transmitting knowledge is becoming a service, students are becoming customers; the success of programs is increasingly judged by student enrolment or marketability. There may be contradictions between the collective good and the outcomes of markets. Markets are the aggregation of individual interest, ideally public service organisations serve the

interests of their clients. Examples of these contradictions are: raising tuition fees excluding lower income groups, increasing enrolment to the extent that it lowers quality of education, etc.

2.22 Leydesdorff, L. (2000). *The triple helix: an evolutionary model of innovations.*

The article elaborates the triple helix model into an evolutionary model of innovations, extending quasi-evolutionary economic models of lock-in, where there is one source of variation into a model with three sources of innovation. The triple helix model conceptualises the dynamics of research systems as a result of inter-linked dynamics of university, industry and government. The article argues that with one source of variations prolonged periods of equilibrium are possible. However, in situations of interacting, reflexive dynamics a triple helix will exhibit complex behaviour, although temporarily trajectories may emerge and continue for some time. The specific complex system Leydesdorff develops implies that the complex system remains in need of local action, but that the effect of the action – e.g. policy actions – is unpredictable. As a consequence, triple helix science policy making should be reflexive in several aspects:

1. As long as the system moves along a trajectory, policy may remove barriers.
2. If the system gets globalised and becomes more uncertain, policy making might create unintended consequences. Policy making in order to be productive needs to be knowledge intensive and often be oriented to certain niches or regions.

The consequences for university are not further elaborated.

2.23 Mason, Robin (1998). *Future trends.*

The final chapter of the book looks into the future of the universities in a globalised world. Throughout the book a central dilemma came to the fore. There is on the one hand the reality of increasing competition, undercutting the university both at home and abroad (with the 'danger' that if the traditional providers ignore the consumer demands, others (i.e. private for-profit universities, virtual universities, corporate universities, educational brokers) will quickly appear to meet the demands). On the other hand, there is the belief that entering the global market is ultimately undermining the whole notion of a university, for the focus in consumerisation in the short run.

One way out of the dilemma is co-operation, by: working with a complementary partner; working with an educational partner abroad; working with a consortia of universities; working with international partners to develop courses jointly.

The author believes that universities can become global providers without losing their morals or their quality. Eventually global practices will be accepted as the legitimate domain of universities. The same range between small elite providers and mass providers will be reflected at the global level. The process towards global providers involves closures, amalgamation and the marginalisation of purely campus-based institutions.

2.24 Martin, B.R. (2001). *The changing social Contract for science and the evolution of the university*

This article first traces the history of the "social contract" between universities (in terms of the research function) and the state. It argues that the Cold War period (1945 to the end of the 1980's) was one in which more emphasis was put on high levels of autonomy for science, and the period we are now entering/have now entered could be characterised by a return to a more clearly defined relationship (more clearly defined expectations) between federal funding agencies and research institutions. In particular, three "driving forces for change" (environmental factors) are identified:

- increasing competition (leading governments to need more explicit science policies);
- constraints on public expenditure (governments need to be more selective in funding and have clearer priorities), and;
- the growing importance of scientific competencies (demands for new skills has led to mass higher education, but governments are not necessarily prepared to pay for similar increases in the scale of scientific research, leading academics to spend more time on teaching).

The result of the above is that governments now expect more specific benefits from investments in research. Martin explains that we can understand these changes in terms of a shift from Mode 1 research (discipline-based) to Mode 2 (multi- or trans-disciplinary, carried out in a variety of institutional settings). He prefers to think of this as a changing balance between the two types, and the current balance can be said to be more similar to earlier eras.

Martin traces the history of different types of (university) institutions, and explains how Mode 1 and Mode 2 research was distributed over different types of institutions with different missions (i.e. the land-grant institutions were founded primarily to carry out Mode 2 research), although the emphasis was more on Mode 1 research. What has changed from 100 years ago, in Martin's view, is that whereas earlier the public and private spheres (and consequently funding) were quite separate, there is now an emphasis on overlapping in the form of public-private ventures.

The **institutional** consequences of this are likely (based on an analysis of organisational changes in the past) to be the birth of new hybrids (greater variety within institutions in terms of mission, target audience, functions, etc.), and the birth of new types of institutions with special functions (i.e. Phoenix University). In addition, another possibility is the “networked university” which would involve a closer integration with outside research institutes, or consultancy companies. And finally he envisions more entrepreneurial universities which emphasise the service (or “third”) function in addition to teaching and research.

2.25 Mayer, E. (1998). *Interdisciplinarity: The endless frontier.*

This article addresses the barriers to introducing interdisciplinary centres (specifically in the German context, but drawing on a wide variety of examples from other countries). She argues that the complexity of modern questions of importance require such an interdisciplinary approach.

The barriers to institutionalisation of interdisciplinary innovations mainly stem from the history of the university itself (the separation of knowledge into different categories and the institutionalisation of these, and the funding mechanisms that have been built up to support these research areas). Organisational aspects of introducing or supporting interdisciplinary studies are noted (tensions between departments if ownership of the new unit is not clarified), financial barriers (funding systems that do not deal well with non-discipline based research), and cultural aspects are touched upon (strategies for creating a base or home for interdisciplinarity).

2.26 Middlehurst, R. (2000). *Higher education professionals for the twenty-first century.*

Middlehurst report four common changes affecting business: rapid development and deployment of ICT; increased speed of scientific and technological advance; increasing global competition; changing demands in response to rising incomes and shifting socio-economic pressures. These drivers of change may accord the UK Department of Trade and Industry (DTI) end up in two scenarios:

- **Wired world** is a network of economic agents coming together via ICTs on a project-by-project basis, held together by a web of contracts. Self-employment and portfolio working are common and small, innovative and responsive businesses are dominant.
- **Built to last** in which businesses will seek to capture and internalise knowledge (the principal competitive advantage), for instance through comprehensive remuneration packages to retain individuals. Stable and often large companies and strategic partnerships dominate the economic landscape.

These drivers have been used to develop scenarios for HE (in the UK) in similar ways. They reveal an increasingly crowded market place with new providers emerging to compete with existing universities and colleges. Several types of universities are outlined: *mega universities* (China TV University 530,000 students, or Open University UK 150,000 students); *for-profit HE* (Phoenix); *virtual universities* ("Middle Asia Web University"); *local low-cost provider university*; *"world school university with branch campuses world-wide"*; *"Harvard-in-Australia university"*, and growing numbers of consortia.

Features related to these scenarios in HE are: technology-dependence; a blurring of traditional boundaries, e.g. between higher and further education, public and private, education and training; disaggregation of functions, including separation of teaching from assessment and accreditation, and outsourcing; changing educational values (shorter programs, delivered by practitioners, accompanied by in-company certification rather than academic qualifications); global market place of reputation built into recognisable "brands"; smart alliances across sectors; brokers and visible growth of educational service companies; new competitors.

Middlehurst goes on to consider the impact of these trends and developments for the concept of professionalism. In re-examining some of the key tenets of professionalism – skills, authority, standards and autonomy – shifts are evident. Professionals are increasingly expected to be "multi skilled". Making the transition from a narrow skill-base to multiple skills is unlikely to be achieved without training and development. In the past, trust in professionals was bound up with a mystique relating to expert knowledge. Today, trust is built on transparency of behaviour and outcomes. The "authority of knowledge" is not accepted as implicit; such authority has to be earned and legitimated in a constant series of negotiations between constituencies and stakeholders. Professionals are often seen as strongly autonomous and individualistic. However, increasing complexity calls for extensive collaboration across different roles, constituencies and networks.

Growing complexity places a premium on the building of networks and this could be usefully furthered if HE came to value the mobility of professionals across sectors. Staff can be drawn from outside the sector and much can be learned from benchmarking elsewhere. Institutions and the HE-sector as a whole urgently need greater flexibility in contracts, reward systems and work practices to break down the barriers between different categories of staff and to profit from the rich diversity of talent available. In all, there will be a need for "continuous professional learning".

2.27 Middlehurst, Robin (2001). *University challenges: borderless higher education, today and tomorrow.*

Middlehurst distinguishes four interrelated and partly overlapping sets of parameters of change. First, economic and business dynamics relate to the costs involved in expanding the range and flexibility of educational provision. The flexibility concerns both pleasing new types of customers (e.g. working adults) and providing education differently ('just in time' learning). The economic and business dynamics also concern the fact that governments probably cannot bear the costs of higher education solely, while at the same time much is expected from higher education in the knowledge society and the global economy.

Second, social and intellectual drivers are: widening access and participation, rising public expectations of customer service (individual choice, provider accountability), challenges to traditional notions of educational authority, and new patterns of interaction (network formation).

Third, technological developments relate to information and communication technology, which erode the boundaries of previously separate sectors and businesses, and create new markets and competitors, and new combinations of products and services.

Fourth, changes in government policy are notable. Some policies have remained constant, but also new elements have been introduced, like new public management and increasing attention to market and quasi-market mechanisms. As a consequence of these sets of change parameters, the higher education landscape may change considerably. The author distinguishes the following developments:

- the rise of corporate universities;
- the emergence of 'for-profit' education;
- the increasing role of media and publishing businesses;
- the rise of professional associations;
- the expansion of educational services and brokers ;
- virtual universities;
- increasing co-operation (networks, consortia) between universities and colleges.

The described change parameters will obviously have impact on the higher education landscape, challenging existing universities. An evident challenge is to cope with the changing boundaries in the landscape (as has been described above). Another fundamental challenge is to rethink the delineation between core and peripheral services. Universities will have to define their core business, and will have to decide whether they should remain extended across the full range of 'traditional' services. A third fundamental challenge relates to prepare (or not) for a

wider range of educational values beyond the traditional education of young adults.

2.28 Muller, S. (1996). *The advent of the "University of Calculation"*.

Muller distinguishes four kinds of universities throughout modern history: the medieval University of Faith, the University of Reason (starting off in the 19th century), the University of Discovery (second half of the 20th century) and now we are at the doorstep of the University of Calculation.

Even we are still struggling to understand and manage the University of Discovery, the University of Calculation is emerging. It is the product of the electronically operated intelligence processing made possible in the computer age. Its hallmarks are the augmentation of individual human intelligence in terms of speed, power, and imaging. The university will be no less profoundly affected by the knowledge-driven society than other social institutions, but as part of the knowledge industry it will be more fundamentally transformed than the rest. The university will survive because the knowledge driven society requires knowledge-trained human talent in substantial quantity, and the university is the existing institution intended to train and capable of training such talent. Physical human participation in the university of calculation may be flexible and reduced, but it is not likely to fade away all together.

But what kind of institution will the emerging University of Calculation turn out to be? That will depend on how four fundamental issues are addressed: will the university still be a place of learning? Will it play a role in shaping the character of the students (Bildung)? Will it retain the character of a community? And will the university stand for a set of values?

Muller mentions some general forces that threaten the university (i.e. tend to answer the questions negatively). One of them is that the general public by means of the government, and the media nowadays regard the university primarily as an economic investment that must provide an appropriate return. The present University of Discovery with its vast laboratories and the like is expensive, but the University of the Future will not cost less.

The University of Calculation, emerging from the University of Discovery to serve the evolving knowledge economy, consumes applied knowledge in unprecedented quantity and at near-incredible speed. Measured explicitly only in economic terms, the University of Calculation will find it difficult to maintain learning merely for the sake of learning. In the knowledge society functionality appears to be valued more than character formation (Bildung). Personal freedom is stressed. This also impacts on the sense of community. There appears to be no question

but that each individual within the University of Calculation will be able to function with an unprecedented degree of physical autonomy. There is a greater likelihood of clusters of relatively small disciplinary communities rather than a single, all-embracing community. The University of Discovery already exhibits this feature and the University of Calculation seems unlikely to reverse this trend.

The university of calculation can be seen as a expensive institution, highly functional as an economic investment in terms of training and continuing innovation in science and technology, no longer committed to learning per se nor to character development, and representing a convenient aggregation of talents more like a marketplace of research and training than an intellectual community. A further implication of such an institutional evolution is that participants in its activities would not necessarily share any common set of values beyond the economic imperative of producing well enough to be compensated, and vice versa. The university would not play an institutional role based on its own set of values. There are according to Muller however two avenues that appear to offer some relief. The first is the atomisation of knowledge. The University of Calculation is to use its vast augmentation of the human mind to reintegrate knowledge-to rebuild a sense of the whole. Such an effort toward the recovery of coherence would at least to some degree restore community within the university itself. The second avenue is that the knowledge society offers enough leisure and access to its members to make it possible for them to learn for pleasure as well as for vocational purposes. A growing number of people seek education for the enrichment of their minds and lives.

The integrity of the university of calculation in the next century depends on its recommitment tot the coherence of human knowledge and to learning above and beyond mere professional skilling.

2.29 Müller-Böling, Detlef (1997). *Neue medien – Hoffnungsträger für die Hochschulenentwicklung?*

The German HE system – like many other HE systems adapted to the quantitative changes (mass enrolments). However, regarding qualitative adaptations, the German *Hochschulen* are lagging most other Western European systems.

In the view of the author, future HE institutions should be autonomous, academic, competitive, discernible and economic (efficient). Each of these characteristics raises questions concerning the role of new media. An important question regarding the autonomy is whether innovations regarding new media and technologies can be implemented, given the weak corporate power of the governing structure. With respect to the academic characteristic, the question is put forward

whether the traditional unity of research and teaching can be maintained and whether cultural differences will fade away because of a dominant (Anglo-Saxon) culture. When competition will be a main characteristic of *Hochschulen*, one may wonder whether private corporations will take over (parts of) the tasks and functions of traditional providers of higher education. Regarding the discernible role of *Hochschulen*, the author reflects on the question whether the new media will bring about more homogeneity (one standard) or whether differences will be more clear and whether working on the individual level (a consequence of the introduction of new media and technology) is not at odds with developing an institutional profile: does the individual learner perceive this. The final characteristic, economic efficiency, challenges the institutions to find out whether new media and technology are really more effective and efficient.

In the future, the state, business and industry and the *Hochschulen* themselves can contribute to the development of new media and technology in higher education. Regarding the latter, it is the question at which level of the organisation the driving powers lie: the chair, the faculty, the institution or a group of institutions. The author gives preference to strategy development at the institutional level.

2.30 Newman, Frank (2000). *Saving higher education's soul. The futures project.*

Though HE has maintained a remarkably stable structure new forces are reshaping HE. The HE-environment is increasingly competitive and the reins of government are loosening worldwide in favour of market-driven decision making. The nature of the HE-system of the future depends on how skilfully the new market forces are used and contained. For a long time HE institutions have held a privileged position because they have focused on the needs of society rather than self-gains. In turn they received special responsibilities. In a market driven area this special status is endangered. Is this a serious problem? Or what needs to be saved? The problem is to ensure that the drive for efficiency and revenue takes careful account of the broader purposes of HE. Newman pays attention to three special attributes of HE:

- socialising students (to the community, to the life of the mind, and to the profession);
- providing all citizens social mobility through the opportunity for access to HE;
- and upholding the university as the home of disinterested scholarship in the pursuit of truth as well as open and unfettered discussion of critical issues.

The real threat to HE is that we will focus only on the short-term gain that competitive new forces offer us, that we will search for ways to maximise institutional

revenue rather than pursue the longer-term goals that have formed the backbone of HE for centuries. There is no place for nostalgia, but at the same time we need to be careful to rush toward for-profit activities.

2.31 Newman, Frank and Lara K. Couturier (2001). *The new competitive arena: market forces invade the academy. The futures project.*

The authors claim that unprecedented competition is reshaping the basic way universities and colleges operate. They start their article by analysing the forces pushing for greater competition, these include:

- more demanding students: as students are treated more like customers they start acting more like customers;
- the rating systems increase competition;
- new (for profit, virtual) competitors;
- blurring of the difference between for profit and non profit institutions as the former are moving into traditional academic areas particularly bachelor and master degree programs. This is reinforced by the commercial activities of the traditional non profit (both private and public) institutions;
- information on all kinds of education has become widely available on the Internet.

The result is a market place for HE with choice among a wide array of alternatives. These changes are combined with important developments in technology. Computers and electronic network change the traditional teaching styles. In choosing where to enrol students increasingly demand proof of the universities ability in handling technology. Technology can reduce the cost of teaching offering an opportunity for new providers to enter the market. The competition is centred round these new teaching styles, each institution showing its ability to help students learn. This also means a shift from competition on inputs (selectivity, endowments etc.) to a competition on output (measuring learning).

The consequences of the increased competition on new issues are difficult to predict, but it is certain that every institution will be affected. Certain study programs, especially those with large lectures will suffer most. A danger is that the new for profit providers only select the profitable part of the market, leaving the universities in poverty. All this is not to say that the traditional models will disappear, but even within these models changes will be made.

For policy makers there are difficult choices to be made. The authors suggest policy makers to:

- require a better flow of information and a greater degree of transparency;
- reducing bureaucracy and putting frameworks in place that stimulate institutions to take into account public demands;
- provide incentives for the use of technologies;
- require the measurement of learner outcomes;
- design financial aid packages that balance the desire to reward student merit and the stimulation of participation by low income and less advantaged students;
- Stimulate institutions to be entrepreneurial.

Institutions too should react:

- institutions will need a strategy in order to compete;
- institution will have to find their specific niche;
- leadership will be key in the new competitive environment

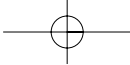
If policy makers and institutional leaders are slow to understand and react they run the danger of drifting into an environment that is unconsidered and to some degree unexpected. This may lead to several problems:

- less able and affluent students may be neglected;
- traditional institutions may slowly transform in for profit institutions losing their academic values;
- prestige may become a more important performance indicator than learner outcomes;
- a gradual growth of large-scale institutions with uniform practices, the creation of course ware may move out of the academic process to for profit firms with less variety as a result.

However, there are also great opportunities in terms of new learning modes, for costs being lowered, access to be increased. But for these to be realised discussion and planning are essential.

2.32 Newman, Frank and Lara K. Couturier (2002). *Trading public good in the higher education market. The observatory on borderless higher education. The futures project.*

The article starts from the assumption that market forces in HE may have positive effects, but if the market is released uncontrolled it may negatively affect HE as well. Good in the sense, that institutions may become more open to their environment. Bad if the academic values of institutions are corrupted by the need to



make money. The article then deals with the question which solutions help steer the market in ways that benefit the social good.

The authors start of by arguing that markets and competition have become central to HE in the past decade. There is competition among old universities for scarce resources and students. There is competition with new (private) institutions sometimes in the area of virtual education or life long learning. This competition has moved to a global scale with the formation of alliances of universities to offer online courses.

The authors claim that this new complex and dynamic environment requires from the institutions that they have a strategy rather than drift into the future. There are difficult questions for governments too:

- how to overlay a societal frame on the policy decisions so that the welfare of society and its student become the ultimate goal?
- what incentives to use to redefine competition so that institutions compete to fulfil the public good?

This is specified in the article into three more questions:

1. How can policy encourage institutions to measure and report learner outcomes so that the market is operating based on good information about institutional performance?

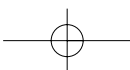
One of the problems here is to define quality, recognising the new situation of life long learning and virtual education that transforms Higher Education. Another problem is the increasing number of foreign institutions that operate in a country. The authors propose measuring learner outcomes along the teaching missions of the institution.

2. How can policy turn students who cannot pay or will be expensive to educate into a target-market?

Basically governments should provide HE institutions with premiums for accepting *and* graduating students from lower income classes or under-represented students.

3. What types of new market oriented structures for HE systems would encourage institutional accountability, responsiveness and innovation?

The authors propose the following. The state maintains ownership of the institutional assets. The state and institutions negotiate a fixed annual budget, adjusted for inflation, with the agreement that the institution will not request further state support. The institution is then responsible for making up for any lost revenues for fund-raising, tuition revenues and contracts with business and industry. Institutions can qualify for bonus funding based on performance in



areas such as measurement of learner outcomes, partnerships with elementary and secondary schools, diversity of enrolment by socio-economic status, race ethnicity and service to the community.

2.33 Noll, A. Michael. *Technology and the future of the university: A sober view.*

Technology has had considerable impact on education and the university, but the Internet – today's newest technology – will not lead to the death of the university. While there is clearly a role for virtual education over the Internet, the conventional university will survive since students are well served by a real, physical, educational experience.

2.34 Nowotny, H., P. Scott, et al. (2001). *Re-thinking science.*

In their book *Re-thinking Science*, Nowotny et al. also develop the consequences of mode 2 knowledge production for the university, after a recapitulation of the main argument of Gibbons et al. The crucial issue for universities is how they cope with on the one hand to define a core, set priorities, create effective management – which implies some sort of organisation along probably anachronistic divisions between disciplines, or teaching and research, or scientific and social roles – and on the other hand de-institutionalise itself in order to become an open organisation which enables flexible responses on the needs of the knowledge society and allows for different institutional forms for teaching and research. They give little guidance, but reference to virtual universities, corporate universities and “primitive” universities based on networks of researchers, teachers and students as possible models. Within the sea of change, they also pinpoint two stable functions for the universities. First the education of researchers, for which it has a monopoly. Second, to be the generator of cultural norms for a society, which might be more than ever procedural and less substantive. Nowotny et al. consider such procedural norms also as a possible base for creation of knowledge within the future academe, “*instead of detailed methodologies*”.

In three later chapters of the book they take up this issue of creating socially robust knowledge (knowledge that can hold when it moves through different societal contexts) within three arguments. First: the basic conditions for creating knowledge are still valid. Knowledge still has to rest on consensibility of claims – that is the ability to contribute to consensus – and consensuality – the maximum degree of agreement. Of course, socially robust implies that the scope of consensus is much wider and transcends the traditional boundaries of science. The second argument is that indeed the reliability of knowledge, which rests always bounded social and epistemic circumstances, has to be realised while being sen-

sitive to social implications. Or more radical: knowledge can only become reliable within wider contexts if it is robust towards these social implications.

Consequently, that science 'works' becomes more important than an objectivity based on strict methodologies. Nowotny et al.'s third argument indeed is that the epistemic core of new knowledge is empty, that is there is not one methodological principle that lies at the core of knowledge production, but rather a repertoire of norms and practices.

2.35 Pavitt, K. (2000). *Academic research in Europe. SPRU electronic working papers series.*

In a working paper, Keith Pavitt argues that up till now Europe's innovation policy has neglected the role of publicly funded academic research. He argues that the Commission should consider the possibility of an independent Agency (research council) to fund academic research based on quality solely. In comparison with the US, EU fails to develop real competition on academic funding and puts too much emphasis on issues like "foresight", "practical usefulness" and "regional spread of funding".

Characteristics of the Agency should be:

1. Strict separation of the Agency's funding and decision making from national agency funding.
2. Participation in decision-making of high quality scientists.
3. Strong focus on quality, original and exciting research programmes.
4. Flexibility and variety in funding schemes from postgraduate support to lengthy research programmes.

2.36 Peters, G. and M. Vermeulen (2000). *Marktwerking in het hoger onderwijs.*

The authors analyse the extent to which HE systems have been marketised and conclude that this has been very limited so far, mostly because students do not decide on entrance on the basis of price and quality. Marketization may be possible in the future, but depends critically on four pre-conditions:

- enough customer information;
- no monopolies;
- no distribution problems (no exclusion on the basis of income);
- many externalities (positive/ negative effects for others than those who pay/ earn).

The authors conclude that the first three preconditions are met, but that the fourth may be problematic. HE has distinct positive effects on national economies.

This poses a restriction, as well, because it raises the complexity of the market. HE institutions will have to cater for very different groups of students, partly on markets, partly in the public sphere. Also the institutions are in a sense squashed in between their customers, their professional values and the government. All this can be dealt with, but requires highly skilled management. A final problem is the effects of competition, this may increase efficiency in some parts of HE, but other parts depend critically on sharing of knowledge. Marketization may be necessary and even positive, but it requires a strategy thought through well.

2.37 Privateer, Paul Michael (1999). *Academic technology and the future of higher education. Strategic paths taken and not taken.*

Privateer argues that a change is needed regarding education technology. Old notions of teaching and instructional delivery must be replaced by new learning management systems. If colleges and universities want to reinvent themselves, they have to take a long and hard strategic look into how their delivery of instruction conflicts with the cognitive potentials of contemporary information technologies. It makes little sense for academia to continue a tradition of learning significantly at odds with technologies that are currently altering how humans learn and interact with each other in new learning communities. If our computers are becoming smarter, able to selectively retrieve, store, and alter highly volatile information life cycles. Then the role of the learner is changing too. Our students need no longer function like machines that replicate a "master" knowledge of something that will surely change because technology will continue to make more information available than even before, especially with quantum computing and nanotechnologies looming in the near future. Our students, *like our institutions*, should be prepared for a different path. Learning ("strategic academic technology") should be aimed on the production of intelligence rather than on the storage and recall of random and quickly outmoded information. Institutions should articulate a new mythology based upon new connections between contemporary notions of organisations, contemporary global issues, and contemporary technologies.

2.38 Renwick, William L. (1996). *The future of face-to-face and distance teaching in post-secondary education.*

The author posits three questions. First, who will be the delivery actors of post-secondary distance education? Second, whether the dual-mode (combination of traditional and virtual university) university is the likely future of all HE institutions. Third, what should be the interaction between the two modes of education (face-

to-face versus distance education) and what are the consequences on teaching staff, content, and design of materials.

Regarding the first question, the author expects that new kinds of relationships are beginning to form between HE institutions and other organisations and agencies, which best can be thought of as strategic alliances (contractual agreements to protect or advance mutually agreed objectives). Furthermore, there is more room for entrepreneurial activity, either by the public and private sector. This could lead to a stronger position of private enterprises in the HE industry.

Concerning the position of dual-mode, face-to-face and distance institutions, the author expects that dual-mode and distance institutions will survive in the future. The dual-mode university is however challenged to further develop the dual-mode approach, addressing the issue of effectiveness. The traditional face-to-face universities will be challenged to implement elements of information and communication technology. This does not logically imply that the university should offer distance education; implementing ICT can also be confined to research or experimental work on a relatively small scale.

The interaction between the two modes of education is not seen as very complicated. One could assume that the underlying views, norms and values of the two modes are rather distinctive and that there is in fact rivalry between the two (which mode is more effective or efficient?). The author argues however, that given the developing tradition in dual-mode institutions, the differences are blurring. There is mutual understanding of the underlying perspectives on learning and teaching, and most staff involved understands that in the future a combination between the two modes is the most feasible way to survive. This in particular relates to the new generation of staff – the present-day students – which is raised in a culture that views the role of information and communication technology as more or less given.

2.39 Richardson, R. C. et al. (1998). *Higher education governance, balancing institutional and market influences.*

Changing policy environment:

- HE has become essential for a middle class life and thus for social mobility;
- an increasing enrolment demand with more diversity;
- pressures of cost-containment;
- eroding consensus on financial support;
- growing concerns about quality;
- the unpredictable impact of ICT;
- new providers of Higher Education;

The authors claim that with these developments HE has entered a new era. The past few decades were an era of institution building. Institution building benefits from centralised structures. The new situation with greater complexities and dynamics call for a more de-centralised system in which institutions are made more responsive to the needs of their environment. This does not mean that the state should simply retreat. De-centralisation in itself will only give more authority to the professionals inside the institutions. Though many of the values of the professional and society overlap leaving all authority to the professionals may lead to self serving and inward oriented institutions. The state should use its authority to balance the professional autonomy with market demands. Instruments that could be used for this are: need based student financial assistance and competitive research funding.

2.40 Rip, Arie (2001). *Science for the 21st Century*.

Epistemological aspects of future research are also developed by Rip in an essay on Science for the 21st Century. In an historical based knowledge-sociological analysis of scientific knowledge production and current trends in science, he derives more detailed requirements for processes and arrangements of robust knowledge production. The current trends are:

1. Shift towards cross disciplinary and non-disciplinary research.
2. Shift out from traditional positions and roles.
3. Fusion between science, high-tech and the innovation competition.
4. Importance of scientific expertise for decision-making under uncertainty and the call for "sound science."
5. Shifting social contract between science and society with new stakeholders becoming important, new (and sometimes abstract) sponsors and new legitimations for science.

These trends highlight a tension between on the one hand the need for some order in knowledge production by reducing variety and develop productive practices and on the other hand the need to go against the same order and innovate. "Traditional science", which in Rip's analysis is less traditional, but a socio-historical product of post WWII developments, celebrates one specific knowledge production and emphasises disciplinary rules. But other forms of knowledge production have shown their value and may become important again as well as new ones – based e.g. on the possibilities of ICT – . In addition to the knowledge based on controlled experiments within real or virtual laboratories, robust knowledge has developed in professional communities through circulation of embodied knowledge and articulation and codification of experiences between local practices and in disciplines like

geography and biology through “natural history”, i.e. the recognition of patterns in collections of observations. All three modes have found their own way of handling with the inevitable underdetermination of knowledge: that is knowledge can never be fully certain, but can be made robust if it is produced through processes that focus the claim, reduce the uncertainty and put in context. New ones may develop, like the Mode 2, but the risk is that Mode 2 is indeed seen as *the* mode of knowledge production and is made dominant by sponsors and institutional practices of knowledge institutes. The risk is that possible other productive modes of knowledge production will be suppressed and the produced knowledge is not the best one within all circumstances. In order to prevent a (too quick) lock in of one mode of knowledge production, Rip pleads for heterogeneity of knowledge production. Another new mode is indicated in the concluding part of the essay, where it is shown how indigenous knowledge of Maori can make a productive mode of knowledge within New Zealand.

The essay is concluded by a list of requirements for robust knowledge production:

- profit from lab science and its acquired capacity to control conditions;
- give natural history modes of knowledge a central place again, to address issues such as sustainability and the environment;
- forget about disciplines, and create instead domains of overlapping knowledge production;
- do not consider interdisciplinarity as a goal, but the management of heterogeneous knowledge,
- develop ways to get input from new stakeholders, such as the environmental movement, patient organisations, etc.
- develop public involvement not through public understanding, but through public capacity to make informed judgements about scientific claims;
- allow for partial lock ins through linkages between levels of the system and nested spaces, but remain openings for new ventures.

2.41 Roberts, P. (1999). *The future of the university: reflections from New Zealand.*

Roberts provides a typical example of changes in a HE-system that has undergone, and seems to continue to undergo, the winds of neoliberalism. He foresees a possible future of a HE-system that is typically consumer driven. Institutions, should they survive at all, will in his eyes be seen less as repositories of knowledge and more as providers of services. Academics, likewise, will no longer be seen as (merely) bearers of intellectual wisdom but as sellers of products. Conditions of academic work will change: fixed-term lecturing appointments, and the develop-

ment of a growing army of tutors in poorly paid, teaching-only jobs. Flexible specialisation positively demands an easily disposable, infinitely malleable, unsettled, non-unionised workforce.

The governmental policies all give evidence of a move toward a more competitive tertiary environment. And if governmental funding continues to decline (in real terms), the pressure to make money in non-traditional ways will show a corresponding increase.

2.42 Schimank, U. and M. Winnes. (2000). *Beyond Humboldt? The relationship between teaching and research in European university systems.*

The authors argue that the relationship between teaching and research in Europe is changing. Three idealtypical models of those relationships can be distinguished:

- the Humboldtian model (e.g. Germany, Italy): close connection between research and teaching, no functional differentiation;
- (towards) the post-Humboldtian model (e.g. UK, Sweden, Norway, the Netherlands), with much more functional differentiation (in terms of roles, organisation, and resources) between the different tasks;
- (moving away from) the pre-Humboldtian model (e.g. France, Ireland, Iceland, Spain and Hungary): much differentiation between research and teaching.

The two former systems have more and more been criticised. All systems are moving in the direction of the post-Humboldtian pattern, but this pattern is not yet stable. It's not yet stable because the Humboldtian model better fits most professors' interests (intrinsic attraction of research, reputation is located in research, high process autonomy, dual tasks can be used as an excuse. This, the post Humboldtian model is resisted by many academics). The conventional wisdom that research and teaching should be united is nowadays under pressure (for good teaching does not presuppose being an active researcher). Curiosity-oriented research has always been defended by reference to this form of conventional wisdom. It is the question whether curiosity-oriented research will find other ways of legitimisation "which buffer it as reliably against extra-scientific (=> mode 2) demands".

2.43 Trow, Martin (1997). *The development of information technology in American higher education.*

The author comments on debates on IT, for they lack a consideration of historically shaped characteristics of higher education, in particular the development from elite (adult socialisation, the shaping of mind, character and sensibility) to mass (the transmission of knowledge) to universal ("the study of all sorts of things that escape categorisation") higher education.

There are three (analytically distinguishable) motives to add more IT to curricula: enrichment and improved efficiencies in learning, wider access, and cost containment. In elite institutions, IT will primarily be used in addition to the traditional ways of education. Mass and universal education are characterised by the slogan "here and now" and lend themselves better for IT application than elite higher education. The difference – according to the author – between mass and universal education in relation to IT is that in the former most immediate problems regarding organisation and finance will arise more sharply.

The fact that IT will primarily be used next to traditional education implies that the ownership on IT-based education is still with the academic. It is unlikely that a teacher will find commercial software that smoothly fits in with his/her traditional courseware, so teachers will develop handcrafted courseware. This consequently also implies that developing IT-based education is costly and that teachers need to be strongly motivated to create their courses. There are probably opportunities to use the experiences and resources of the extension branches of the elite institutions to develop these specialised courses.

Another argument for the mix of traditional and IT-based education lies in the confrontation of the views from administrators versus academics. From the administrative perspective, using commercial software to broaden the clientele of the institutions seems most attractive, but the idea of self-contained courseware with minimal supervision might go against the academic traditions. An in-between solution of a mix of the two approaches seems most feasible.

A third argument to engage in IT-based education despite the problems connected to it, lies in the fact that other institutions are also introducing IT in higher education. In combination with the challenge to introduce IT, institutions are often afraid to lag behind other – competitive – institutions.

To overcome the duality of the mass market for courseware and the elite academic characteristics of universities, either new structures (schools, institutes) could be created, extension services could be used, or partnerships with other institutions could be developed.

2.44 Welle-Strand, A. (2000). *Knowledge production, service and quality: higher education tensions in Norway.*

She argues that in the future mainly institutions that are able to produce and transmit innovative and relevant knowledge that is competitive in the market will prosper. Such institutions, the Service University, are likely to have the best chances of finding a pragmatic balance between knowledge-based services relevant for the market and independent, innovative and critical research.

In Norway, she says, the traditional research university is losing its hegemony. It has to fight for its legitimacy, with all the new universities or other organisations producing knowledge relevant for users, domestic as well as international. Mode 2 (Gibbons) is on the march. She makes the following assumptions about the Norwegian situation:

Although the traditional research university seems still to be regarded as a significant knowledge producer, there are clear signs of “newcomers”: state colleges, private colleges, research institutions, and foreign organisations. The “newcomers” seem to have strong political and economic support.

Institutional leadership will be one of the most decisive conditions for achieving high quality science and profitable services. It is asserted that the successful institutions in the future will be an “ivory tower” and an “enterprise” at the same time, making enough money to have healthy budgets and invest in basic research. They will continue to have status as distinct scientific institutions.

2.45 Whitty, G. and Sally Power (2000). *Marketization and privatization in mass education systems.*

Recent education reform in many countries has sought to dismantle centralised educational bureaucracies to create systems that emphasise parental choice and competition between schools, thereby creating quasi-markets in educational services. In addition to this widespread Marketization of public education systems, publicly financed and provided education services have been privatised.

In this paper, Marketization and privatisation policies are compared, and initial research evidence on the impact of Marketization and privatisation in England, the USA, Australia and New Zealand is examined in the light of the claims about diversity of provision, efficiency, effectiveness and equity. The authors conclude: “in general, the system-wide effects of recent reform measures do not seem yet to demonstrate the positive outcomes envisaged by their leading proponents.”

The authors then consider the significance of attempts currently underway in the UK and elsewhere to temper the emphasis on consumer rights within policies of Marketization and privatisation with a renewed concern for the citizen rights traditionally associated with social-democratic approaches to education policy. They conclude: “...while the Third Way may offer an alternative to either vehement advocacy or rejection of Marketization and privatisation, there is already some concern about the coherence of New Labour’s reforms and the extent to which marketization and privatisation will continue unabated under the new more fashionable discourse of mutuality and partnership.

3

Supranational bodies

3.1 Caracostas, P. and U. Muldur (1997). *Society, the endless frontier.*

Some of the observations and ideas now brought under the label of the ERA have been formulated before in "Society, the Endless Frontier", a study by DGXII (the Commission's DG for Science, Research and Development) on the future of research and innovation policies in the 21st century. The first part of this study describes the development of RTD policies as one which changed its main focus in the OECD countries from "basic science for the military", via "key technologies for the industry" towards "innovation for society" nowadays. The report also describes the evolution of the Framework Programme and its achievements. The second part analyses what got known as the European paradox: key strengths in science, but lagging behind in innovation. The third part is the most interesting one for our purposes as it sets out ideas to "deepening interaction between society, innovation and Europe in the 21st Century. Following thinking on national systems of innovation, the knowledge society and technology and society studies, it pleads for innovation policies focusing on dissemination of technology by co-operative networks, life-long learning and organisational innovation. In terms of structuring European RTD policy, the document is modest in its proposals by "just" proposing a co-ordination of science and technology policies at different levels. Although not developed at length, what is interesting in this study is the emphasis on society as an/the important aspect of RTD policies. This notion continues within most of the European policy discussion and addresses the epistemic and civic dimensions of the future of academic research.

3.2 Council of the European Union (2001). *The concrete future objectives of education and training systems*

Europe's goal is to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion. The world is characterised by rapid change: increasing globalisation, growing complexity in terms of economic and socio-cultural relations, ICT, and information and knowledge drive new economic structures. Changes concern:

- changes in working life;
- changing demographic structures and varied migration flows;
- equal opportunities and social exclusion;
- enlargement of the EU.

In the light of these challenges and developments the European ministers of education have adopted the following concrete strategic objectives for education and training:

- increasing the quality and effectiveness of education and training systems;
- facilitating the access of all to the education and training systems;
- opening up education and training systems to the wider world.

3.3 Guidelines for EU research activities (2002-2006). Brussels: 22+ annexes.;

3.4 Towards a European research area.

In a "Communication" to several European policy actors, the Commission that Europe is not investing sufficient in research and technology, although science and technology are at the base of employment and at the heart of public policy making. Yet, there is no European policy on research. National research policies and that of the EU overlap without coherence. The document gives some broad idea on how a European Research Area can be shaped in order to "go beyond the static structure of 15+1 towards a more dynamic configuration."

- In order to optimise current scientific strengths the Commission wants to create (virtual) centres and develop a common policy for large research facilities.
- To overcome the 15+1 policy structure, the commission wants more co-ordination of national and European research policy; including co-operation between national funding bodies and closer co-operations between European research organisations like ESF, ESA, EMBO, EUREKA, COST etc.
- To get a more dynamic private investment in R&D, Europe needs better use of research policy and innovation policy instruments and effective tools to protect intellectual property rights.
- Greater mobility of researchers across European and increase number of young and of female researchers should improve the human capital in research;
- A common system of scientific and technological reference for policy decision making and investments in research for policy should improve the use of knowledge in decision making.
- Europe needs a common framework for social and ethical values in scientific and technological matters.

The consultation round on the ideas of the ERA has indicated wide support. The 6th Framework Programme is presented under the label of "making a reality of the ERA". As previous FP's were an instrument for co-operation and collaboration, the new one is designed to develop RTD excellence and its impact on the innovation process and integration of European research. The ERA will be made real by three ways: First integration of European research through networks of excel-

lence, integrated projects and EU's participation in research programmes of Member States. Second, by "structuring" the ERA through co-ordination of activities in research and innovation, human resources and mobility, use and development of infrastructure, and development of science/society interface. Thirdly, by strengthening the co-ordination and collaboration between research policies and programmes of national and international scientific organisations and Member states.

3.5 OECD (1998). *University research in transition.*

Assuming that universities are key elements in the science system, this document explores the changes in the environment of universities and other higher education institutions. The changes and trends raise serious questions regarding the guarantee that these institutions can continue to make its contribution to the science system.

The document distinguishes the following trends:

- declining government funding: government budgets for research and development decline and higher education institutions seek for new sources of support;
- changing nature of government funding: from input-oriented to mission-oriented, output-oriented and contract-based;
- increasing industry research and development finance: leading universities to perform research more directed to potential commercial applications;
- growing demand for economic relevance: the institutions are challenged to contribute to the national innovation systems, while at the same time there are constraints from the traditional organisation of disciplinary research;
- increasing systemic linkages: with industry, government, and other research institutions to improve the effectiveness and feedback loop in national innovation systems;
- growing research personnel concerns: ageing of the workforce and declining interests in (some fields of) science put pressure on the future availability of future staff;
- internationalisation of university research: globalisation and technological developments affect the climate for research, making research more competitive and leading to specialisation.

The report maintains that OECD countries need to ensure that universities can continue to perform their functions to the benefit of society at local, national and global levels. Policy considerations/concerns are:

- how to achieve stability in research, particular regarding long-term curiosity-

driven research, given stagnation of government research and the temptation to emphasise short-term research for industry?

- what are the limits to concentration of university research, given the need that universities also have local and regional functions?
- how to achieve a balance between the teaching and training function on the one hand and the research function on the other?
- how to develop proper (in particular flexible) human resources policies for academic researchers and teachers?
- how to design adequate training for researchers?
- how to organise (more) autonomy for higher education institutions?
- How to organise valuable research evaluations?

The report closes with the recommendation to all relevant stakeholders (universities, governments, industry and society at large) to ensure that universities can continue to adapt so that their three functions (production, transmission and transfer of knowledge) can benefit society at the local, national and global levels. Successfully addressing both the short-term and long-term challenges will require a concerted action.

3.6 OECD (1998). *The global research village: How information and communication technologies affect the science system.*

The central question in this document is how ICT has influenced science in five areas and what are the implications for the science system. Regarding the implications, these mainly concern those developing science policies. The report therefore addresses in particular national governments. The report sketches the state of the art, but hardly deals with future developments.

- Communication among scientists: There is a growth of collaborative arrangements (e.g. publications with international collaborators, increase of communication in research projects).
- Access to scientific information: increased ability (accessibility) of databases (e.g. digital libraries, software sharing).
- Scientific instruments: progress in the speed of computation, the use of virtual laboratories, and the use of virtual instruments and miniaturisation (i.e. shrinking of instruments and tools in weight, volume and energy).
- Electronic publishing: growth in application of electronic journals. Dependent on the specific approach (e.g. pre-print versus pure electronic), much can be gained in terms of speed of processing.

- Education and training: ICT opens opportunities for learning and allows for virtual communication between teacher and student. Research on the effectiveness and efficiency show diverging results.

Concluding remarks on the findings:

- there is a huge variety of ICT use and impact across the disciplines (e.g. natural sciences versus humanities);
- whether productivity has been improved or the costs of research lowered is difficult to answer, but potentially ICT offers substantial opportunities;
- the role of governments in ICT: support the technological infrastructure; provide an adequate regulatory framework; and give attention to ICT needs of those involved in higher education.

3.7 OECD (1999). *The response of higher education institutions to regional needs.*

The report states that there is a concern to harness higher education to specific economic and social objectives, particularly in the field of regional development. Universities are challenged to respond to demands of actors that have not (explicitly) been engaged in a dialogue with the universities. This does not imply that higher education institutions have not spent time and energy on ties with the regional environment, but the report pleads for recognition of a regional role (service to the community) alongside and integrated with the 'traditional' teaching and research roles. The authors argue that value added can be attained through mechanisms (funding, staff development, incentives and rewards, communications, etc.) that link the three roles of the university with components of the region (skills, innovation, and culture and community).

Based on a conceptual analysis and practical experiences regarding higher education and regions, the authors mention a number of barriers and drivers. Some examples of barriers regarding teaching: anxiety about decline in standards as a consequence of the increased diversity of course provision, determination of content and mode of delivery of courses by external accreditation with little regard for regional development needs, and weakly developed regional economic development strategies embracing all actors. Barriers regarding research: research agenda heavily influenced by research councils and national government priorities, academic staff promotion depending on original research of (inter)national significance, research sponsors base their funding decisions mainly on the quality and reputation of key individuals neglecting regional impact. Drivers for teaching: attracting inward investment of firms with potential to collaborate with academics, increase the uptake of graduates into employment within the region, attract

more revenue. Drivers for research: perceived thrust of government policy towards promoting industrial links, regionalisation of national technology development and transfer policy in regional for a concerned with economic development, demand from government and others for higher education's involvement as a precondition of competitively awarded industrial assistance.

The report formulates the following recommendations:

- to national governments: to compile and analyse basic information on the geography of higher education within the national territory, to set up an inter-ministerial dialogue and develop a national agenda (employment, education, technology), and to work out incentives and funding programmes for regional development and higher education institutions;
- to local and regional authorities: to use higher education institutions' expertise in regional analyses, to incorporate higher education institutions into regional action plans and programmes, and to fund collaborative projects;
- to higher education institutions: to map regional links, to self-evaluate the institutional capacity to respond to regional needs, to establish internal mechanisms (marketing, strategic planning, mutual understanding) for regional engagement, to review incentives and reward systems, and to develop staff.

3.8 Salmi, J. (2001). *Tertiary education in the 21st century: Challenges and opportunities.*

Salmi of the World Bank is certain that the hegemony of traditional universities is definitely challenged and institutional differentiation is bound to accelerate, resulting in a greater variety of organisational configurations and patterns with the emergence of a myriad of alliances, linkages and partnerships within tertiary institutions, across institutions and even reaching beyond the HE sector. Nevertheless, traditional universities, at least some of them, will continue to play a major role, especially in advanced training and research, but they will undoubtedly undergo significant transformations prompted by the application of new education technologies and the pressure of market forces.

Salmi sees three major, intertwined new challenges, which bear heavily on the role and function of higher education:

- economic globalisation;
- the increasing importance of knowledge as a driver of growth;
- the information and communication revolution.

The implications of these converging challenges for HE systems and institutions herald:

1. Radical changes in training needs. Update knowledge on a regular basis; a progressive blurring between initial and continuing degree studies as well as between young adult and mid-career training; primary clientele of universities will no longer be young high school graduates; there will a growing importance of "methodological knowledge" skills (the ability to learn in an autonomous way; learning to learn), more competencies such as learning to work in teams, peer teaching, creativity, resourcefulness and the ability to adjust to change; international recognition of degrees and credentials.
2. New forms of competition. For instance, corporate universities, that is universities owned by, or very closely related to, big corporations; it is estimated that there are about 1,600 institutions in the world today functioning as corporate institutions; experts are predicting that by the year 2010, there will be more corporate universities than traditional campus-based universities, and an increasing proportion of them will be serving smaller companies rather than corporate giants. Another form of unconventional competition comes from the new "academic brokers", virtual entrepreneurs who specialise in bringing together suppliers and consumers of educational services.
3. New configurations and modes of operation for institutions. A key aspect will be the ability of universities to organise traditional disciplines differently, taking into consideration the emergence of new scientific and technological fields. Training en research in new fields require the integration of a number of disciplines which have not necessarily been in contact previously, resulting in the multiplication of inter- and multidisciplinary programs cutting across traditional institutional barriers. New patterns of knowledge creation do not imply only a reconfiguration of departments into a different institutional map but more importantly the reorganisation of research and training around the search for solutions to complex problems, rather than the analytical practices of traditional academic disciplines (mode 2; Gibbons). Realigning universities on the basis of inter- and multidisciplinary learning and research themes does not imply only changes in program and curriculum design, but also significant modifications in the planning and organisation of the laboratory and workshop infrastructure.

3.9 World Bank (1998/99). *World development report. Knowledge for development.*

The report focuses on the importance of knowledge in today's world. It focuses specifically on two kinds of knowledge:

- knowledge about technology, this knowledge is typically less available in the developing world than in industrial countries and less available amongst the poor than the rich;
- knowledge about attributes, a lack of this type of knowledge causes information problems that frustrate the smooth functioning of markets.

These two types of knowledge are interrelated in the sense that more technical knowledge can alleviate information problems. Universities are mostly useful in their role to help absorbing and communicating knowledge. With the increasing importance of knowledge in any country there is special importance for universities in developing countries. The World Bank report advises states to reduce the knowledge gap of the poor by public subsidising of poorer members of the population. It advises states to ensure that enough students enter in mathematical and technical courses. And it advises to create life long learning opportunities in the institutions.

4 Institutional leaders and managers

4.1 Alva, Jorge Klor de (1999). *Remaking the academy in the age of information.*

Jorge Klor de Alva, president of the University of Phoenix, discusses the changes of the new economy that is moving towards us without question. The knowledge-based economy requires that learners will need to be reskilled numerous times in their working lives if they wish to remain employed. Access to lifelong learning will therefore become progressively more critical for employees as well as their employers., who will find themselves pressured to provide or subsidise that access if they wish to retain their workforce and remain competitive.

A knowledge-based economy must depend on networks and teamwork. There must be reliance on (ICT) technology. Public private partnerships will be widely prized. In such a vibrant milieu as this, many of the risk-averse, traditional rules of HE are beginning to appear not merely quaint but irrelevant or, to the less charitable, downright absurd!

The University of Phoenix, in a way the first real national university, has helped to prove that the age of learning is always, the place of learning is everywhere, and the goal of learning for most people is best reached when treated as tactical. Having adult students means having a different "clientele" with their own needs:

- students want to complete their education while working full-time;
- they want a curriculum and faculty that are relevant to the workplace;
- they want their education to be cost-effective;
- they expect a high level of customer service;
- they want convenience.

It goes without saying that this might have serious effects on faculty. The University of Phoenix has already started unbundling faculty roles, that is, in separating teaching from content, development, and assessment. In other words, task prescriptions, labour conditions and the like will (continue to) change.

4.2 Berkhout, A. J. (1998). *De universiteit van de 21^e eeuw. Multidisciplinaire wetenschap in een flexibele netwerkorganisatie.*

Berkhout – member of the central executive board of the TU Delft – urges the establishment of network structured university. If universities want to be the frontrunners in innovation processes, then they must pay more attention to interdisciplinarity. They have to realise this by stressing both the depth and the breadth of knowledge and disciplines. The motive of scientific research, he argues, is not only “scientific prestige”, but “societal impact” at the same time. The main challenge for universities is to translate big societal problems into stimulating fundamental scientific problem statements that attract the best scholars.

At present, Berkhout believes, continuous specialisation has led to fragmentation and compartmentalisation. A university, however, must be more than sum of the parts (synergy). Generating “loose pieces of knowledge” is simply not good enough anymore. Research must be co-ordinated and steered from a broader concept in such a way that discipline-based specialists are told and taught that their specialised knowledge (depth) must contribute to the larger whole (breadth). Moreover, in the recent past much emphasis has been on “more of the same thing” (monodisciplinary research schools). What is really needed, however, is strong links between different disciplines: combining complementary knowledge.

This “and-and” strategy of depth and breadth research activities demands special communication capabilities, because people from different disciplines easily misunderstand each other. Too much communication may lead to “another discipline” (same jargon, concepts and thought), whereas too little interaction leads to misunderstandings (answer should be: living apart together).

These processes of fragmentation and integration call for a network organisation (discipline-technology matrix). The columns of the university continue to be the faculties, subdivided by departments and the like. The faculties are discipline-based and protect specialisation. The rows create opportunities to combine the

specialised knowledge of different faculties into coherent research programs. Essential in this decompartmentalisation is that the individual scientific contributions remain highly specialised to guarantee the depth of knowledge production. In other words, it is neither mono nor multi, but both mono and multi.

One of the consequences of such a structure is that a second kind of professor is demanded: besides scientific experts for specialised knowledge areas, universities need “integrators”; professors possessing specialised knowledge and having a broad view of adjacent areas too. These professors must be willing to develop and implement coherent multidisciplinary research programs.

4.3 Klerk, L. F. W. de (1999). *Op weg naar de 21^{ste} eeuw: van academia naar nutsschool?*

Rector Magnificus Len de Klerk poses the question whether universities change, or should change, from places of curiosity driven research to places of useful research (“van academia naar nutsschool”). He holds the opinion that this is not a “or – or” issue, but a “and – and” thing. It will be difficult to establish a hybrid successfully, but it is the most desirable way. Universities, he argues, must be a place for academia to teach scientific orientated courses (meant to train researchers) and to carry out fundamental research (curiosity driven) for the sake (or utility) of all. There is no contradiction by definition between fundamental-theoretical research and practical-problem solving research. Academia, focused on knowledge discovery, has a utility function that will have the features of a market culture. In other words, he foresees a public organisation that has privatised some cash cows and that partly operates in a marketed world.

4.4 Fekete, A. (2001). *Vision of The future for the university of sydney.*

The aim of the University of Sydney should be the solving of hard, important problems. This aim emphasises knowledge creation and knowledge application. It is therefore broader than the current concept of “research”.

According to Fekete, the best hope for teaching students to solve hard important problems is to involve them in that process while they are students. This carries “problem-based learning” or “active learning” to its logical conclusion: working on problems that are real, not merely realistic. It also aids in making students participants in a “learning community”, with the other people (staff, students and perhaps clients) who are co-operating to solve problems.

The current structure of the University of Sydney is very hierarchical, and thus intrinsically conservative and divisive. Working on important problems requires

flexible interaction and rapid response (change in weeks, not in years). A two-fold organisation for the University is suggested, combining stable and innovative elements. The key is for the hierarchy to remain, but complemented by a diverse collection of "clusters" or specialist centres, each focussed on a particular sort of problem.

There are many valuable aspects of the current hierarchical structure, with staff working on continuing appointments in discipline-based departments in faculties in colleges, under direction from a chain of command starting at the VC. This is a powerful way to maintain the knowledge base, so that a coherent understanding of the field is available when a problem becomes important where this discipline is relevant. Fekete would like to see this structure maintained, with some changes. The most important change is that staff should have continuing (secure) appointments for only part of their workload. The norm should be approximately half-time positions in departments, and the other half would be "at-risk" employment in the clusters. Another change would be a prominent shift from lecture-based teaching.

The author hopes to see each cluster as an independent specialist group, dealing with a focussed class of important problems. Staff would work in the clusters on a short-term contract, or even on a casual fee-for-service basis, to supplement the work and salary from their departmental appointments. Students would participate as members of problem-solving teams, and gain academic credit towards their degree.

New clusters are expected to arise continually in response to perceived opportunity, and old ones would fade as funding dropped or essential staff left. Bureaucratic obstacles should be removed to any staff forming a cluster when they see a niche. Fekete expects that Sydney's University would not have a cluster in every possible topic, but rather that they would have (at any time) some areas in which we had special expertise; they might have a cluster for optical fibres, but not for membrane technology; we might be a centre for intellectual property law but not for taxation law.

4.5 Goedegebuure, L. and F. van Vught (2000). *Monsters, markten en mondialisering: uitdagingen voor de universiteit.*

The authors analyse the combined (and interactive) impact of ICT and globalisation on new developments in Higher Education. Their first claim is that ICT will fundamentally change teaching methods in universities. Methods of teaching will be more interactive due to ICT, but ICT also offers the opportunity to increase student numbers with a lower student staff ratio. Their second claim is that ICT in

combination with globalisation makes distance education a possibility. There is a growing market for HE worldwide. The authors expect fierce competition for that market, especially for students from South East Asia. ICT can reduce costs and can make these distant markets available, but high investments are necessary, to share costs, international coalitions of universities are developing and will develop even more in the future. The international developments and increasing importance of markets require a changing role of the state, towards a more facilitating role.

4.6 Ronayne, Jarlath (1997). *Research and the new universities towards mode 2.*

Vice-chancellor Ronayne observes that many (in the UK, US and Australia) believe that a research policy of selectivity and concentration in the pursuit of excellence in research is desirable. The argument is that if a country wants (to continue) to have world class universities than governments must concentrate its research infrastructure and other funding in a small group of universities. Most advocates of this policy perspective, however, do not realise, according to Ronayne, are unaware of the fact that the concept that constitutes a world class university is changing.

External relevance and accountability are being incorporated into the design of the knowledge production process. The culture of academic science and its traditional value system is undergoing a major change. The new culture, no matter what we may think of it, is one of entrepreneurship in a commercial/economic sense. Mode 2 research is on its way!

Ronayne mentions four phases in research policy (US/UK perspective). The first one is designated "policy for science" (just after WWII the growth of science per se was stressed). Then, around 1970, phase 2 came into existence, "science in policy", stressing the use of science in the pursuit of national goals. Phase 3, policy for technological innovation focuses on how does one link the scientific enterprise to industrial innovation and competitiveness. And, now phase 4, that is mode 2, is on its way. Mode 2 challenges research policies and practices by asking what contribution to economic performance can realistically be expected from disciplinary based sciences institutionalised in the universities and driven by internal considerations. The role of the discipline-based science in the economy has yet to be critically examined. The transition to the new phase of science policy will need to be understood in terms of shifting intellectual values and revised constructions of knowledge itself. Science and technology are not now as functionally separated as they were and in the new phase they will be virtually inseparable within a multidimensional concept of the transformation of fundamental concepts to marketable products.

In formulating research policies the perspectives from which it is viewed must now encompass not only the nature of knowledge itself but also the expectations held by society of their work, and the pressures that these expectations place upon the institutions and their founders. The new production of knowledge has also consequences for the 'academic profession'. The competence to carry out research always derived from intense socialisation to an academic discipline and much of it still has this character. However, new patterns of contextual research are emerging in and alongside the universities. It involves close working relationships between people located in different institutions not all of them researchers. There will be more and more interaction between university based scientists with business people, venture capitalists, patent lawyers, production engineers as well as research from outside the university.

There will be increasing erosion of the monopoly enjoyed by the universities. Their special position as the centres of research will continue to decline and they will have to realise that they are no longer self-contained and self-referenced institutions but are part of a larger network of knowledge producing institutions that extends into industry, government, media, and communications.

4.7 Strangway, D.W. (unknown). *Planning and preparing for the 21st century in higher education.*

Strangway (president emeritus, University of British Columbia / President of the Canada Foundation for Innovation) looks back from the year 2025. His scenario for the first 25 years of the third millennium mainly focuses on Canada, but seems relevant for other (western) countries too. The driving force is the knowledge society, in which besides knowledge and information accountability in several ways is the buzzword. Financial and social accountability becomes increasingly important. The social accounting is relatively new for Canada.

He foresees a renewed commitment to Newman's mid-19th century "Idea of the university", that is knowledge should be pursued as an end in itself rather than for utilitarian or professional purposes. With the new capital accounting principles based knowledge and ideas (knowledge society/economy) it becomes clear that knowledge is an end in itself and is the basis on which utilitarian and professional purposes would subsequently be built.

Universities disciplinary organised realise that societal issues and opportunities demand another organisational basis: "*society had problems and opportunities, while universities had departments*". Structural changes are slow in coming but Strangway projects that within 15 years classical departments such as the Physics department will disappear. New departments (in the science areas) are those like

life science, physical science, mathematical science and earth science.

Another striking carrier for change contains the massive retirements of faculty: the renewal of staff gives the opportunity to implement big changes. Within 15-20 years a pretty complete renewal of faculty will happen. It means a loss of expertise, opportunities for change, and more competition for highly qualified staff.

There will be an increasing demand for participation. More students want to enter the HE-system. At the same time the general public capacity and will to provide ever more funding had reached its limits. The consequence of this is that the once public institutions will become increasingly privatised. Tuition levels will be increased dramatically (in combination with more publicly provided scholarships). Strangway speaks of "publicly assisted universities".

Moreover, there will be more providers of teaching and of research. The latter most of the time in partnership with the business sector. Partnerships of all types will be developed. The variety and diversity of the university system to deal with the growth will be truly remarkable.

Increasingly in the changing scene, undergraduate programs become less specialised and revert to more traditional Newman vision of a focus on liberal arts and sciences. The skills developed are generic, while post-graduate specialities aim at developing more specific skills. And with the new capital being based on knowledge, ideas and innovation (knowledge society!), the demand for more research in all sectors also increases dramatically.

New ICT technologies are applied all around, but have not reduced the unit cost of teaching because it is difficult for the new technologies to cost effectively synthesise and incorporate rapidly changing material.

4.8 Thorens, Justin (1996). *Role and mission of the university at the dawn of the 21st Century.*

Thorens – former president of the University of Geneva – mentions ICT and globalisation as trends, and speaks with respect to HE in particular about massification and its consequences. He strongly advocates the pursuit of knowledge as the distinguishing mission of the university in order to survive. Universities must remain or become once more the chambers of reflection of mankind, a source of imagination and innovation, but in a spirit of generosity and enterprise at the local, regional and international level. In this perspective, one of the aims to be pursued, in parallel with the pursuit of truth, is to reach true democratisation, to promote access to HE, regardless social origin, and to preserve and strengthen quality. If we want HE to keep its value elitism cannot be avoided; not elitism based on social origin or wealth but on work and competence. The university will

best serve society and mankind by maintaining its traditions (pursuit of truth, the advance of knowledge, autonomy) while adapting to change.

The birth and explosive development of post-industrial and/or post-modern society, brought about by informatics and new technologies of communication and telecommunication bring us instantly into contact with every region of the world, however distant, and give us almost immediate access to all centres of knowledge in the developed countries clearly lead directly or indirectly to globalisation. The world has now become a village'. The world and civilisation are going through deep changes, the consequences of which are as yet unknown and they continue to have a profound influence on our conception of the planet.

Universities have been caught up in these upheavals and must take them into account and adapt. The author believes that they will, either of their own accord or under the pressure of events. He feels that people must try and conceive the mission of the university of the future on the basis of that today. Questions must be asked about what a university is, what its role and purpose is and what resources should be put at its disposal for it to be able to fulfil this role. The past cannot give a definite key but it can help people to understand the present and prepare the future, as long as people are modest enough to doubt and have the wisdom to listen, the courage to question themselves and the generosity to try. The fundamental role and the basic elements that make an institution of higher education should be defined. This article studies the role and mission of the university at the dawn of the 21st century.

5

National governments

5.1 Department of Trade and Industry (1999). *Excellence and opportunity. A science policy for the 21st century.*

DTI developed a White Paper "a science policy for the 21st century" that contains a research strategy for the UK for the coming years.

To be a successful nation the UK must make sure that their science base is strong and excellent, that they have the facility to quickly transform the fruits of scientific research and invention into products and services that people need to improve their well being and quality of life. For Britain to prosper in the 21st century and to be able play a leading role in the creation of the new global industries, we must have a first class process for pursuing scientific advance and using it successfully. We must have the ability to generate, harness and exploit the creative power of modern science.

Innovation is important. The UK needs both scientific excellence and the right climate and incentives for innovation to flourish. The importance of excellent, curiosity-driven research cannot be emphasised too strongly. It is part of our culture but also of vital importance to industry. It is no accident that the universities, which are famous for producing spin-off companies, and for stimulating growth in their local communities, are also famous for the fundamental research they do. Investment in basic research is the fundamental building block for seeking greater commercial exploitation of research by businesses and universities. Investing in the generation and acquisition of new ideas goes beyond university funding. Much of the science base is in company laboratories and research centres: it is not just in universities.

But knowledge must also flow out of the science into products and services. To achieve that, we need to create bridges between the public and private sectors, often at a regional level where clusters of companies and universities can form to share ideas and exploit opportunities.

The public investment in basic science can deliver higher returns.

The BSE crisis and the controversy over GM foods have raised questions about the value of scientific progress in society. It is in the public interest, in the interests of scientists and in the interests of companies seeking to exploit science commercially that critical questions (moral issues) are addressed. We need a more systematic and independent approach to satisfy public concerns about the risks created by scientific innovation. Public policy has a vital role to play in the development of a knowledge driven society.

Many UK universities are creating strong links with industry and spinning out new companies.

The government plays according to the white paper three roles, indicating the "third way". It needs to be an effective investor, facilitator and regulator. The government has, with others, a clear role in the funding of basic curiosity-driven research; the value of basic research can rarely be captured by the private sector (public good). Investments will be related to: renew the infrastructure, to boost key new research areas, better support of post-graduate research students, and the recruitment of 50 top researchers. Public funding should also play an important role in forming networks, that is examining public private partnerships and to create regional clusters. The government should help to provide the framework. As a regulator the government should restore public confidence by implementing stronger guidelines on how scientific advice should be used in drawing up government policy, and by publishing a new code of practice for scientific advisers to government which will commit them to high levels of openness and transparency in their work.

5.2 Ministerie van OCW (2001). *Grenzeloos leren; een verkenning naar onderwijs en onderzoek in 2010.*

In this report, the Dutch ministry explores possible futures for all the education sectors. Here we only summarise the main points related to research. It states that investments in curiosity driven research, and in R&D, are low in intentional perspective. The use of resources for research should be more flexible and effective. Outcomes of basic research lead insufficiently to innovations (in business and society). The allocation of research money should be better co-ordinated among the various ministries (education, economic affairs and others). The mutual relationships between university and industry need to improve in the knowledge intensive society ahead.

Trends that are mentioned are internationalisation, increased competition and mobility as a consequence, ICT, biotechnology and nanotechnology as the main fields of attention, and demographical trends that urge to interest young students to take a career in science.

Ambitions are to maintain the high quality level of research (in general) by investing in young talent and by creating more scope for centres of excellence. It is also needed to strengthen the relationship between teaching and research. Research money must become available in a more flexible way, and private companies must be interested to increase their investments in (basic) research. Moreover, Dutch research should try to conquer a solid position in European networks.

5.3 Norway: Academia 21st Century

Based on a variety of short fact sheets (from internet) of the Norwegian government

In the area of research, international co-operation is fundamental. As a small nation, Norway is dependent on research collaboration with other countries. Yet in many areas of research the country is competitive on an international level.

Yet a national objective remains that the Norwegian investment in research as a percentage of GDP should be at the OECD level before 2005. This is even more imperative, due to the fact that income from the petroleum related activities will be reduced in the coming years, the numbers of elderly in the population will increase and environmental problems may aggravate. Both industry and society will depend on innovations to meet these challenges.

Increased investments in research will be achieved through a combination of more public investments and stimulation of the private sector to invest in

research. Research will further benefit from increased international co-operation, especially in the European context. Finally the science system will be strengthened along three lines. Firstly, quality is to be rewarded more, quality assessment must become of greater importance in allocating public means. Secondly, the scientific equipment in institutions is to be upgraded. Thirdly more researchers must be recruited, the number of posts must be increased with 30% by 2005. The work to achieve equality of opportunity in research must be intensified. There will be four areas of priority in the science system: marine research, ICT, medicine and health care and environmental and energy research.

5.4 Sweden: Academia 21st Century.

Based on a number of fact sheets (from internet) by the Swedish government and research council.

Knowledge, above all access to new knowledge, is becoming more and more important in modern society. It is research that lays the foundation of the development of knowledge in society. Including the substantial investments made by business Sweden allocates nearly four per cent of GDP to research and developments, which is more than any other country in the world. Generally speaking the standard of present day research in Sweden is high. The goal of government is to confirm Swedish position as a leading research nation. The state bears overall responsibility to ensure this goal is achieved, it bears particular responsibility for fundamental research and post-graduate education.

If Sweden is to strengthen its position as a leading research nation more concentrated efforts are needed in Swedish research. The research community must become better in setting priorities and establishing a clear profile of its own important research areas. A new structure for research financing should facilitate concentrated efforts in key areas. The new structure will also significantly improve the conditions for multi-disciplinary research. The Swedish Research Council will be responsible for supporting fundamental research in all scientific fields. Apart from the general council, two specific councils are set up to stimulate research in two fields: environment, spatial planning and agriculture, and working life and social sciences. To ensure more effective organisation for applied research the Swedish Agency for Innovation systems is established.

5.5 Swedish Ministry of Education and Science (2000). *Research and renewal, summary of a government bill.*

The Swedish government proposes a number of structural changes to deal with

environmental factors:

- the impending generation change in the Swedish research community, and
- increasing demand for staff with research degrees

Some other needs are not directly spelled out, but can be inferred from the bill, such as need to support interdisciplinarity, to improve supervision in postgraduate education (possibly to decrease the time to degree-my interpretation).

Eight high priority fields have been defined by the government, and a particular amount of funding has been earmarked for the creation of graduate schools within each. Interdisciplinary and multidisciplinary fields are also covered (the government wishes specifically to support these areas). This is an example of a new organisational structure built up to solve some specific problems perceived by the Swedish government.

6 Industry

6.1 Everhart, T.E. (1996). *Investing in technological leadership.*

The author argues that government, industry and universities all have a role to play in order for the USA to maintain technological leadership in the 21st century. Universities play two important roles in this respect: delivering graduates and research. Academic research is being used in industry to benefit the nation. Although research results are being utilised faster and better than in years past, it is still important to improve the technology transfer process. Key to this are the people who know, who have used and who may have developed the knowledge that is being transferred. Graduates are the best way for universities to transfer technology to industry, but there are never enough graduates, so consulting by faculty is a long-standing and successful alternative. Next to this co-operative research is being used increasingly, with Engineering Research Councils as successful examples. The centres were an attempt to broaden the research focus in academia, give students an opportunity to learn more about systems-design parameters and increase contact between industry and universities.

What is worrisome are projections of future funding for university research, federal investments both for defence and other R&D are dropping as a percentage of GDP. Two aspects of this drop are especially worrisome. First, it will decrease the number of graduates who have experience with cutting-edge research. Second, cutting federal funds that pay the real cost of facility management and operation and depreciation rid the universities of their flexibility to pursue new and important areas of research.

Universities will need to retain and strengthen their role as essential partners with industry and government; they will need to become more efficacious in teaching and in research. There are new opportunities to improve the way in which teachers and students learn through interactive learning and problem-solving, through multidisciplinary research and teaching and through providing research opportunities to undergraduates.

6.2 Galvin, R.W. (1996). *Trends in engineering and science: An industry view.*

The author argues that industry is not here to serve governments or universities but to serve customers. However, to make society function government, industry and universities should co-operate constructively. The author expects increases in the number of students in engineering in the next 10 to 15 years. He expects increases in the investment of a few wealthy industries in basic research in the coming 10 to 20 years. More R&D consortia focused on both engineering and science will succeed. The costs, risks and pace of R&D will continue to require creative collaboration between industry, universities and government.

6.3 Nicol, R. (2000). *The future of research – collaboration.*

The author is head of the research department of British Telecom. He states that the fast development of ICT fundamentally changes the way in which companies and their research units should operate. ICT developments have been a driver for growth in the telecom market, which meant that many new suppliers of technology emerged. This means that companies like BT can now buy ICT products from a host of suppliers instead of making it themselves, it also has expanded the freedom of choice for BT of where to go next. "Deciding on the best way is the major challenge of the new decade"

Since developments have gone so fast and are so widespread, no business can reasonably cover all the ground itself. Research will need to increase its influence in the world of suppliers. For this research collaboration needs to increase, with suppliers, with universities, with venture partners, with customers and with the market place.

6.4 UNICE (2000). *Stimulating creativity and innovation in Europe; the UNICE benchmarking report 2000.*

Chapter three: Creating knowledge and exploiting new ideas

Innovation depends upon the creation and diffusion of intrinsically new knowledge and ideas, and new concepts from the fusion of existing knowledge,

particularly in science and technology. Increasingly this depends upon more effective interactions between all parts of the "innovation system". The creation phase is equivalent to the invention or discovery phase and is an important determinant of the level of innovation. Access to information about new ideas and knowledge is important because it influences the number of companies, in any country, which are potentially able to commercialise new ideas.

This report shows that Europe lags in terms of the creation of knowledge and new ideas and in the breadth and diffusion of these ideas. It also shows that Europe spends too little on research and development, particularly business R&D. European academics and companies have fewer incentives and face greater obstacles to collaboration compared with many other countries. European systems to protect ideas are not sufficiently supportive of innovation. In order to facilitate the creation and exploitation of knowledge and new ideas the report makes the following recommendations.

1. Governments must improve the quality and scale of the science base, in order to improve knowledge and create new ideas.
 - Increase the level of public expenditure on R&D, in areas of strategic importance for business, without any increase in the overall level of public expenditure.
 - Increase the level of competition for public research contracts between scientific bodies (in the private and the public sectors).
 - Create more pan-European "centres of excellence", in co-operation with industry.
2. Governments must improve the diffusion of the results of public R&D and promote collaboration between universities, research institutes and companies, especially SMEs.
 - Provide incentives to universities and research institutes to commercialise their work.
 - Remove obstacles to collaboration between universities, research institutes and companies.
 - Remove obstacles to the involvement of universities in spin-off companies.
3. Governments must further improve the competitiveness of the systems for obtaining, retaining and protecting Intellectual Property Rights in Europe.
 - Reduce the cost and the time required to obtain and to retain patents, through the introduction of a simple, single language "Euro-patent".
 - Improve the effectiveness of patents, particularly in areas such as software, biotechnology and intangibles.

4. Companies must increase their level of expenditure on R&D to internationally competitive levels.
 - Benchmark expenditure on R&D against relevant competitors.
 - Adopt best practices.
5. Companies must continuously upgrade their innovation systems by adopting global best practices.
 - Benchmark all aspects of their innovation process, against relevant competitors. SMEs should use trade associations to facilitate this process, where necessary.
 - Adopt best practices.
 - Integrate technology strategies into their overall business strategy.

6.5 --- (2001). *Investing in knowledge. Joint manifesto of VNO-NCW, KNAW, NWO, TNO and VSNU.*

Investing in science and technology means investing economic growth and the quality and sustainability of our society. Industry, knowledge providers and government should join forces to strengthen the entire chain from knowledge creation to innovative application of knowledge. Government should rise the funding of research in universities and institutes with 200 million guilders annually. This additional funding for research focused on the long-term is necessary because the Netherlands will otherwise fall back behind the US and other important countries in the European Union.

The institutions involved in this manifesto will each work to further improve the networks between research institutes and companies. Universities and research institutes will use severe quality criteria in internally allocating funds; they will be accountable.

7 Other

7.1 --- (1997). *The knowledge eactory. A survey of universities.*

Leading question: Can the university accommodate all these different demands (that is those implied by looking upon it as a "knowledge factory" in the new economy) and still remain true to itself? Universities face the mix blessings of two successes: the success of the sciences over the arts and humanities, and the success of democracy opening up the university for the masses.

1. France and Germany are still struggling with the consequences of mass education in a more or less uniform system of higher education. For Germany the problem is that the research university is simply too expensive to accommodate massification of HE properly. The consequence is that the excellent can't be excellent and the less talented do not get the HE they needed either and drop out.
2. One of the problems for any reform is an academic drift or mission creep: within any institution "below" the research university, there is a pressure to be like such a university. The exemplar in this publication is California State University, which has a mission for mass HE (produces 60% of California's teachers and 10% of all in US) but a staff that is mainly from research university and wants to do research.
3. On the place of research: in most countries universities still have the reputation to be the place for public research and have more or less been protected from cuts in research funds (compared e.g. to government laboratories) and in some countries (France, Japan) research at universities is growing. In these latter countries, MIT is a role model - not just as an excellent research university, but as an incubator of new industry as well.
4. Gibbon's thesis that research is moving to peri-university institutions or in other words, academic research becomes part of a socially distributed knowledge production system. With blurring public-private boundaries.
5. What remains is that universities are professional organisations with at the most hierarchy within independent structures at lower levels of the organisation. When it comes to research, most universities have no central steering core that could move the departments into a common mission.
6. "Their health will depend on their ability to adapt. This will not be easy. Even the great American research universities that have come closest to creating the core-and-cloud university of the future find it difficult to define the core and to manage relations with the cloud. It will be harder still for foreign admirers to import this model." The basic trick behind the American success, is "let market forces work".

The future of the university that the Economist foresees is the successful research universities operating in a market driven research system. Each of the institutions will strive in such a system to be among the best, but only few will succeed. Indications of Oxford and Cambridge are moving towards MIT through their research policies by allowing private firms to enter the campus, are supporting the claim. The Economist talks about the core-and-cloud of a university: the core

being the traditional academic identity, the cloud the new activities that position the university within the new context. Driving force behind the development is the new demands in a knowledge economy put upon universities by their main sponsor: government. Ironically, it is the same government that might obstruct the move to more market mechanisms.

7.2 Euroscience (1998). *The future of young scientists in Europe.*

Constant production of new knowledge underlies progress in science and technology, but it is also a prerequisite to science based activities targeted on economic or societal demands. In the last decade, however, both the mode of knowledge production and its articulation to problem solving objectives have undergone important changes. On the one hand, sources of new skilled about will be increasingly expressed outside traditional fields of scientific activity, for instance knowledge intensive business services. This creates new employment perspectives for young scientists. On the other hands, research-needs from industries or the public sector will increasingly rely on subcontracting specific problems to temporary taskforces.

The above does not mean that there is no place for curiosity driven research. Generation of new knowledge is a prerequisite for innovation. Investing more and more efficient in basic research in Europe remains imperative. What needs to be re-appraised is the relation between knowledge production and problem-solving and the way in which object driven projects will be able to rely more easily and more directly on basic research potential.

To cope with more flexible employment schemes and secure jobs for young scientists requires a more focussed preparation. Due to the institutional inertia rapid change at the institutional level is unlikely. It may be more fruitful to start changes at the least formalised level, that of graduate studies and post-doctoral programs. Doctoral programmes should become wider, involve more diversified theoretical and practical teaching and include practical stages sensitising graduate students to object drive and problem solving research.

7.3 (---) (2000). *Policy for higher education in a changing world.*

Scenario: The Rise of the Consortia

Factual Background: A Worldwide Case

There are already several functioning world-wide consortia of universities providing valuable collaborations in research as well as student exchanges in traditional degree granting programs (e.g. Universitas 21, CLUSTER (Co-operative Link between Universities of Science and Technology for Education and Research),

Cambridge-MIT Institute, and Fathom.com.

A newer development is the rise of consortia for virtual education. While some of these consortia have been in operation for a number of years, there has been a spurt of recent growth in this area. It seems likely that the number of consortia providing research collaborations, degrees, and particularly now virtual education will grow, creating a whole new level of competition in higher education.

Hypothetical path of development of the consortia movement

As the interest in networking and virtual education grows, the appeal of consortia includes:

- Development of successful coursework requires a substantial investment. Universities find that a consortium allows cost sharing over course enrolments and projects.
- A major appeal, at least up front, is that of a brand name. The combination of several well-known universities helps to maximise that appeal while at the same time minimising the risk to the value of the brand name of a new venture.
- Consortia provide valuable opportunities for networking and collaboration where the strengths of different institutions can complement each other.
- Consortia can pool the resources of more advantaged populations to provide more educational opportunities for less advantaged populations, as the World Bank is trying to do with the African Virtual University and the Global Distance Learning Network.
- A consortium for virtual education helps universities to deal with the concerns of their faculty. While some faculty object to any involvement in virtual education, others want their university involved but in a form that is controlled by the faculty. The need for fundamentally changed operating procedures and rapid decision making make this impractical. Entering into consortia allows the university administration to avoid a direct power struggle.
- Many faculty in the latter camp believe that, by retaining the rights to their lectures, much like the rights of their books or articles, they will become wealthy when these lectures go on the Internet. What emerges instead is the use of teams of professionals preparing courses using advanced software, tutoring, and lots of student/tutor and student/student interaction, but very little demand for lectures, and little marketing of courses based on faculty star power.
- Faculty from the university are indeed involved, but as consultants-new income but not six figures. Students are attracted by the university's name, not the faculty names.
- As time goes on, however, some individual stars emerge.

Over time, the difference between for-profit and non-profit institutions begins to erode. More consortia function as for-profit organisations.

Possible questions raised by the growth of consortia

For the institutions, joining a consortium has some added attractions: an income stream to the institution, some added income for faculty, and a chance to get in the game at relatively low risk. Questions:

- Will the courses and degrees of consortia be valued? Will they be of as high quality? Will participation in a consortium compromise the value of the brand name for the elite institutions? Will becoming a member of a virtual consortium help a university market its traditional campus program? What will happen to consortia as tensions arise over divergent missions between institutions, and between institutions and their for-profit partners?
- In the absence of effective measures of learner outcomes, will the consortia system simply deepen the dependence on "prestige" rather than on actual measures of quality? Will the members of a consortium be able to agree on a system for measuring learner outcomes? Will governments allow the use of student aid for enrolment in consortia programs?

The growing competition might force most universities to give up the idea of being all things to all people, forcing painful choices as to where to focus resources and attention. Questions:

- Will the choices provide real differentiation, useful to society, or will the institutions simply gravitate to the mean? Will important university functions be lost? Will the consortia create a resource drain from the individual participating institutions?

As development of virtual courses gets easier, more funding for virtual education becomes available, and richer institutions enter the game, it is likely that new entrants will have an easier time and will be able to develop courses of higher quality. Questions:

- If virtual education expands to the point where a student can access almost any course around the world, at what point will we reach saturation for particular courses? How many virtual versions of Biology 101 do we need? What does saturation mean for those early pioneers who developed courses early on and with less funding, as institutions more funding and more prestige enter the market?

7.4 --- (2001). *Privileges lost, responsibilities gained: reconstructing higher education.*

In June 2001 48 international leaders in higher education met for a forum to debate and discuss the forces shaping higher education and to outline a road map for the future. The conclusions of this conference are the following.

Throughout the world HE systems are in the midst of major transformation. Many of these changes are reactive, as institutions struggle to redefine their role in a new environment. The new world is marked by new competitors, and by new technologies that enable different routes to learning and different methods of teaching. It includes a changing role for the state, and market demands that are forcing a new relationship between the traditionally non-profit HE sector and the for-profit sectors intent on shaping (and in some cases appropriating) HE's core "products": new graduates, new theories, new knowledge. While there are real differences in how these factors are playing out around the globe, one remarkable outcome of the diverse and international conference is the uniform affirmation that these same forces are at work everywhere.

The implications of such change are clear. HE must define its core functions and the core values and practices that enable them. It must attract a new brand of leadership that can navigate in this new environment, and those leaders must be prepared to defend HE's unique functions in the context of inevitable engagement with new stakeholders placing new, profit-oriented demands on institutions and systems. It must recognise the increasingly global nature of information and of institutions, but must reject the notion that there is a set of approaches or solutions that can or should be applied globally.

Appendix 2: Matrix

Visions of stakeholders and their views on trends, policy options and problems

In the matrix below one will find perceptions of academia's environments, ideas and visions about academia's future and various kinds of policy issues that were raised in the reviewed literature with respect to academia's future. The matrix, reported in terms of key words and 'one liners', is in fact a kind of summary of the summaries (Appendix 1). It provides, for instance, at a glance the kind of trends mentioned by certain stakeholders. To put it slightly differently, this matrix can be regarded as an index for the summaries of Appendix 1.

Please bear in mind that the 'columns' are arbitrary to some extent. The subdivision of policy options, questions and problems is to some extent indiscriminate. What is seen as a policy option by author X could be regarded as a policy problem by author Y. Some of the scenario studies could have been presented in different columns presented in different columns because they usually contain both policy options, questions and problems.

The matrix is structured as follows. First it is subdivided by stakeholder: (1) national agencies/advisory bodies, (2) academics/researchers/professionals, (3) supra-national bodies, (4) institutional leaders and managers, (5) national governments, and (6) industry. Subsequently, the matrix is subdivided in alphabetical order. The sequence of sources in the matrix corresponds with the sequence of the summaries (Appendix 1).

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
NATIONAL AGENCIES ADVISORY BODIES CPB (2001)		HE is not a public good, only governmental subsidy if it leads to positive externalities that can not be realised otherwise.	<p>Policy options/ recommendations:</p> <ul style="list-style-type: none"> - Replace part of public subsidies by private contributions - Income-contingent repayment of study debts - Freedom for institutions to set own tuition fees (with governmental price range) - Selection of students by universities (pilot) - Public support where spillovers are expected - Strengthen link between funding and performance - Stress patenting, licensing and the like (carefully) 	
OCV (1996)	[1-5] ICT in knowledge society [8] pursuit of sustainable economy [3] internationalisation, including regionalisation [8] improving the quality of life	Intensive mutual relationships between science and society Stress self-governance (autonomy), differentiation, and distinctive features Multidisciplinary in science and society		
Rand Europe (2001)	[2] the role of government and markets, funding mechanisms, [3] Internationalisation, Europe [2,3] International competition	<p>Four scenarios</p> <ul style="list-style-type: none"> - government as facilitator - government as director - government as facilitator but more European funding and co-ordination - government and Europe work closely together to combat fragmentation of research 		
SCD/CPB (Pomp 2000)	[1] ICT (new forms of education; easier to measure performance) [3] international mobility (potential 'brain drain') [5] knowledge economy (dependent on HE) [6] individualisation (economies of scale less important; less willingness to redistribute income)	<p>Specialisation: pressure on egalitarianism; greater autonomy, selection, tuition fee differentiation, performance based funding of research</p> <p>Shift from fundamental to applied research</p> <p>International co-operation regarding funding fundamental research</p>	<p>Government should stress:</p> <ul style="list-style-type: none"> - More diversity - Small but excellent research centres - International co-operation - Diffusion of knowledge - Protect fundamental research at universities by restricting applied research; the latter should co-ordinated by the market 	
Wissenschaftsrat (2000)	[5] knowledge society [1] ICT [3] Globalisation and europeanisation.	<ul style="list-style-type: none"> - An orientation to possible applications of research - Better linkages between teaching and practice - Stronger internationalisation of the German system of higher education and research 	<p>More defined missions. Allocation of funding should be based upon the actual activities and performances within the missions.</p> <p>The mobility of academics and students should be increased.</p> <p>Different institutions co-operate more closely.</p> <p>Academic institutions increase their capacity for self-organisation and governments should withdraw themselves from controlling higher education at a detailed level.</p> <p>The unity of research and education should be</p>	

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS renewed and universities must become "academic organisational centres",	POTENTIAL PROBLEMS
ACADEMIC / RESEARCHER / PROFESSIONAL Altbach (1999)	[2] Increasing privatisation in HE (because demands outrun public supply); privatisation especially in Eastern Europe and Asia		Policy issues: 1. How should private HE be funded? Access to governmental facilities? 2. Are private institutions compatible with the academic system? 3. How much autonomy should private institutions have (quality assessment)? 4. What are public responsibilities of private HE?	
Barnett (1997)			There should be a third concept, after academic competence (know how) and operational competence (know that), namely reflexive knowing; paradigm shift	
Caracostas et al. (1997)	[3] Evolution of European RTD policy [5] knowledge society	RTD policies in OECD countries by and large now focus on 'innovation for society'	Innovation policies should focus on dissemination of technology by co-operative networks, life-long learning and organisational innovation.	Key strengths in science but behind in innovation
Clark (1998)	[8] imbalance between demands and responses; demands on universities outrun their capacities to respond		Give universities substantial institutional autonomy with entrepreneurial leadership: Strengthen steering core, matrix like structure, discretionary funding base, stimulated heartland, entrepreneurial belief Collective entrepreneurship overcomes scattered character	Fragmentation, there exists hardly any symbolic and material integration in European HE
Coffield and Williamson (1997)		Universities have to contribute to a civilised and democratic society (quality of life of all its members, sustainability natural environment, stable order of international relationships) Universities should defend critical, basic research and scholarship, articulate and defend their commitment to democratic values, innovate outwards through engagement with localities, generate more income to reduce government dependency, exploit ICT, learn to learn, stress strategic planning and increase staff and student participation		
Delanty (2001)	[1, 2, 3,5] Development of the knowledge society in relation to globalisation, ICT and marketisation of academia.	Modern university loses its traditional problems and has to gain a new key role in society by: developing communications between the different forms of knowledge within society; structuring the public debate and contribute to technological citizenship		
Duderstadt (1997)	[1] ICT enables rapid exchange of information [3] global nature of society	Rethinking fundamental role of creating, preserving, integrating, transmitting, and applying knowledge	Challenge is not technology as such but: imagining and creating digitally mediated environments Experimentation seems to be the adequate answer	

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
<p>Duderstadt (1999, 2000)</p>	<p>[4] networking replaces more formal social structures [5] knowledge as a key factor</p>	<p>Universities may be under increasing pressure to spin off, sell off or close down organisational parts Universities may have to outsource the production and distribution of "packaged" educational content for mass audiences Restructuring of the HE-system Future issues: life long learning, seamless web, asynchronous learning, affordability, interactive and collaborative, working, diversity of services Doom scenario: - Market-driven restructuring in US stresses faculty, fearing decline in public support - Sensing a loss of scholarly community with increasing disciplinary specialisation - Education as a individual benefit rather than a needs of a democratic society Brighter vision: - Learner-centred - Become more affordable - Lifelong learning - Interactive and collaborative learning - Diversity - Intelligent and adaptive learning environments Shift from prestige-driven to cost-competitive driven? Learn-grant university: development of human resources as top priority Knowledge driven society needs advanced education; universities will flourish</p>		
<p>Enders (1999)</p>	<p>[3] academics as global players [5] knowledge society [6] scientification of society; [8] changes in HE; loss of prestige of academics, less exclusiveness of academics</p>	<p>4 possible futures (scenarios): 1. academics as role model in knowledge society 2. deprofessionalization, bureaucratisation and marginalisation: academics only as knowledge workers 3. post modernism: research organised in non-hierarchical, pluralistic, trans-disciplinary, fast changing ways 4. HE-institutions and academics loose their dominant position; other institutions take over.</p>		
<p>Etzkowitz & Leydesdorff (2000) Etzkowitz et al. (2000)</p>	<p>[8] Emergence of a research system in permanent transition [8] Transition of the research system</p>	<p>University research as the "laboratory" for knowledge-intensive network transitions. - Internal transformation through a reinterpretation of traditional roles and tasks; - Stabilisation of trans-institutional arrangements; - Changing balance of centralisation and decentralisation;</p>		

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
Europolis (2000)	[3] Allocation of responsibilities between regions, nations and European level is unclear. [5,6] Future problems in health, food security and safety, and sustainable ask for demand driven, multidisciplinary R&D efforts. [3] Ten new members will increase the European level.	Universities are key to train people and assist innovation. They need to be more autonomous, diverse and internationally oriented. By being entrepreneurial and responsive to outside demands, they will develop institutional diversity.	For universities this implies varied balances between teaching and research. Contractual or more generally market-type relations are fine but should be within limits. Sufficient and stable funding for basic and university research is needed. One or more independent European research councils. A redesign of the Framework Program into one program with four parts.	The creation of European Centers of Excellence is tempting but dangerous, as there is a risk that the CoE's will not be a result of a dynamism, but of bureaucratic compromises that divide the pie equally.
Florida (1999)	[5] Knowledge society / new economy		Policy makers have to realise that in the long run the university become a crucial provider of talent and not just of innovations and new technologies Knowledge will become the key strategic resource of the nation	
Georghiou (2001)	[3] Funding programs at European level have become obsolete		RTD European policy in context of other policies; Shift the main emphasis of European policy to coordination; Create ample space for bottom up decision making, accept variable geometries and compensate risk of these by separate cohesion policies.	New members of EU will not be able to catch up.
Cibbons (1997)	[2] collapse of resource base (restrictions on budgets, more competitors) [8] governmental policies aiming at creating specific research universities [4,8] shift to applied science, growth of university-industry research centres [8] stimulation of technology transfer	The disciplinary-based structure will come under pressure Context of application instead of context of discipline Heterogeneity instead of homogeneity More social accountability More temporary and heterogeneous set of practitioners, collaborating on a problem defined in a specific and localised context. Mode 2 created in variety of organisations (not only universities) Both mode 1 and mode 2 will continue to exist	Permeable: universities should become porous, must built partnerships and participate more fully with other knowledge producers	
Cibbons et al. (1994)		Development of knowledge in context of application Transdisciplinary knowledge New forms of organizing academic knowledge production Societal aspects more integrated in science and research management		
Horst, van der (1997)	[1] ICT	Enabling communication released from the bonds of time and space No longer sufficient to teach applicable knowledge	Universities should focus on the academic approach, the scientific method, the concentration of frontline research and scholarship	

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA only; students should learn to maintain their level of professionalism	POLICY OPTIONS AND QUESTIONS They should continue to be a community of scholars, but with some changes	POTENTIAL PROBLEMS
Huisman et al. (2001) [45]		Authors present 3 scenarios for Dutch HE: 1. By and large continuation of existing patterns with substantial governmental interference 2. Mixed economy; mergers of universities and polytechnics; market driven to some extent in limited number of areas 3. Open, global market economy of HE ("worldwide jungle"); nation state interference hardly existent.		
Johnston (1998)	[1, 3] Intelligence based, electronically mediated, global economy		All four areas of scholarship (for teaching, for discovery, for application and for integration) will remain the core business of the universities. Additional managerial and technological functions are required, but also a need focus on core business (scholarship)	
Judson King (1998)	[2] declining federal funding [2] state demand for relevance [2] increase in private investment in higher education	- Engage in industry-university co-operation - Document effects of higher education on economy		The result is a development of multi level governance which is not well structured and its future is unknown
Kuhlmann (2001)	[3] The emergence of a European political system, [3,4] The development of national innovation systems, which are stirred up by ongoing globalisation of economic activities. [8] The development of innovation policy making in multi actor settings.			
Kwong (2000)	[2] marketization [2] privatisation (changing ownership, contracting out services, or for-profit schools)	Business ethos and practices are becoming acceptable in HE Transmitting knowledge becomes a service Success of programs is judged by marketability		Contradictions between the public good and market outcomes. Raising tuition fees may exclude lower income groups. Concerns about quality.
Leidesdorff (2000)	[8] Development of research system as interactive system between university, industry and policy	Dangers: if traditional providers ignore consumer demands, new providers will soon appear to meet these demands; global market will undermine the whole notion of a university It is possible for universities to be global providers without losing their morals or their quality Mode 2 universities	Co-operation (partners, consortia)	
Mason (1998)	[2,3] globalisation, increasing competition			
Martin (2001)	[2] Increasing competition [5] the growing importance of scientific competencies			

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
Mayer (1998)				Barriers to introducing interdisciplinary centres: - Organisational structure is based on mono-disciplines (institutional sclerosis) - Ibid. funding - Ibid. culture
Middlehurst (2000)	[1] ICT [2,3] global competition (new providers) [4] consortia, big global players in HE (several types of institutions) [8] increasing speed of scientific and technological advance [6] shifting socio-economic pressures Leading to two scenarios: Wired world: network of economic agents, or Built to last: businesses seek to capture and internalise knowledge	Increasingly crowded market place in HE with new providers; technology dependency; blurring boundaries (between higher and further education; public and private, education and training); disaggregation of functions; changing educational values; establishing of recognisable 'brands'; smart alliances, new competitors. This has consequences for professionalism: More multi skilled; transparency instead of mystique; collaboration ('networks') instead of individualistic; Status has to be constantly earned and legitimised.	Mobility of professionals across sectors will be valued; greater flexibility of contracts, reward systems and work practices; need for continuous professional learning.	
Middlehurst (2001)	[8] economic and business dynamics demand flexibility [6] socio-cultural changes (widening access and participation; rising expectations; accountability; etc) [1] ICT [2] changed role of governments (more attention to market mechanisms)	Rise of corporate universities; emergence of 'for-profit' education; increasing role for media; rise of professional associations; expansion of educational services and brokers; virtual universities; increasing co-operation between universities and colleges (networks, consortia)	Challenge for universities is: - to deal with changing educational landscape - rethink core and peripheral services - wider range of educational values?	
Muller (1996)	[1] ICT [5] knowledge driven society [8] university is seen by media and society as economic investment	University of calculation consumes applied knowledge in unprecedented quantities and speed. Difficult to maintain learning for the sake of learning. Relatively small disciplinary communities rather than single all-embracing community. Members not necessarily share common values beyond economic imperatives. Countertrends: atomisation of knowledge asks for integration, and people have more leisure time that can be used to learn for pleasure. Knowledge driven society requires knowledge trained human talent		
Müller-Bölling (1997)		Institutions should be autonomous, academic, competitive, discernible and economic	Can new media be incorporated? Can unity of teaching and research be maintained? Several cultures or Anglo-Saxon dominance? Privatisation? Are new media and technology really efficient? Strategies should be developed at the institutional level (not at chair or faculty level)	Weak corporate powers

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
Newman (2000)	[2] competition, reigns of governments are loosening, market-driven decision-making, drive for efficiency	Threat HE: focus only on short term gains	Three attributes of HE have to be taken into account regarding drive for efficiency: 1. Socialising students (to the community, to the life of the mind, to the profession) 2. Social mobility 3. Disinterested research	
Newman / Couturier (2001)	[2] competition (e.g. new providers) [2.6] more demanding students [1] ICT; e.g. information available on internet	Traditional teaching styles change. Cost reduction in teaching by new technology Shift from input competition (selectivity, endowments) to output competition (measuring output) New providers select promising parts of the market; universities with traditional (hard to make profitable) programs under pressure Institutions need a strategy to compete. Institutions have to find a niche. Leadership becomes vital.	Policy suggestions: Better flow of information and more transparency Reduce bureaucracy, stimulate institutions to take public demands into account Provide incentives for use of technologies Rethink financial student aid Stimulate institutions to be entrepreneurial	Less able and affluent students may be neglected. Prestige becomes more important than learner outcomes Creation of course ware may move out the university, with possibly less variety as a (long-term) result.
Newman / Couturier (2002)	[2] marketization / increased competition [3] globalisation	Institutions may become more open, Or academic values become corrupted	How to overlay a societal frame with the aim of the nation's welfare? How to redefine competition so that institutions compete to fulfil the public good? How to encourage institutional accountability, responsiveness, and innovation?	How to define quality (life long learning, foreign institutions)? How to stimulate institutions to deal with underprivileged groups?
Noit 0	[1] ICT	Conventional university will survive, while there will be a clear role for virtual education too.		
Nowotny et al. (2001)	[2.4.5] Development of Mode 2 Knowledge production	Stable functions of the university are: education of researchers, Generator of cultural norms for a society.		
Pavitt (2000)	[3] Europeanisation		Creation of an independent European Research Council	Europe puts to much emphasis on relevance of science, and to few on excellence
Peters en Vermeulen (2000)	[2] limited marketization		Highly skilled management is needed	Pre-condition marketization: - Consumer information - No monopolies - No distribution problems - Many externalities (problematic) Universities are squashed between customers, their own professional values and the government. Competition not without problems
Privateer (1999)	[1] ICT	Learning should be aimed at production of intelligence rather than on storage and recall; learning how to learn		
Renwick (1996)	[1] ICT [4] strategic alliances, consortia	New relations among HE institutions and other organisations for distance learning education; entrepreneurialism, that in the end favours	Who will be the delivery actors of distance education? Is the dual-role university a likely future for	

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
Richardson (1998)	[1] ICT (unpredictable) [2] pressures of cost-containment [2] eroding consensus on financial support [2.4] new providers HE [2.6] increasing enrolment demand with more diversity [6] HE has become essential for social mobility [6] growing concerns about quality	privatisation ICT will strengthen the development of the dual-role university (combination of traditional and virtual university) Differences between traditional and virtual university are blurring (dual-mode is possible) Greater complexities and dynamics require more de-centralised systems in which universities are made more responsive to the needs of society De-centralisation gives more authority to the professionals	universities? What is the interaction between traditional and virtual education? Combination is best way to survive. Self-serving and inward looking institutions	State should balance professional autonomy with market demands (e.g. competitive research funding)
Rip (2001)	[4.5, 3.2] Fusion between science, high-tech and the innovation competition [5] Importance of scientific expertise for decision-making under uncertainty and the call for "sound science." [5] Shifting social contract between science and society	Cross disciplinary and non-disciplinary research Shift out from traditional positions and roles	Requirements for socially robust knowledge production (not all are policy options)	
Roberts (1999)	[2] neoliberalism	Institutions not repositories of knowledge but service providers Academics not bearers of intellectual wisdom but sellers of products Conditions of academic work will change: fixed term lecturing contracts, growing army of tutors in poorly-paid teaching-only jobs If public funding continues to decline, pressure to make money in non-traditional ways will increase	Governmental policy gives evidence of a move toward a more competitive tertiary education environment	
Schimank and Winnes (2000)		Changing relationship between teaching and research; close connection between them is under pressure in many countries; in the future more differentiation between teaching and research	Curiosity-driven research is partly legitimised by its relationship with teaching; if this connections stop to exist, how can curiosity-driven then be legitimised?	
Trow (1997)	[1] information technology	Foresees a mixture of traditional and IT-based education, partly as a compromise between administrators and academics (mass market for coursework versus elite academic characteristics of universities) New structures could be created, extension services could be used, or partnerships developed		
Welle-Strand (2000)	[2] competition; new providers	Service university; mode 2 is on the march. Besides independent critical research, knowledge services are essential to survive. Leadership becomes even more important; blend of		

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA (how 'tower' and 'enterprise' will be successful (how that makes enough money that can be (re)invested in basic research)	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
Whitty and Power (2000)	[2] marketization (dismantling centralised bureaucracies) [2] privatisation			Marketization and privatisation do not yet seem to demonstrate positive outcomes. Third way, has problems with coherence of reforms (will marketization and privatisation continue under new umbrella?)
SUPRANATIONAL BODIES				
Council of the European Union (2001)	[1] ICT [3] globalisation, regionalisation and engagement of the EU [5] society [7] demographic trends [6] changes of working life		Strategic objectives for training and education in Europe: - Increase the quality and effectiveness; - Facilitate access; - Open up education and training systems to the wider world	
European Commission (2000) (2001)	[3] Europe is behind US and Japan and needs to catch up.		- (virtual) centres of excellence and develop a common policy for large research facilities. - More co-ordination of national and European research policy; including co-operation between national funding bodies and closer co-operation between European research organisations like ESF, ESA, EMBO, EUREKA, COST etc	
OECD (1998)	[1] ICT	Growth of collaborative arrangements Greater accessibility of scientific information Shrinking of instruments and tools in weight, volume and energy Electronic publishing Opportunities for e-learning	National governments should support technological infrastructure (e.g. adequate regulatory framework)	
OECD (1998)	[2] government budgets for research decline; nature of government funding changes; more research directed to potential commercial applications; growing demand for economic relevance [7] growing research personnel concerns (ageing) [3] internationalisation and globalisation making research more competitive and leading to specialisation		Three functions of university should be maintained to benefit society: How to resist short term temptations and secure long term curiosity driven research? Limits of concentration of research? Balance of teaching and research? Human research policies and adequate training for researchers? More autonomy of institutions? How to organise valuable research evaluations?	
OECD (1999)			Plea for recognition of regional role of universities (community service); Integration of the three university roles with regional components National government should develop national research performance	(c) research agendas determined on the levels (national government; research councils); rewards based on (inter)national research performance

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
Salmi (World Bank) (2001)	[1] ICT [3] economic globalisation [5] knowledge as driver of growth	emergence of myriad of alliances, linkages, partnerships institutional differentiation radical changes in training needs (e.g. learning to learn) new forms of competition (e.g. corporate universities) new configurations and modes of operation for institutions (e.g. infrastructure will change because of mode 2) Universities are useful to help absorbing and communicating knowledge Universities of special importance in developing countries	agenda with regional needs; local authorities should incorporate universities into regional plans; universities should map regional needs etc.	(+) government promotes industry links; government transfer policies
World Bank	[5] knowledge society		Governments should reduce the knowledge gap by public subsidising Create life long learning opportunities, especially math and technical courses	Knowledge gap between the poor and the rich countries
INSTITUTIONAL LEADERS AND MANAGERS Alva, Klor de (1999)	[1,2,4,5] ICT, marketization, networks, PPP, new economy and knowledge society			
Berhout (1998)		Lifelong learning will be important part of education; distance learning is a good means to serve adult students; these students will have different needs and this has impact on faculty Network-structured university (fragmentation and integration call for discipline-technology matrix) Interdisciplinarity Stress both scientific prestige and societal impact	Discipline-based specialists must also contribute to the larger whole 'And-and' strategy demands special communication capacities faculties (columns) continue to be discipline-based; rows combine specialised knowledge into research programs two kinds of professors needed: traditional (specialists) and integrators (generalists).	
De Klerk (1999)		Universities should be a place for curiosity driven and "useful" research (hybrid) Universities should be public institutions that have privatised some cash cows (thus, public-private institution)		
Fekete (2001)			Suggests to create a two-fold organisation, combining stable and innovative elements The hierarchy should remain, but complemented by a diverse collection of (independent) clusters (specialist centres), each focused on particular sort of problem Clusters may arise and fade depending on circumstances More flexibility in labour conditions is desirable: secure appointments half time in faculty and other	

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
Coedeghebaere and Van Vught (2000)	[1] ICT [2] marketization (competition) [3] globalisation	Changing teaching methods (more interactive, lower student-staff ratio) Distance education To share costs: increasing numbers of international university coalitions	half 'at risk' appointments in clusters Investments are needed Changing government role, more facilitating	
Ronayne (1997)	[2] marketization [3] globalisation [7] mode 2 research	Entrepreneurship in a commercial/economic sense will be the new culture Science and technology will increasingly be functionally separated Academic profession may change because there will be more close work relationships among "different people", with different values. Universities will lose their monopoly as research centres.	Question: is selectivity and concentration of research resources / infrastructure desirable?	
Strangway (?)	[5] knowledge society [6] social and financial accountability	Revival of Newmair's idea of the university": "knowledge should be pursued as an end by itself on which utilitarian and professional purposes would subsequently be built Other, not discipline-based kind of organisation is required. Classical departments will disappear Higher participation leads to privatisation: there will be "publicly assisted universities".		Massive retirements (within 15-20 complete renewal of faculty: Loss of expertise, opportunities for change, tight labour market (competition)
Thorens (1996)	[1] ICT [3] globalisation [8] massification		Pursuit of knowledge as distinguishing feature; also pursuit of democratisation, access and quality HE should be elitist, based on competence, not origin.	
NATIONAL GOVERNMENTS DTI (1999)	[2,3] global industries [5] knowledge driven society	First class research advance and using it is needed. Innovation is important Curiosity-driven research is important. Investment in basic research is the fundamental building block for greater commercial exploitation Generation and acquisition of new ideas also in company laboratories and research centres; not just in universities	Quickly transform results of research and invention into products and services for people's well-being Scientific excellence, curiosity driven research Create also bridges between public and private sectors (networks, partnerships) Public investment in basic science can deliver higher returns. Develop approaches to satisfy public concerns about risks created by science (restore public confidence) Government plays three roles: investor, facilitator and regulator	Moral issues regarding progress in science

ACADEMIA 21st CENTURY

STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
Ministerie van OCW (2001)	[1] ICT [2] increased competition and mobility [3] internationalisation (European networks) [7] demographical trends		Maintenance of high quality level Invest in curiosity driven research Invest in young researchers (talent) Invest in centres of excellence Stimulate R&D (private investments) Enhance flexibility of funds	
Norway (statements Norwegian government)	[8] reduction of public income [7] growing number of elderly [8] more environmental problems		International co-operation is fundamental. Society and industry need innovations; increase funding level of research to OECD level Goals re. research system: - funding more on the basis of quality - update scientific equipment - recruit more researchers (30% growth to 2005)	
Swedish ministry of education and science (2000)	[5] knowledge society [7] generation change in Swedish research community [6] increasing demand for staff with (multi-disciplinary) research degree		Confirm Swedish position as a leading research nation; state bears responsibility for fundamental research and post-graduate education (establish graduate schools in eight high priority fields) New structure for research financing, priority setting important	
INDUSTRY				
Everhart (1996)		Universities has together with government and industry role to play by delivering graduates (with research experience) and doing research	Technology transfer process needs to be improved Provide research opportunities to undergraduates	Future funding
Galvin (1996)			Government, industry and university have to co-operate to serve customers best	
Nicol (2000)	[1] ICT		No one covers all research ground; research collaboration with suppliers, universities, venture partners, customers and the market place	
UNICE (2000)	[8] innovation increasingly depends on effective interaction between different actors		Create opportunities to create knowledge and exploit new ideas by: governments must improve quality and scale of science base, governments must improve diffusion of results and promote co-operation, protect intellectual properties, companies must increase expenditures for R&D, companies must upgrade innovation by adopting global best practices	Europe spends too little on research; Collaboration in Europe faces many obstacles
VNO-NCW et al. (2001)			Government should raise funding for research Government, industry and knowledge providers should join forces	
OTHERS				
Economist, 1997	[8] massification [8] success of science over arts and humanities	Successful universities combine basic research with incubating industry Research is moving to peer-university institutions	Market driven research model	catering for massified student population academic drift

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STAKEHOLDER	TRENDS	VISIONS OF THE FUTURE OF ACADEMIA	POLICY OPTIONS AND QUESTIONS	POTENTIAL PROBLEMS
Euroscience (1998) [60]	[8] constant production of new knowledge	Universities have no central steering core Knowledge production outside traditional places; Research will rely on subcontracting	Investing in basic research necessary for innovations; reappraisal of knowledge production and problem solving is needed More flexible employment schemes and secure jobs for young scientists require focus	
Futures project (2000)	[4] consortia	World-wide consortia regarding research and student exchanges Virtual education New level of competition Difference between for-profit and non-profit begins to erode. Most consortia will function as for-profit organisations	See summary for many policy questions	
Futures project (2001)	[1] new technologies [2] new competitors, changing role of the state		HE must redefine its core functions Attract new kind of leadership	

