University in Transition

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Research Mission – Interdisciplinarity – Governance

Detlef Müller-Böling
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(eds.)

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Summary

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The major theme of this book is how the many kinds of changes and reforms which the research university needs to make to respond to conditions today could be made. While overall government support is a major concern in both Germany and the United States, the issues go beyond money to the basic organization of research universities: maintaining the integrity of basic university research while collaborating more with industry, recovering and sustaining the curriculum when research predominates, addressing the unruly development of instructional technology, coping institutionally with interdisciplinarity, managing such institutions cost-effectively and efficiently given the substantial barriers within and without. Above all, every author refers in one way or another to the overwhelming need to secure and preserve university autonomy. For German universities, autonomy is still a goal, with many legal and political barriers preventing realization. For American universities, political intrusions, calls for greater scrutiny and accountability threaten autonomy.

Research Universities – Access, Opportunity and Research Mission

The five authors in the first section of the book examine by the connection between research and teaching at both American research universities and German universities. The first two, Richard Atkinson, Chang-Lin Tien, and Cornelius Pings focus predominantly on the

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implications of research funding for the discovery of new knowledge, discuss the perceived decline in federal funding, and the consequences of working with private funding sources. The first two discuss the innovative response to this situation in California, while Pings discusses the relationship to graduate programs. Kenneth Keller moves the discussion into how the emphasis on research is having detrimental consequences for undergraduate education at the research university and how this might be corrected. The only German presenter in this section, Rainer Künzel, provides a comprehensive discussion of the issues of the German higher education sector. Notwithstanding the very different legal and financial constraints on German higher education in comparison to the American, the centrality of research raises the same issues about (under)funding and seeking relationships in the private sector; as well as the union of research and teaching that does not necessarily serve university students effectively at the moment. All of the authors are keenly aware of the "transition," but advocate careful planning and a clear sense of where one is going.

Richard Atkinson, President of the University of California system, discusses the role of the research university in the U.S. economy employing the example of the leading role of research universities in generating and sustaining economic growth. Using "new growth theory" which argues that half of U.S. economic growth since World War II is the result of investment in research and development (R&D), he discusses the critical role the discovery of knowledge plays in driving the American economy. In California in particular, new job creation is the result of the various high technology industries which owe their existence directly to the research universities in the state. The University of California is making it a priority to encourage and facilitate the kind of knowledge transfers between the University and industry which sustain economic growth while providing support for academic researchers and their graduate students. The vehicle is the Industry-University Cooperative Research Program, which is also a mechanism partially addressing the anticipated cutbacks in federal research support.

Chang-Lin Tien, Chancellor of the University of California Berkeley until July 1997, discusses how research funding has had an impact on the research agenda. Beginning with a history of how federal funding for non-defense research and development has declined in the U.S.

since World War II, and notably between 1992 and 1995, he depicts a somber future. California, which receives nearly a quarter of federal funding for R&D would appear especially vulnerable, particularly when industry is also reducing research support. However, at U.C. Berkeley imaginative measures are being adopted to counteract the impending shrinkage of state support.

Collaboration with industry to replace some public funding is one of these measures, which despite serious potential drawbacks, should actually enhance higher education as a vehicle of economic growth. Like Atkinson, Tien discusses "new growth theory" which is shaping a new paradigm in university-industry relations, spearheaded by biotechnology. At U.C. Berkeley various consortia have been developed to optimize these relations with the result that more than 20 percent of its current research budget comes from private funds. Good as this is, Tien makes a plea for university presidents and chancellors to develop an overall strategy for research direction and funding support. Only by carefully managing your research portfolio-planning where you want to go and how to get there – will success be achieved.

Kenneth Keller, former President of the University of Minnesota, looks beyond the present situation of the American university which is often described in terms of a series of issues involving money, to examine the much more difficult and subtle pressures higher education is under to answer the question, "So why the need for change?" In his view serious planning has been neglected as budgeting has been allowed to set priorities. To contextualize planning approaches, Keller presents a short overview of the history of U.S. higher education in order to demonstrate, among other things, the development of contradictory expectations about the function of higher education. Appreciation of today's difficulties and concerns as a success story of U.S. higher education is simply misleading.

Success itself has generated some of these concerns. Since in the U.S. higher education consumes almost 3 percent of gross domestic product (GDP), it has awakened calls for accountability and much greater public scrutiny. This in turn generates tensions because of the broad range of these calls and the need for autonomy for the university – a basic conflict. For Keller the issues are serious and substantive to the extent he feels that it is time for some course corrections.

There are four areas of concern; undergraduate education, the research/teaching model, the constraints of discipline based organizational structures, and achieving inter-institutional coordination. All of these areas embody current and historical conflicts, but they are all aggravated in the setting of the research university – usually to the detriment of the undergraduate. They need to be addressed not only to restore credibility to higher education, but to set a new, planned course to generate long needed corrections. After the magnificent history of U.S. higher education, planning to meet the changed demands of our times is quite possible – indeed, it has already begun.

Cornelius Pings, President of the American Association of Universities, focuses on the interrelationship of doctoral education and research at the 100 or so leading U.S. universities and how both are relatively recent phenomena – indeed, in their current form, products of the post-World War II era. Within these 50 years since 1947 an ideal set of relationships seems to have evolved. But, he sees symptoms of unease related to financing of research, the costs of tuition and digital information technology. This unease is heightened by often mindless calls for change by politicians and the media without any notion of what to change to.

Within this context graduate education has produced a number of national discussions which Pings calls the myths of "human bondage," "too many is not enough," and the "Broad-Based Specialist." Having disposed of these, he argues that the reality is that there are too many Ph.D. programs. Another dimension of change in the U.S. which affects both graduate education and university research is concerned with changes in industry – the great reduction in private labs, the ever shrinking time of the product cycle of technology to market place, and the expectation that university research might fill the void. Like Atkinson and Tien, Pings, while welcoming new industry-university relationships, argues for great caution so that intellectual freedom is sustained and faculty do not become "patent whores."

Overall the American research university is still an institution of stability and continuity. Such changes as need to be made to meet the exigencies of the present need to be made thoughtfully to preserve unfettered inquiry and relevant teaching – and not in response to uninformed political goading.

Rainer Künzel, Vice Chair of the German Rectors' Conference, has used a brief description of the development of the German higher education system since the 1960s to present a comprehensive blueprint for higher education reform. The problems he presents are related to the fundamental structure of the system and "can only be ascribed to a limited degree to decreasing funding." Among these problems are a lack of differentiation among universities, a deterioration in faculty/student ratios, a growing number of first year students (a number augmented by German unification), enormous overuse of facilities, and concerns about quality. Despite a recent reorganization of the system, universities bear three quarters of the burden of training. Because of the connection between research and teaching at German universities, this puts an additional burden on faculty and defines curricula in ways which do not necessarily safeguard quality. In this area the state funding structure is decisive, along with the shift of research activities to institutes outside the university. That students could be better served is indicated by the long study period, the relatively high dropout rate, the disparity between study programs and labor market needs, and the decline in appeal to international students of German doctoral programs.

The core problems to be addressed stem from accommodating too many students, insufficient functional differentiation among institutions and control deficiencies within the system, i. e. the powerlessness of university officers from rector on downward to govern and manage their own institutions. In a series of detailed proposals, Künzel suggests a step-by-step remediation of the current situation. Far more than a course correction, it is a fundamental restructuring of German higher education which emphasizes quality over quantity and advocates a redefinition of its legal and financial framework. However, in Künzel's view, academics and university leaders must take the initiative in dealing with problems within their own institutions to credibly make the larger political case.

Strategies of Formation and Implementation of Research Missions

This section focuses on how research directions are determined and supported at universities in the context of the total research organization in both countries. Although the actual organization of research is formally and markedly different in each with respect to the kinds of agencies and directorates which set research goals and fund both individuals and research institutes, there are two paramount similarities: 1. The federal governments of both countries pay for a major portion of the research infrastructure. Through its agencies it influences research direction directly by setting priorities and approving certain research proposals over others. 2. Individual, investigator initiated peer review projects are the foundation of the research system. Housed exclusively in universities, with a monopoly on training the next generation, the ideas of faculty engaged in basic research ultimately provide the institution with its research mission. In both countries the current age structure of the professoriate means that over the next 20 years, more than half of existing faculty will be replaced. Who is selected by departments and schools to match a research plan will shape the research mission of universities for many years.

Beyond the abstract structural similarities lie a number of serious problems which are perceived to threaten ongoing funding for university research, and undermine the basic nature of university research and the intellectual autonomy of individual researchers. External political pressures in both countries have also changed the dynamics of preserving the research mission of universities. In Germany in particular, student numbers, the diminishing capacity of government to fund all aspects of the university, as well as the legal and budgetary relationships which govern how universities are run are creating an urgent need for radical reform. The focus is on the universities there to develop distinct research profiles, to use resources more efficiently, and to introduce many changes in how universities are organized.

The articles in this section have ostensibly very different concerns, yet come remarkably close in their analysis of what needs to be done. Dagmar Schipanski, Chair of the German Science Council (*Wissenschaftsrat)* until January 1998 is chiefly concerned with making the

complexities of the German research system intelligible. She focuses on the location, organization and funding of the extended German university/research system. Like Künzel, she emphasizes that the limited number of research universities not only produce the majority of graduates of the entire system, but are the "backbone of the whole science system" by having a monopoly on the granting of Ph.D.s. At these universities the emphasis is still largely on basic research while applied research is found more at technical universities and the numerous external research organizations. These include the Max Planck Institutes, those of the Fraunhofer Society and Blue List, along with the Hermann von Helmholtz National Research Centers. The most important of all organizations, however, is the German Research Association *(Deutsche Forschungsgemeinschaft)* which supports investigator initiated, peer reviewed projects within universities.

While there is a complex arrangement between the *Länder* and the federal government with respect to funding, the federal government nonetheless has substantial input in shaping science policy through its large share in funding research institutes and organizations, and individual research projects, as well as through its share of investment in higher education. Still, there is no comprehensive national science policy, the *Wissenschaftsrat* (among others) was created in part to remedy this situation. Yet the system is well defined, "has rules for everything," but in Schipanski's view lacks innovation, a new spirit. Interestingly, it is not so much the system of research funding in general, but the university where she sees the need for change. In harmony with Künzel's suggestions, she refers to conclusions of a working group of the *Wissenschaftsrat* in which there should be much stronger activity profiles, mission orientations of the systems' parts, particularly universities. There also should be stronger competition among universities for limited funding, opening the door to considering in what ways the "transition" is to occur in universities.

Werner Meißner, President of Johann Wolfgang Goethe University, Frankfurt/Main, picks up Schipanski's brief recommendations to make them the major focus of his paper. He challenges the need for reforming the structure of research in Germany, especially when, in his view, the system of research promotion conforms miraculously to the principles of university research and is effectively supported by the *Deutsche*

Forschungsgemeinschaft and the other research funding organizations which respect university autonomy. So what is needed is not a new vision about supporting research, but a new vision of research universities, one, however, that has nothing to do with "globalization."

Because of the size of today's German universities, they cannot effectively execute their triple task of performing top research, teaching through research and training young research talent. The solution is to differentiate training with a general basic teaching section for most students and a more exclusive research section open to advanced students. Meißner would put an end to the fiction that teaching and research can be combined under conditions of mass education, thereby recasting the debate on university reform. Implementation implies a division of labor within big universities and among them. He would preserve free education, but impose fees for advanced students. Along the way he thinks the introduction of Bachelors' degrees and professional training programs a good idea. Differentiation would also affect faculty so that it would be equally prestigious and profitable to be either a "teacher" or a "researcher." With half the faculty needing to be replaced in the immediate future, now seems a good time to start.

Such reforms are only possible with a new vision of university management in which university presidents play an active role from within. The central concepts defining this changed role are the idea of "motion," "competition" and "decision bound-dialogue" to replace the exhausted democratic model of university decision making. Like Künzel, Meißner is concerned about the role of faculty with an oblique reference to egoism, but rather than exhort better behavior, he thinks the new role of the president will counteract their activities.

C. Judson King, Provost and Senior Vice President of Academic Affairs of the University of California, brings out one of the most interesting distinctions between the German and American research systems in his article on sustaining the research mission of the University of California. This distinction also explains why at least American public research universities have a mixture of basic and applied research in their mission. The origin lies in the Morrill Land Grant Act of 1862 which granted land throughout the United States to create public institutions of broad access and practical research for the benefit of the community where the campus is located. This is almost diametrically

opposed to the Humboldt idea of highly selective training of the future elite of the German states. Although the practical execution of research on behalf of the community has largely been syphoned off into "extension" activities, a pragmatism about university research remains. Hence when King describes the changing relationship among major university research funders – the federal government, the individual states, the university and industry – he describes the increasing role of industry with approbation. He also feels that the University of California is concerned about demonstrating the worth of its research to the state and its people, as with the federal government. In his view, "the funding of research by the federal government is based on measures and concepts of positive results to the economy and to society from that research. This calls in some sense for the renewal of a land grant mission."

Like Atkinson and Tien in the first section, King comments on the future of federal research funding, and views the predictions of a coming 25 percent reduction offset by current increasing support levels. Like them too, as a member of the same governing structure, he is enthusiastic about developments in industry-university cooperative research programs which he sees as a major force in helping the state's economy to grow. It is a relationship of increasing "intimacy."

Notwithstanding, he sees the U.S. research agenda as fashioned indirectly by individuals. Within the university, departments and the administration plan future research areas by defining these and hiring new faculty in the defined areas. As this can be a 30 year decision, the research agenda is established. Even at the federal level where directorates within agencies establish research priorities, as personnel within the directorates change, so priorities can change. Lobbying through national associations such as the American Association of Universities is another avenue of influencing national research direction.

Patricia J. Gumport, Director of the National Center for Postsecondary Improvement at Stanford University, provides a case study of how the federal government and individuals interact to define a major research project. Of particular interest is how the U.S. Department of Education's call for proposals, Gumport's team's proposal, and the theme of this conference "The University in Transition" intersect. It was suggested that the conference arose out of a sense of urgency about challenges to the research university in both countries which require

immediate attention. Similarly in designing the proposal to meet the very specific government guidelines, Gumport's team took as the major premise for the new center that "postsecondary education in the United States is facing a set of extraordinary challenges, for which policy makers, administrators, faculty, students, employers and funders need research." An uncommon element in the request was to establish a national center, not one at any particular university. U.S. $12.5 million over five years is also something of an exceptional sum, so the proposed center involved researchers from universities across the United States, particularly Stanford, the University of Michigan and the University of Pennsylvania.

Six project areas have been created which include a range of postsecondary institutions, not solely the research university. Four of these apply particularly to the research university and include: 1. How they adapt to shifting environmental demands such as cost containment, increased accountability and affordable access. 2. How can students' transitions between school and work be improved in light of changing economic and workforce demands? 3. What are the assessment mechanisms that enhance student learning? How do institutions respond to external and internal pressures for assessing student learning from a range of perspectives? 4. How can the environment within academic departments be transformed to drive the kind of real change which will improve undergraduate education? How can both the quality and productivity of academic institutions be improved?

Interdisciplinarity: A New Academic Culture – Conditions for Its Success

The five authors in section three focus on different aspects of the multilevel topic "interdisciplinarity." Jutta Fedrowitz, Program Manager of the CHE and biochemist, gives an overview of different approaches of programs, centers and organizations. An overview of interdisciplinary courses, institutions and organizations found on the Internet shows that "interdisciplinarity" serves to identify university programs as well as it is a merely fashionable label for sometimes even dubious activities, which have nothing to do with science. From her own experience she

reports the possibility of initiating interdisciplinary dialogues between science and the humanities and gives examples of interdisciplinary centers in Germany. The summary of a short study of international views on problems and possibilities of interdisciplinary cooperation helps to point out the conditions for success in this field.

Evelies Mayer, Professor of Sociology at the Technical University of Darmstadt and former Minister of Science of Hesse, shows the endless frontier of interdisciplinarity by introducing the history of interdisciplinarity at German universities. Using the example of the Center for Interdisciplinary Studies on Technology in Darmstadt, she discusses the preconditions for establishing an interdisciplinary research center, its success and the struggle against budget cuts. An academic culture of change is needed to create more centers, and to protect the existing interdisciplinary centers in Germany from the iron grip of the cash nexus.

Konrad Jarausch, Lurcy Professor of History, University of North Carolina, Chapel Hill, introduces Clio, the muse of history and epic poetry, as a hardly sociable lady in tweeds. Establishing centers for German studies in the U.S.A. demands cooperation between historians and Germanists. But why should a Goethe specialist, a historian of the Second World War or a scholar interested in European integration talk to each other? Shared opportunities in a center are not enough to overcome the respective prejudices of the disciplines which see each other as stodgy philologists (Germanists), shallow behaviorists (political scientists) or compulsive collectors (historians). Interdisciplinarity in German studies has shown best results when individuals learned the methodologies of another discipline or when a small group of diverse scholars can cooperate on a joint project for a longer time. This has often been underestimated by after dinner rhetorical speeches about interdisciplinarity. Given the chance of individual long-term cooperation, German studies can come up with new knowledge and conceptions.

James Rolleston, Professor and Chair, Department of German, Duke University, Durham, N.C. focuses on two graduate programs at Duke which have been redesigned as interdisciplinary programs. The first is a program for comparative literature derived from foreign literature, the second a program in German studies which is derived from German literature. While the literature program required new resources and a

new professorship, the second reoriented the energies of people already on campus in a multidisciplinary style. Both represented academic paradigm shifts and also were successful adjustments to the labor market, related to the rise of cultural studies.

David Hodges, Professor of Electrical Engineering and Computer Sciences, University of California Berkeley, presents the development of Berkeley's Interdisciplinary Program in Microelectronics since 1961. Involving participants from physics, materials science, chemistry, chemical engineering, mechanical engineering and industrial engineering, more and more interdisciplinary programs have been carried out. Shared facilities are extremely helpful in recruiting young faculty members of different disciplines for the Microfabrication Laboratory. Researchers have access to a range of experimental skills and equipment that a single faculty member could not obtain in a single department.

External and Internal Governance of Universities

Section four covers a very broad range of concerns about how universities are governed. While the intensity of the discussion is driven by important funding considerations, the perceived need for change and reform is found in areas of both micro and macro management and governance. In this area, though, there is a great difference in how the systems in Germany and the United States work, and the areas perceived as in need of reform. In Germany there is basic dissatisfaction with how the university system is organized, financed, governed and dealt with politically. The impetus for reform is the poor functioning of too many aspects of the university, the threats to the quality of education and the pursuit of untrammeled research – as Künzel in the first section makes very clear. In the United States the impetus for reform comes from many sources, among them the effect of rising costs, new technology, increasing (critical) public scrutiny, political intrusions, and the threat of reduced research funding from the federal government. While there are shades of criticism in the American contributions and calls for "course corrections," there is no suggestion of fundamental restructuring as is made currently in Germany.

Steven Muller, President Emeritus of the Johns Hopkins University, makes the case that the driving force of the modern university is drastic change brought about by the great multiplication in knowledge created by electronic technology. The need for change is so insistent that the university has to reinvent itself, making it "desperately difficult to manage." The problem is that as evident as the need for radical change is, the quality and direction of that change is completely unknown. He speculates on a number of possible changes including the demise of the personal lecture system, consolidation of facilities and centers of knowledge, restructuring of undergraduate education with closer links to professional employment, among others.

All of this, in whatever form it might actually occur, represents a colossal challenge to university management. Change also generates conflict so that management requires conflict management, especially at a time when the benefits of change are uncertain. Muller's focus is on management requiring courage to implement new ideas as well as the ability to admit mistakes and move on in a new direction. "Smart management" is equally necessary to work with a team – flexible and highly competent, accessible to all members of the university community. To be effective such management needs to function in autonomous universities in which management is part of the community and holds control of the university budget.

Because of the great difficulty of university management as Muller structures it, he argues for it to be assisted by a strong, able and independent board of directors as an alternative to supervision by government and applicable in all countries. Such a board's existence establishes the reality that university management is neither selected directly, nor is accountable to the faculty. Management's accountability to a board rather than to the faculty is critical as faculty have "scant chance" of raising their sights to the whole university. A board also provides public spokesmanship and real help with management.

In his article, Detlef Müller-Böling, Director of the Center for Higher Education Development, addresses the complexity of the modern research university and its inherent internal and external conflicts. In a series of suggestions for university management in which he determines that real conflict occurs in the area where internal and external forces and reactions meet. He calls this "the in-between" where oppos-

ing forces are blurred and which is the only place for management to take a position, given the loss of a unifying ideal about what the university is supposed to be. In his view, the university has three characteristics: 1) It is a professional organization 2) marked by organizational fragmentation with 3) decentralization of decision making. Characteristics such as these resist formal and stringent governance. Moreover, they can be perverted to amplify governing problems. Were this not bad enough, there are many forms of resistance to university management and governance such as simply ignoring management directives, challenging them on theoretical principles, deferring decisions, and the building of strategic political alliances by the faculty to protect their own interests.

According to Müller-Böling, management is perpetually between Scylla and Charybdis, between looming dramatic changes with respect to instructional technology, needs for life long learning and society's increasing distrust of technology on one side, and the ways in which universities are currently organized and managed on the other. Hence university governance will have to turn into conflictual management, that is "into management of the university's inherent conflict and tension" – "the in-between." This is to be achieved through "decentralized responsibility with a centralized concept and organized coordination" which can only occur in a genuinely autonomous university.

By working his way through a series of tools taken from organizational theory, Müller-Böling takes up the most applicable which draw on organizational culture, self-regulation, and management by objectives – the latter dealing with the fundamental conflict of university governance – and deals with these topics under the headline of conflictual management. All this requires negotiation about the mission and goals of the university at all levels so that individual and corporate goals are shared. This in turn will not be done without conflict, nor should it be suppressed. Hence decision makers from department chair on up require "twofold legitimation" from both their constituency and from senior authority. This is necessary to bestow sufficient authority to actually manage conflicts.

Klaus Anderbrügge, Chancellor of the University of Münster, focuses on the disjuncture between the historical mission of German universities and the real demands put upon them to "service" nearly two mil-

lion students, to transfer scientific theory into industrial practice, and many other issues – what he calls the *status quo* and the pressure to reform. Reform, however, is already occurring in many aspects of university organization, but the most important reforms concern the maintenance of quality standards in teaching, research, and management. Three areas stand out for particular reform to uphold these standards: budgeting, research and teaching, and university management.

Budget reform requires real university autonomy so that those responsible for running the university really have at their command the necessary instruments of reform for increasing management's efficiency. When limited financial autonomy was granted in one *Land*, the universities instituted real evaluation of effectiveness in teaching, research, and management and then distributed internal budgets primarily according to measurable achievement criteria. This demonstrates that universities will reform when conditions make it possible.

The recovery and maintenance of quality in research and teaching requires substantial change in how teaching is organized with the introduction of something closer to the American system of grades and internationally comparable final examinations. The development of quality standards in management and administration requires both autonomy from the state and individual creative ability. Like Muller, Anderbrügge suggests the value of competent teams. Like others in this volume, he sees the current democratic committee system where every faction is represented as dysfunctional for decision making. University officers from the *Rektor* on down should be given comprehensive decision making powers for all matters at the university, while at the same time being completely accountable to democratically authorized representative organizations such as the senate or a faculty board. Decision making power and responsibility would no longer be separate, so long as the provision for special interest groups is restricted. The necessary basis for this to take place would be the guarantee of dependable funding from the state with substantial institutional autonomy from the state.

Budget reform and management is the chief focus for Jürgen Heß, Chancellor of the University of Freiburg, in his discussion on innovations on university management and the safeguarding of innovation in university research. For him reform is hindered by a crisis in "self-or-

ganization," a financial emergency, and a crisis in credibility, but he has several ideas about how to deal with these. These include a very different form of budget allocation to which evaluation of performance is linked, including the allocation of research funds. University autonomy and the development of distinct profiles are also necessary.

In his exposition of governance at the University of California, Martin Trow, Professor of Public Policy and former Director of the Center for Studies in Higher Education, U.C. Berkeley, not only very clearly delineates the way in which U.C. is governed, but step by step he makes clear the profound differences between the American and German systems of public higher education. For U.C. the two guiding principles are the maximization of the university's autonomy and the pursuit of pre-eminence, principles which are shared broadly throughout the university community and are mutually reinforcing.

Since early after its founding, resistance to politicization has characterized the legal framework of the university by providing, among other things, a block allocation for the university to spend internally according to its own lights. It also provides a Board of Regents who appoint the senior officers in the system. U.C. is not a democracy and this power of appointment guarantees that officials have the authority to govern. To be sure, the underlying idea is shared governance, that is the faculty through the Academic Senate which is responsible for academic programs, appointment and promotion of academic staff, and establishing the criteria for student admission, has its decision making areas. Additionally, it consults and advises on everything else and usually works with the administration. It is also a mechanism whereby broader politics usually is not allowed to intrude. Of course, there have been some notable exceptions, particularly the conflict over abolishing affirmative action, but generally the system functions effectively.

The modern guarantor of university autonomy lies in the California Master Plan which was created in 1960 to structure a three-tiered system of higher education which gives the University of California the exclusive right to grant doctorates. Part of this structure is that U.C. salaries, for instance, will be based on eight other competitive universities' salaries, so that U.C. itself does not have to negotiate with the state about them. By formularizing otherwise contentious issues and creating a central administrative office, the Office of the President, to make sure

formulas and agreements are adhered to, politics is again put at a distant remove from the concerns of individual U.C. campuses. This in turn makes it possible for campuses to focus wholeheartedly on building and maintaining their academic pre-eminence. Markets, Trow argues, become a substitute for politics with the drive to maintain competitive excellence functioning within campuses to keep their programs up-to-date and top-notch. This also enables campuses to initiate radical reform within by the presence of a functioning leadership structure and a consensus for excellence.

U.C. is a complex structure with several other aspects that enable it to function as it does. While in its operation it is not without flaws or glitches, it generally succeeds very well. The issues of university autonomy, independent leadership, budget control, shared governance and a broad commitment to academic excellence embody much of what German university reforms aim for, and clearly demonstrate the differences in the two public systems.

Hans Weiler, Rector of the Europa University Viadrina, Frankfurt/Oder, focuses his contribution on the "domain of decisions made within institutions of higher education" within the two countries. He offers a rich set of comparisons which go beyond any of the previous discussions. Since he presents his observations in a summary form of theses, the article itself should be consulted directly as it forms a conclusion for the whole. He elaborates on models of governance, the precarious legitimacy of governance, the dual meaning of "responsibility," the "equity-efficiency quandary, or: decisions on selection, rewards, and punishments," and the knowledge base of decision making. He goes on to consider centralization and decentralization in governance, allocation of resources – the crucible of decision making, and people in governance. To conclude he suggests an extensive list of areas which could be profitably investigated to provide a deeper understanding of similarities and differences between the two systems.

Finally, Clark Kerr's essay on "The American University always in Transition" provides a summary of the issues discussed in the conference in the context of the slow nature of change within the university. Present crises, he opines, are often mere local turbulence and one should focus on long-term trends in higher education to have a sense of where the university might be going.

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Chancellor Chang-Lin Tien was so kind as to host a welcoming reception at his home. President Gerhard Casper not only hosted the last day of the conference on the Stanford campus, but invited the entire conference to lunch in Hoover House, his campus home. We greatly appreciate their hospitality and the congeniality they bestowed on the proceedings. President Casper's assistants, Karen Mela and Jean Fetter are thanked for their smooth and efficient cooperation with the organizers, along with Heiner Schulz, Ph.D. candidate, Department of Political Science.

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The editors

Foreword

Detlef Müller-Böling, Evelies Mayer,
Anne J. MacLachlan, Jutta Fedrowitz

University in Transition – A German-American Dialogue in Higher Education

This volume is the result of the "University in Transition" Conference held at the Universities of California Berkeley and at Stanford in March of 1997. American and German university leaders from research universities were invited to discuss common issues related to funding reductions, maintaining the research mission, access, the role of interdisciplinarity and changing forms of governance. The goal of the conference was to promote an ongoing dialogue between German and American experts in higher education and to revive the regular meetings of the German Rectors' Conference and the American Association of Universities.

Among the 60 participants of the conference were 14 past and present American university chancellors, presidents and public system presidents and experts in higher education; and some 20 German university heads, Rectors, Chancellors and Presidents, plus representatives from the major institutions for research support in Germany. Of special importance was bringing to expression their own daily experience with the general issues.

The conference was conceived out of a sense of urgency about numerous issues confronting the higher education system in both countries. The focus was on research universities in Germany and the United States and the problems they face in preserving both research

quality and integrity in the face of decreasing government funding, as well as its "pure" character in the face of growing involvement of business in research support and its accompanying pressure for research of a more applied character. Although the systems of the two countries are very different, issues of access, affordability, and the quality of the teaching program are critical right now as each country's system attempts to deal with growing numbers of qualified students, the real costs of their education, and the conflict arising from the idealized partnering of research and teaching. These issues and many others are closely connected to the relative degree of power for institutions to govern themselves and allocate their own budgets. This is a particularly burning issue in Germany where real control lies with state governments and ministries, rather than within the governing structure of each university. In the United States, governance issues are thought to be equally critical, but from the perspective of maintaining the autonomy of public institutions free from political interference and a functional consensus among faculty and admininstrators to preserve the mission of their universities. Further complicating an already highly complex series of concerns are the trends in disciplinary change expressed in part in a move toward increasing "interdisciplinarity." Here, too, there are close parallels between the two countries.

The complexity and multiplicity of issues presented a challenge in giving the conference a title. "The University in Transition" was selected as the best umbrella for these interconnected themes. The one drawback is that such a title can evoke an image of the university like a ship on the high sea with a definite destination. This is exactly the problem. There is a sharply perceived urgency about addressing the many issues facing the modern research university, but little sense of where the future might lie. This is different from perceived crises in the past 50 years because the framework is not primarily an issue of structure and organization of institutions and their funding, but a move into unknown territory. Among these are the consequences of living in a post-cold war world (sharp decline in U.S. defense research funding, German unification), sharp disciplinary change, among it, the aftereffects of post-modernism, the softening of boundaries between many scientific and engineering fields, the completely unassessed effect of instructional technology; the demands of a large, growing and diverse student

body; and a prevailing ideology that universities should be more like businesses.

Another dimension affecting the German-American discussion is the difference between the two systems. Nothwithstanding the more than 3,700 postsecondary institutions in the United States, the apparent disorder is reduced to functional categories initially defined by Clark Kerr when head of the Carnegie Foundation.[1] At the top of this scheme are the Research Universities defined as offering a full range of baccalaureate programs along with graduate education through the doctorate, with an emphasis on research and in receipt of more than U.S. $40 million in federal funds. There only are 88 such universities in the United States. This functional categorization joins the private California Institute of Technology with around 2,000 students with public universities such as the University of California Berkeley with 30,000 students. This kind of institution was the topic of discussion in the conference. The attributes of these universities of particular interest to the German participants are their autonomy, ability to charge fees, the diversity of the undergraduate course offerings, excellence in research and a historical corporate identity manifest in sports teams and reinforced by alumni support.

The German system has 82 designated universities in a system of around 325 postsecondary institutions. The parameters defining the activities of all of these are established in federal law which makes each of the 16 states responsible for its own educational system, and employees members of the state *(Land)* bureaucracy. Funding comes principally from the states in conjuction with the federal government. The national legal framework mandates unselective admission of all students who have passed their high school leaving examine *(Abitur)*, and access without cost. In theory all 80 universities are alike in quality and are governed by the principle of the inseparability of teaching and research. Yet despite the apparent order of this system, institutions in each of the 16 states have evolved along different lines and institutions are functionally but informally differentiated. The huge and growing number of students attending university has led to functional selectivity

1 *A Classification of Institutions of Higher Eduction, 1994 Edition.* Carnegie Foundation for the Advancement of Teaching, Princeton, N.J.

in some courses of study *(numerus clausus)*, inadequate physical resources, a growing faculty/student ratio, and the de-coupling of research and teaching.

Both systems have been very successful from the point of view of educating an ever increasing number of students since World War II, finding the resources to support and develop distinguished research programs, attracting graduate students from other countries, and changing the character of their respective societies by the numbers they have educated. All of this has been very expensive, however, and expansion not only is costly, it produces numerous problems. There is a tendency to ascribe these problems to a current shortage of funding. While that is an undeniable part of today's issues in higher education, it is far from the only source of difficulty. So, what the conference discussants did was to look for the most part beyond funding to organizational developments, to how teaching and research programs have evolved in ways which no longer seem to serve students all that well, at disciplinary changes, at issues of governance and administration, at academic culture and the professoriate. Their analyses are distinguished by their proximity to all of these issues.

Research Universities – Access, Opportunity, and Research Mission

Present Challenges of the Research University

Richard Atkinson

My topic is the role of the research university in the United States' economy. As late as the mid-1970s, there was no substantial economic data, no reliable economic analysis of the relationship between investments in research and development (R&D) and economic development. When I served as Director of the National Science Foundation in the late 1970s, we were well aware of the importance of such data in making the case to the Congress for federal support of research, and of the gaps in our knowledge about how R&D affected economic growth. Accordingly, we initiated a special peer reviewed grants program at NSF focused on just that issue – the relationship between investments in R&D and the growth of the American economy.

In the intervening 25 years, a substantial body of research has been conducted which has in turn led to a development in economics called "new growth theory." This work was nicely summarized in a 1995 report of the President's Council of Economic Advisers: 50 percent of the growth in the American economy in the last 40 years has been due to investments in research and development. Obviously, the private sector is a major driver of R&D, but federally funded research at universities throughout the United States also plays a key role. The report points out that when federal investments in university research increase, there is – with an appropriate time lag – a corresponding increase in private sector investments. There is now a well-researched link between university based research and industry's R&D efforts.

Our German colleagues with us today will have to make their own judgements about whether this linkage also characterizes the German

economy. I believe the economic evidence about the connection between R&D and American economic growth, however, is overwhelming. What surprises me is how few people are aware of these developments in economic theory, and of the critical role the discovery of knowledge plays in driving the American economy.

The State of California provides one of the best examples of this linkage. In the early 1990s, this state endured one of the worst recessions in its history. California in prior periods had entered recessions later, and come out much earlier, than the rest of the country. But in the 1990s this traditional pattern broke down. California suffered a brutal economic downturn fueled by tremendous cutbacks in defense and aerospace – a huge loss of jobs that resulted in a dramatic drop in the tax revenues of the state. California's economic hard times, I might add, had a direct and painful impact on the University of California. U.C.'s budget today is about U.S. $900 million less than it would have been if the state had been able to provide only normal cost increases – in other words, a barebones budget – in the early 1990s. This staggering figure equals the entire 1995 state funded budget for three of U.C.'s nine campuses.

What has happened in the past few years? California has come storming back from the recession. Why? New jobs have been created at a very fast rate. Where are those jobs coming from? From a particular type of activity: high technology. And these high-tech enterprises are not the vast IBMs of the world. The companies that are pulling California out of recession are small, entrepreneurial, high-tech ventures. These companies and their technologies can be traced directly to the research universities of the State of California. And by that I mean the various campuses of the University of California, Caltech, Stanford, and U.S.C. (University of Southern California). If you look at the biotechnology industry, for example, a booming area in California, you will find that its success – in fact its very existence – is directly traceable to research programs that came out of the universities of this state. Digital telecommunications is another case in point. It could not possibly exist at its current scale and scope without the California research universities that produce the new knowledge and educate the graduate students essential to keeping this industry on the competitive cutting edge. Multimedia, computers, and software are yet other examples.

As we consider new growth theory and our recent experience in California, it is crystal clear that research and graduate training will play an increasingly important part in ensuring the economic growth on which our standard of living depends. The University of California is very much focused on its responsibilities to help keep the California economy thriving and productive. We recently held a statewide conference on technology transfer, bringing people from the university together with colleagues in government and the private sector to examine how we can do more to facilitate the transfer of technology. We have also established a new program – the Industry-University Cooperative Research Program – which seeks to mine the most promising research areas for new products that, in turn, create new jobs.

The Industry-University Cooperative Research Program works like this: A U.C. researcher joins with a scientist or engineer from a private company to develop a research proposal. A panel of experts drawn from industry and academia selects the best projects for funding. At least half of the funding for each project comes from industry, with the remainder from the university.

The benefits to companies and to California are evident. The most important of these benefits is that the U.C. program involves graduate students in every aspect of the research it sponsors. Industry thus gets the benefit of some of the world's brightest young minds. Graduate students learn firsthand about industry's needs. As a result, they have an incentive to stay in California and continue contributing their talents to our economy.

We want to foster these kinds of exchanges between industry and universities. We clearly do not want to be involved in turning the University of California into a "job shop." But we do want to be involved in speeding the transfer of ideas developed at the university to the marketplace.

More than 50 years ago Vannevar Bush, President Franklin Roosevelt's science adviser, argued in his landmark report *Science, The Endless Frontier* that the national interest demanded federal investment in research performed at universities – basic research that would lay the groundwork for new products and new processes. Events have proved him right. The partnership among government, universities, and industry that Bush envisioned and helped create has been a remarkable success.

Nonetheless, you often hear that the federal government in the United States is reducing its commitment to the support of research universities and scientific research generally. Some forecast that support of university based research will decrease as much as 25 percent in the next five years. But it has also been true – despite difficult budgetary problems at the federal level – that federal budgets for university based research have remained relatively robust. It is my view that from a political perspective, most people in the United States who have thought about these issues have concluded that support of our research enterprise is critical to the national interest. And Democrats and Republicans alike have come to the view that the research university plays a key role in keeping our R&D enterprise thriving and vital.

There may be differences of opinion about whether science policy in the United States should be driven by the federal government, or whether we should have a national science policy at all. But I believe there is agreement on the importance of research and development to the economic future of this nation. And when the history of the last half of the 20th century is written, the vital role research universities have played in the American economy will be regarded as one of the truly great accomplishments of the post-World War II era.

Research Funding and Its Effect on the Research Agenda

Chang-Lin Tien

I have been asked to address a question that has long troubled higher education – research funding and its effect on the research agenda. The Chronicle of Higher Education recently compared the problems of public universities confronting state legislatures to those of a student who orders a pizza – he has to worry not only about how large the pizza is but how many people want a slice. Higher education has a similar problem with federal research funding – the pizza is getting smaller just as more hungry universities are looking for a slice.

The numbers are clear, the trend is chilling, and the implications are stark:

– In 1965, non-defense research and development was 5.7 percent of the federal budget; today, that figure has shrunk to 1.9 percent.
– From 1992 – 1995, for the first time in 25 years, real federal spending on research declined for four straight years.
– The NIH (National Institute of Health) gets 30 percent of the science budget. NSF (National Science Foundation), which funds university research, gets about 5 percent. As NIH has grown, NSF has declined.
– For the past 27 years, the United States have spent a smaller portion of GDP (gross domestic product) on non-defense R&D than Japan or Germany.

Cutting back research at this point in our history, President Clinton recently observed, is like cutting back our defense budget at the height of the cold war. But the five year deficit plan embraced by Congress and the President calls for a 35 percent cut in science spending by

2002. Science and technology funding fared relatively well in the current budget, but it will decline significantly as discretionary spending falls over the next several years.

Berkeley currently gets about one third of its federal research funding from the National Institutes of Health, one third from the National Science Foundation, and one third from NASA, the Department of Defense, and other federal agencies. We are fortunate to have a very balanced research portfolio.

In California, we watch these numbers very closely. Our state receives nearly a quarter of all federal spending for R&D and conducts one fifth of all R&D performed in the United States. If we were a nation, we would be the world's fourth largest performer of R&D behind the U.S., Germany, and Japan.

Research is crucial to higher education, both for the advances it yields and as a powerful tool for teaching. Three California universities rank among the top ten recipients of federal R&D funding. The 60 member American Association of Universities includes six University of California campuses. Federal funding helped create the research university and has fueled campus research for five decades. Every American who won a Nobel Prize in recent years received government support for his or her work.

And there is no viable alternative to federally funded campus research. States cannot assume the burden. Many states are flush with tax revenues – more than 15 have budget surpluses. But in state after state, higher education has lost ground to prisons, schools, health care, and welfare reform.

In an era of downsizing and re-engineering, private industry is also cutting back its commitment to basic research. Bell Laboratories, General Electric, General Motors, Ford and many others are all reducing spending. From 1993–1995, industry investment in research dropped 12.2 percent in real terms.

As if budget constraints were not enough, the university research agenda appears to be under threat on a number of other fronts as well. Populist pressures are rising in Congress to spread research spending among a wider range of institutions rather than focus it in historically elite academic research centers.

The risk, of course, is that R&D will become a pork barrel program

on a par with highway construction or harbor building. The worry is that we may end up with research programs that, like some federal highways, go nowhere.

For many universities, financial necessity has been the mother of invention. At Cal, collaboration with private industry is replacing some public funding and allowing companies to get more return for their research dollars. But increased private support has been accompanied by fresh concerns, such as the risk – or at least the perception of risk – that universities will favor applied research over basic research.

Clark Kerr catalogued these concerns in a 1990 article in "Higher Education." Closer contacts with industry, he noted, could:

– induce students to go where the money is and abandon less lucrative areas like the liberal arts, humanities, and social sciences;
– favor large, big-name research universities over smaller second tier schools;
– divert time, energy, and intellect from teaching and research to entrepreneurial activities;
– trempt faculty to use academic facilities for private gain, promote opportunistic over academic mentalities, and introduce other industrial serpents into the academic Garden of Eden.

Such potentially negative impacts, Kerr concluded, are more than offset by the likelihood that an alliance of campus, industry, and commerce would:

– enhance higher education as an important engine of economic growth;
– increase public support for higher education;
– engage academics in the real world.

Higher education cannot escape its role as a crucial economic force in our nation and our state, as it is in Europe and around the world. Cal is proud of the fact that it contributes mightily to the economic vitality of the Bay Area, California, and the United States.

This is nothing new. In its early years, U.C. worked closely with farmers. We built an agricultural industry in California that still leads the nation. More recently, Bay Area universities blazed a trail in aerospace, telecommunication, Web technology, and biotechnology. California's biotech industry is now number one in the world.

By mounting world class efforts in engineering and computer sci-

ence, Berkeley and Stanford enabled California to lead the information revolution. RISC chip technology developed at U.C. Berkeley has contributed billions of dollars to the state economy. Without its campuses, California could never retain its dominance in the American economy.

Economists at Berkeley have proposed a New Growth Theory which argues that half of America's economic growth since World War II is the result of investment in research and development. R&D increases productivity, and increased productivity is the key to higher living standards and stronger economic growth.

Initially, many people disputed the New Growth Theory. Now, it is becoming widely accepted. A corollary of the New Growth Theory posits an echo effect. When government invests in basic research, business gears up and spends more for applied research. The reverse is also true. When government cuts public funding, corporate wallets snap shut.

Campus research as an adjunct of national policy – and funding – is hardly new. In the 1950s after Sputnik was launched and the cold war heated up, federal money flooded into university research. I was a beneficiary of that great growth. But as engineering enrollments swelled, long established ties to industry withered away.

Now, universities are rediscovering their links to industry and developing new avenues for technology transfer. They want to make sure that ideas developed in campus labs find profitable application in the private sector.

Biotechnology is an example of the new paradigm. The industry was born in California in the late 1970s when a team of researchers from U.C. and Stanford spliced the first gene. Now it is a U.S. $13 billion industry, and a third of all the biotech companies in America lie within a half hour drive of a U.C. campus.

U.C. scientists started the three largest biotech companies in California. With 7,000 employees, they make half of all biotech sales in the United States – U.S. $3.7 billion.

This didn't happen by accident. And it didn't happen because money was driving the research agenda. Biotechnology depends on world class university research. Our faculty, our students, and our labs are their life blood.

The communication revolution that is sweeping the world is built on

a foundation of new technology funded by federal research grants and carried out on state supported public campuses and in private universities. The Internet was first funded by DARPA (Defense Advanced Research Projects Agency).

Like other recent revolutions, it depends on close ties between campus and industry. The half-life of high tech products is getting shorter and shorter. The turnaround time for new products has shrunk so dramatically that the distinction between pure research and product development has virtually disappeared. Most scientists now disparage the difference between basic and applied research. There is, they say, little difference between the two. We need to be a little more flexible in our thinking. Academics are not always known for their flexibility.

Whatever the distinction may be, research is the base on which high tech companies are built. The sooner an entrepreneur can get a look at our work, the better. And the sooner professors begin to think like entrepreneurs and adopt a more risk-taking approach, the better. Cutting edge companies depend on a constant flow of talent and ideas to develop new products.

At Cal, our most important contribution is not a product or a process or a patent – it's people. Businesses want their people on campus, in the labs, at the bench, working with our people as they develop the next generation of technology. They want to meet our graduate students. They want to get an early line on the rookie scientists who will become the stars of tomorrow.

Industrial funding is moving up the research stream. Companies want to collaborate. American business and foreign concerns know the university has an important role to play in basic engineering research.

Some of the most creative experimentation now underway has to do with how the university and industry relate. As the hunt proceeds for the ultimate prototype, people are becoming convinced there may not be a single optimal paradigm – no one size fits all research models.

At Berkeley most of our private funding comes through consortia. A group of faculty identify a group of companies that might be interested in their research. The companies pay from U.S. $5,000 to U.S. $500,000 to join a consortium.

They get demonstrations, work with faculty, and meet our graduate students. Their scientists and engineers spend time as visiting scholars,

working in our labs. We have more than a dozen consortia operating on the Berkeley campus, and no two are alike. The sole similarity is that they all adhere to the basic academic model. There is little concern about secrecy. No limitations on publication. Everything our consortium members see and hear is in the public domain. This is a totally transparent process.

What they want – and what we provide – is early access to research. In fast developing fields, six months is a lifetime. Some companies cut in-house research and buy into consortia to gain access to talent, facilities, and support that would be prohibitively expensive for all but the largest commercial concerns.

All the best research universities have industrial associate programs, technology licensing agreements, industrial affiliates, consortia, and a host of other collaborative instruments for industry. The programs, and the technology they spawn, are increasingly decentralized. At Berkeley, private funding for research has grown from a very small portion 20 years ago to more than 20 percent of our current research budget.

While we share some of the concerns about cuts in federal research funding to balance the budget, we see a shift in research funding rather than an overall cutback. Some research areas recede, others grow. New fields emerge, others disappear. Research is not a zero sum game, but universities must be alert to stay at the cutting edge.

University presidents and chancellors must pay very close attention to their research portfolio. Instead of simply relying on individual professors to win research grants, they should have an overall strategy for acquiring research funding.

Many of the top research universities have experienced only minor funding reductions, while smaller schools have been hard hit. The better schools have newer facilities, more distinguished faculty, better students, and more assets of every kind. This is a major concern of the American Association of Universities.

As competition increases and resources shrink, the gap between first and second tier schools will grow. There will be “haves” and “have-nots.” The long-range implications of this flight to quality are unclear, but the process bears watching. I’m very concerned, not only about individual institutions, but about the general direction of the overall trend.

California is the place to watch. Science and technology generate more inventions, more jobs, and more profits in California than any other state and most nations.

At the same time, competition is growing, and nowhere more so than around the Pacific Rim. Japan will double R&D spending by the year 2000. Singapore will increase R&D spending by U.S. $2 billion over five years. And new collaborative efforts are underway among the ASEAN partners. I recently visited Malaysia where the government has made multimedia a national priority.

What can higher education do to respond to this array of challenges? We can start by going back to basics. We can rebuild the confidence and trust that underpins the relationship between higher education and the larger society.

We can remind people that federal funding for research is a basic government responsibility. That it is as important as health care, education, and the environment.

University presidents and chancellors need to develop an overall strategy for research direction and funding support. Too many universities take a passive approach, waiting for a famous professor to win a big grant.

The pace of change is swift and research trends shift very quickly. We have to be very careful about how external research funding affects our research agenda. If we don't have a research agenda, it is much easier for external funding to affect our work.

Private fundraising provides greater discretion. We are currently in the midst of a U.S. $1.1 billion campaign. And I tell our researchers, let me worry about the money. If this is the best person academically, we will find the money to hire him or her. If we don't have a well thought out research agenda, if we don't know where we want to go, we won't know how to get there. And we must constantly monitor our research portfolio and update our agenda. Berkeley has been a world leader in high energy physics. But we must ask ourselves if we have stayed with it too long. Are there other areas we should be exploring?

The question of big science versus small science also has to do with how well we manage our research portfolio. Regardless of the size of the project, we must be decentralized, innovative, and willing to take risks. We must provide discretionary support to professors who can't

get funding for their work. We must find seed money for high risk, high payoff projects.

We must devise new, innovative funding streams and mechanisms that are tailored to our research agenda. We must be open and aggressive in confronting the downside of industrial support and the dangers of commercialization. We must be willing to tell industry, we want your money, but we will decide what to study.

We must be constantly vigilant to the potential for misconduct. There will be problems, and we are very dependent on public perception to continue public support. Even the slightest hint of scandal in university research can be the kiss of death.

In the end, the key to an innovative and effective research program is to have a blueprint firmly in mind. Only if you have a very strong sense of where you are going and how you plan to get there can you avoid the hazards enroute. Careful management of your research portfolio will help get where you want to go.

The American Research University: Time for Some Course Corrections

Kenneth Keller

For those of us who have spent most of our adult lives involved in American higher education – and that includes essentially all of the American participants in this meeting – the current problems confronting our research universities seem a bit ironic, and certainly frustrating. Our sense – our correct sense – is that the history of the American university is a story of success, and there is an old, if inelegant, American adage: If it ain't broke, don't fix it. "So why the need for change?" our heads ask. And "why the lack of appreciation?" our hearts add.

The fact is, of course, that in the cold light of day, most of us do understand the problems, and if we didn't there would be many around to tell us that all is not well. The situation is one that an erstwhile colleague of mine, Harlan Cleveland – a person with a fine sense of irony – would describe as the need to deal with the consequences of success. That is, the need to recognize the ways in which our 150 year history has achieved so much that we have changed the face of American society and this new society, the new context in which we operate, requires adjustments to our old model.

The current situation – the crisis, if you will – is often described in terms of a series of issues involving money:

– rising levels of tuition that are particularly threatening to middle income families;
– inadequate research support made worse as faculty start-up costs escalate and federal agencies fund a progressively smaller fraction of good quality proposals;

– increasing infrastructure costs to maintain aging buildings and to keep up with new computer and communication technologies;
– the burdens of dealing with salary issues and the rapidly growing expense of fringe benefits in budgets in which 70 to 80 percent of expenditures are associated with personnel;
– the pressures to balance the federal budget in a political environment in which funding for education and research is in the unhappy position of being among the few categories where spending can be adjusted, that is, reduced.

However, as serious as these issues are in themselves, they are really symptomatic of more subtle problems. For that reason, dealing with the symptoms alone – that is, the financial problems – is unlikely to cure the underlying ill. Indeed, there is a strong argument to be made that the current situation arises, at least in part, from having allowed the process of budgeting to become the *de facto* substitute for planning in many of our institutions. We have struggled with, and continue to struggle with, trying to reverse the order, to institute planning processes that guide budgeting. There are signs that we may be making progress, albeit very slowly. Certainly, the notion of setting priorities and making choices among our programs, rarely discussed as recently as two decades ago, is now a much more common theme.

But how to approach planning, how to think about the future of the research university, is no easy task. It must grow out of an appreciation of our history – even a celebration of it – a hard analysis of our present, and some creativity with respect to our future. In my remarks today, I would like to touch on each of these three aspects.

The American research university had its modern beginnings in the mid-19th century. It owed much to the then growing English tradition of education for social purposes – to serve society – and to the German model of what we have come to think of as graduate education and research, so well exemplified by the von Humboldts and the University of Berlin. But though it grew out of those two traditions, its special themes and its energy were distinctly American.

As early as 1781, Thomas Jefferson had set forth a vision of an American university reaching out to educate large numbers of young people. He spoke of institutions of higher education that would "... avail the state of those talents which nature has sown as liberally among the

poor as the rich, but which perish without use, if not sought for and cultivated." That dual theme of broad social purpose – raising up those who were talented enough to benefit from higher education, regardless of social class, and serving the state by providing it with an educated citizenry – was reinforced and given tangible support by the Morrill Land Grant Act of 1862 through which grants of federal land were made to the states to establish institutions that would "... promote the liberal and practical education of the agricultural and industrial classes in the several pursuits and professions of life."

Mr. Jefferson's vision and the Land Grant Act became guiding principles, but the form that the research university took continued to evolve through the second half of the 19th century and the first half of the 20th century. It was shaped by a number of developments at both public and private institutions which, although different from each other in some respects, overlapped significantly in their purpose and form, particularly at the graduate level. There is little doubt that these developments contributed to the success of the American university; it also planted the seeds of some of the problems we face today. It is worth reviewing some of the key events:

– Yale University's granting of the first American Ph.D. degree in 1861 was the first step toward the modern university. It was a step taken quite grudgingly by a faculty that saw little value in research.[1]
– The 1860s and 1870s saw the financial stabilization and expansion of many new state universities, particularly in the Midwest, with the support of the Morrill Land Grants. The political rhetoric and support emphasized the role of these institutions in practical education, but the Land Grant Act itself recognized that proper practical education required a grounding in "... scientific [and] classical studies."
– Professional education entered the picture in 1868, when Ezra Cornell established his university with the marvelously entrepreneurial promise to offer "... any person instruction in any subject."
– During the 1870s, Charles Eliot, at Harvard, relaxed the rigidity of

1 Some years later, Timothy Dwight, president of Yale at the turn of the century, described J. W. Gibbs, a Yale theology professor in the mid-19th century (and father of the great physical chemist) as "... a scholar of the German order ... who had landed on American soil a little too early to be understood."

undergraduate education by introducing an elective system. Not only did this allow a broadening of the curriculum, it made it possible to teach courses at several levels – the beginning of sequences and specialization, and, one might add, curricular debate.

– It was not until 1876 that graduate education on the German model got a strong foothold with the establishment of Johns Hopkins University – and with it, the beginnings of tension between undergraduate and graduate education.[2]
– In 1887, the Hatch Act provided the first significant federal support for research – through the agricultural experiment stations – and with the exception of some special efforts during World War I, it was the last real expansion of the federal effort until the middle of the 20th century.
– The University of Chicago in 1892 formalized the notion of academic disciplines by organizing its administrative structure around a set of departments. The discipline-centered structure quickly became the norm throughout the country.
– Research in American universities received its major boost in the closing days of World War II, when Vannevar Bush delivered his report, "Science – The Endless Frontier." The ultimate acceptance of his recommendations, and the creation of the National Science Foundation in 1950, established the pattern of American research – investigator initiated, peer reviewed grants, given primarily to university faculty. Today, about 50 percent of all basic research in the United States is carried out by faculty at our 100 research universities, and about 80 percent of the support for university research comes from the federal government.
– And if there is a last important milestone to be mentioned, it is the launching of Sputnik in 1957, which led an alarmed government to expand opportunity in all aspects of higher education – more students, more faculty, more support for graduate education, for research, for new academic programs, and even for new institutions. The motivation and the justification for the 25 years of growth

2 Henry Rowland, Professor of physics at Hopkins, when asked what he intended to do with undergraduates in the laboratory, responded, "Do with them? Do with them? Why, I shall neglect them!"

that followed the event are captured in the title of one of its key pieces of legislation – the National *Defense* Education Act (italics added).

The success of the system of higher education that grew in this way is obvious in the numbers. About 35 percent of the world's research publications have American authorship. A higher percentage of Americans have college degrees today than had completed high school in the first decades of the 20th century. The number of college students has risen from 140,000 in 1894 to 14.4 million in 1995. And the amount spent annually on higher education has grown from U.S. $675 million as recently as 1940 to U.S. $213 billion in 1995 – an amount that approaches the size of the U.S. defense budget.[3]

But there is another side to such figures. With higher education now spending almost 3 percent of gross domestic product, universities are subject to much greater scrutiny than ever before – and calls for accountability. It is a new situation – new for the public that demands it and new for the institutions that are subjected to it. With the end of the Cold War, the easy justification provided by the needs of national defense in a bi-polar world is no longer available. With the growth in the sheer numbers of postsecondary institutions, the unquestioned role of research universities has now been opened to question.

Complicating the situation further, there is an obvious tension between the need for institutions to be, on the one hand, accountable and, on the other, autonomous. If universities and their faculty are to serve their proper function, they must be free to be critical of society, to define the problems they choose to address, to restructure the curriculum as new knowledge is produced. Universities are in the ambiguous position of being part of society and, at the same time, separate and independent.

At this point, neither the principles of accountability nor the limits of autonomy have been well-developed. Clearly, the society that estab-

3 Of course, U.S. postsecondary education today consists of much more than the research universities that are our focus at this meeting. In the late 19th century, those universities represented the overwhelming majority of all institutions of higher education. Today, the research universities – about 100 in all – are a small fraction of the nation's 3,700 postsecondary institutions, which raises academic concerns about their appropriate role and political concerns about their diminishing influence.

lishes and pays for universities ought to have a role in setting their goals. But goal-setting is often confused with much more comprehensive control as various constituencies seek a role not only in specifying what society needs or wants of universities, but precisely how those goals are to be met: the shape of the curriculum; faculty hiring (and firing); academic standards; teaching loads; and the balance of teaching and research.

Furthermore, as the table shows, there are many constituencies to assert these prerogatives. Funding for American universities comes from many sources – and each, regardless of share, tends to assert majority ownership.

Table: The Sources of Support for American Institutions of Higher Education (1989 figures)

Source	Billions	Percent
Federal Government	U.S. $17	12
State Government	U.S. $38	27
Local Government	U.S. $4	3
Tuition & Fees	U.S. $34	24
Sales & Services	U.S. $31	22
Gifts, Grants, Contracts	U.S. $8	6
Other	U.S. $8	6

On the other hand, faculty have often mistaken autonomy itself for institutional ownership. In planning and governance as well as in public statements, valid assertions about the importance of the faculty to the quality of the university sometimes appear to be dismissive of at least the rights and, on occasion, the interests of the public.

This conflict between accountability and autonomy might be less problematical if all of the things that we do were rationally justifiable in current circumstances. But that is far from the case. Institutional organization, curriculum, faculty workload, the length of the school term, even the hours in the day that we teach, are determined more by history and habit than reasoned argument. Which leads, of course, to embarrassingly inexplicable differences between institutions and even within institutions: for example, in the difference between the teaching

expectations we might have for a biochemist on our medical faculty and a biochemist in a college of arts and sciences; between the rewards and "perks" we provide to a professor of operations research in an engineering school and his or her counterpart in a business school.

That these differences are difficult to explain makes us no less assertive in their defense. My own institution, for example, recently debated the advisability of switching from a quarter system to a semester system. Clearly, a transition of this magnitude is a major administrative undertaking, perhaps not worth the effort. But it is difficult to argue, as many did, that a semester system would be an academic disaster that would destroy the coherence and flexibility of the curriculum, when some 80 percent of postsecondary institutions in the U.S. have long used that system!

These issues are not the large ones that confront universities; we have long lived with such quirks. But in an era in which we are subject to great scrutiny, they tend to lower public confidence in us. Moreover, the same habits and history that give rise to small irrationalities make it difficult for us to confront what are serious and substantive issues; the issues that lead me to suggest that it is time for us to make some course corrections in steering American research universities into the future.

As I implied earlier, the problems that I believe require attention in many respects were there at the beginning, inherent in the very structures that made for the success of the research university. They have gotten more serious over time, as higher education has expanded and as political, economic and demographic circumstances have changed. They need to be addressed, but because they connect to our successes as well as our failures, they do not admit of easy solutions.

There are four areas in particular that loom large as we think about our future:

Undergraduate Education

Undergraduate education suffers from disagreements over what ought to be taught, to whom it should be taught, and who ought to teach it.

The mid-19th century debate that pitted the supporters of "liberal

and classical education" against the proponents of "practical education" has not diminished over time, although it has become somewhat more confused. The great expansion in enrollment in postsecondary education that followed World War II was driven by the conviction that a "college education" would provide upward mobility. Ironically, the college education that seemed to correlate with economic and social status was a generalist's education of the kind provided in liberal arts colleges, both the free-standing variety and those attached to research universities. Nevertheless, this new wave of students (and their parents), assumed and expected that their university years would give them a profession, if not a vocation, and as universities opened their doors wider, they responded to the new demands by introducing new "majors," more specialized, more practical, more marketable.

In the 1960s, a further complication was introduced. Universities were called upon to be explicit agents of social change, indeed, laboratories of social change. Although the notion of introducing social values into education was not as foreign to the history of the American university as its critics claimed, the sometimes wholesale restructuring of the curriculum, from admissions criteria to graduation requirements to course content and course distribution, was quite far-reaching.

Each of these themes – liberal education, job oriented training, and social change – might well be a legitimate goal for undergraduate education. However, to accomplish them all simultaneously is quite difficult – and made more so because the debate about curriculum usually takes place without any clarity about which of the goals is being pursued. Clearly, the situation must be sorted out, perhaps by recognizing that not all schools need choose the same direction, thus providing focus and choice for prospective students. At the very least, it might help to define the "terms of reference" for the debate that is occurring both inside and outside our universities.

For research universities, and particularly public research universities, there are at least two other important issues. The first is how to interpret the "land grant mission" in the late 20th century. At the time of their creation, the land grant schools represented the only opportunity that large fractions of the American population had to pursue higher education and their commitment to provide broad access and comprehensive instruction was, indeed, a noble one. Now, although land grant

schools continue to be important in providing education for substantial numbers, there are many other institutions that also serve that public purpose, and the same undifferentiated commitment can be interpreted as implying that no one else can do it as well; an assertion of privilege rather than of obligation. Therefore, land grant institutions need to rethink their undergraduate teaching mission with due regard to the other opportunities available to prospective students.

This latter point raises the other important issue: What kind of undergraduate education are large public research universities in the best position to provide? It seems unlikely to me that they will ever be able to offer students the nurturing environment of small liberal arts colleges or community colleges. Furthermore, there are other institutions that can provide those undergraduate programs requiring little specialization in a more cost-effective way than can our research universities. What these latter institutions can do is draw on their research strengths to offer programs that others cannot; programs that offer a much greater breadth of courses, that allow students to customize their programs, that include significant research opportunities, that use graduate students to provide near-peer mentoring.

To move in this direction (as some are now trying to do), two obstacles will have to be overcome. First, although these kinds of undergraduate programs would, when combined with those available at other kinds of institutions, offer students the greatest choice and thus serve the public good, they are certainly not the least expensive. For institutions committed (or forced by public, or at least legislative, pressure) to a market model, they are difficult to justify. Second, these are programs that require the active engagement of faculty, that require a focus and commitment by research oriented faculty on an undergraduate teaching role.

And, of course, that runs counter to the culture and history of our institutions.

The Research/Teaching Model

Research universities have long been subject to complaints from those outside the institution that faculty spend too much time on research, too little time in the classroom. It has been a popular theme for state legislators and the topic of successful, if uninformed (and uninformative), books and magazine articles. It is also, as many of us know, a highly oversimplified conclusion that ignores the real efforts involved in teaching at the postsecondary level or the advantages of integrating teaching and research.

On the other hand, I believe that, as valuable as the teaching/research model has been, it does have flaws which have been magnified in recent years. We usually describe the model as one that gives rise to a very useful synergy: Research enriches teaching and teaching enriches research. On closer examination of the argument and the practice, however, the relationship appears to be rather more asymmetric than the claim would suggest. Research does, indeed, enrich teaching as faculty members active in research bring their interest, enthusiasm, and familiarity with the current state of their fields to the classroom.

But the enrichment in the other direction is less obvious. Indeed, the strongest argument made is an economic one: Undergraduate tuition helps to support faculty lines and graduate assistants help keep undergraduate education costs down (and do a good deal of the work as well). The actual teaching, usually in one's discipline – indeed, most often in one's specialty – most often at an upper division or graduate level, is not inherently broadening or enriching for a faculty member's research. Graduate thesis advising, at least in the natural and engineering sciences, does provide for useful research collaborations, and that is certainly positive.

If the issue were merely that the linkage between research and teaching is asymmetric, it might be of minor importance. But I believe the arrangement has developed a rigidity that is more deeply problematical. First, it has imposed very severe constraints and inflexibility in hiring decisions. It is not possible to hire faculty to explore new, ripe areas of research if there are no retirements in the same discipline or if undergraduate enrollment in the discipline is not increasing. The reverse is true as well: Increasing student numbers in a field necessi-

tate hiring additional faculty even if it is not warranted by the vitality of the research field.

The dependence of faculty in the natural and engineering sciences on graduate students as research collaborators leads to a further problem. The production of Ph.D.s is linked to the needs of research rather than the need for new researchers. A number of commentators have expressed concern that this is leading to overproduction of Ph.D.s who are either unable to find research positions or, once having found them, are unable to garner the federal research support necessary to be productive. The response often made to such comments is that people trained to the Ph.D. level in the sciences can find other useful occupations after graduation. Even if that were true, it is a weak justification for an expensive system and it adds to the tensions over accountability.

It seems to me that we have reached the point where we should begin to experiment with ways of altering our research/teaching model. Some of that change may involve a greater use of post-doctoral fellows and professional staff in research, but by far the most interesting is the possibility of relaxing the rigidity of the teaching research connection. I believe we should be stretching scholars to undertake teaching in subjects somewhat removed from their specialties, in certain instances even reaching beyond their fields. Should it not be possible for chemical engineers to teach freshmen courses in calculus or in physical chemistry? Could microbiologists or biochemists not teach introductory biology? Could an East Asian scholar originally trained as a political scientist or historian not offer a general course in those other fields?

There may be other ways of approaching this relaxation of the model and, in most instances, it may be a question of being sensitive to opportunities. But there is an academic principle to be served in the effort as well as an organizational motivation in attempting this kind of stretching. Teaching at some remove from one's specialty, dealing with students not yet immersed in one's own discipline, may help to correct the asymmetry in the relation of research and teaching noted above. The need to place one's own scholarly work in a broader context, the exposure to questions that are often naive, but sometimes innocently penetrating, may indeed stimulate new thinking about one's own research.

Even if "field-hopping" is impractical in many instances, this argument suggests that there is much to be gained by having senior faculty

teach freshman courses while leaving the less demanding upper division and graduate teaching to those young faculty members just trying to establish themselves as researchers.

The Constraints of Discipline Based Organizational Structures

It was H. J. Mackinder, a leading figure in Geography at Oxford in the early 20th century who remarked that "All knowledge is one; its division into subjects is a concession to human weakness." The remark is two-edged; it recognizes, on the one hand, the cleverness with which human beings have (successfully) broken complicated problems into encompassable pieces and, of course, on the other hand, that the pieces are arbitrary in their division and need to be reassembled for true understanding to emerge.

Research universities have done well on the former, but struggle with the latter. Essentially all operate with departmental, discipline based structures. Faculty frequently feel a closer connection with their disciplinary peers in other institutions than with their colleagues on the campus in other departments.

This system has worked well in many ways. It has certainly produced good research, particularly of the kind that Thomas Kuhn called "normal science." It has served well in quality control, with disciplinary peers judging each other's proposals, papers, and accomplishments. And clearly it has produced an extraordinary system for graduate student education.

But it is not clear that it has served undergraduates with the same success. The undergraduate years should be a time of discovery, a time when students' horizons are broadened, when they come to understand different ways of knowing. Our rhetoric about undergraduate education stresses such themes: learning the intellectual skills of analysis; learning to connect values to action; appreciating the interrelationships among fields of knowledge. But the curriculum is organized around disciplinary departments that segregate information, that often encourage, even force, students into disciplinary specializations long before they have any real idea of their options or even the content of the fields they choose.

Ironically, there are even questions about how well the disciplinary structure can continue to work for research; or, more precisely, how well it can be expected to work in a world in which the rate of change of knowledge continues to accelerate. Jacob Bronowski and Arthur Koestler have argued that real creativity is not so much the discovery of new knowledge as the discovery of new connections, the kind of activity that occurs at the boundaries of fields.

Yet, in the structure of research universities, these have been the most difficult activities to stimulate and maintain. Generally, it has fallen to deans and university presidents to nurture and support multidisciplinary programs and centers. In the long run, this is not likely to be effective. Our challenge is to find ways to create "scholar-matrix" organizations – centers, institutes – that can survive without becoming new bureaucracies. The key, I believe, will lie in finding ways for disciplinary departments to have a sense of ownership of these enterprises, but accomplishing that remains a challenge.

Achieving Inter-Institutional Coordination

The U.S. has no overarching educational planning structure and no formally designated national universities. It depends on a loose federation of public and private institutions to meet many of its national educational and research goals. The feeling of kinship among these institutions – certainly among their leaders – is high, but the complexities of their funding (including the overlap of some of their funding sources), the competing demands they face within their own regions and constituencies, and the limited talent pool of faculty and students has led to cooperation in spirit but competition in fact.

There is much to be said for competition, but in this case U.S. institutions may pay a heavy price for it. To the public, it seems inefficient and in many respects it is, particularly in highly specialized fields. More than that, competition, combined with the kind of market models that universities are much drawn to these days, may actually lead to reduced choice for students and less effective outcomes for the nation. If universities compete where they see a market opportunity, and shy away from areas in which there are no rents to capture (as individual

institutions), it is the public good of student choice and generation of new knowledge that will suffer.

Good academic programs and good research programs require a critical mass – of faculty, of students, of resources (for example, special collections, equipment, local demography or geography or environment). That calls for universities to collaborate, to work together. Indeed, new developments in technology make such collaboration easier, but it can only happen where institutional structures will make it possible.

We have not reached that point. Moreover, because we function in a political environment, and because we are major beneficiaries of public financial support, even where competitive forces might be expected to lead to the emergence of those programs of the highest quality, it is not the case. Quality is only one factor in the political determination of resource distribution, and the other factors often work against the interests of research universities. Unfortunately, this reality has led some research institutions to "join them rather than fight them" and, at least until recently, the result is a continuing rise in "pork barrel" appropriations. We have yet to see what effect the congressional commitment to a balanced budget will have on this trend.

Pork barrel appropriations and inefficient competition are not without their costs. They are among the factors that appear to be giving rise to a diminution in the credibility of research universities – and perhaps higher education in general – in the eyes of the public and legislative bodies. A set of unrelated issues – intercollegiate athletic excesses, scientific misconduct, low student graduation rates, increases in undergraduate tuition, indirect cost recovery conflicts, even questions about unrelated business income – have clearly hurt us.

It seems to me that one route to regaining our credibility is to make the informal federation of research universities an effective and responsible institutional structure for cooperative planning and effective delivery of educational programs. It is a tall order, but there have been some small steps taken – by schools in certain regions, by institutions with strong commonalties – that suggest that it is not beyond the realm of possibility.

Conclusion

It is difficult for universities – either singly or in aggregate – to plan, to set priorities, to make choices. We are not well structured for it, perhaps because we have not been called upon to do it before. Ours has been a history of expansion, slow at times, rapid at times, but inexorable for almost 150 years.

In those historical circumstances, what made most sense was decentralization, placing authority where expertise was, leaving to scholars to define the new problems and the new directions. Furthermore, since the community of scholars was primarily the community of peers within a discipline but outside one's institution, there was even less basis for a community to be developed within an institution, that is, within a single university, as Clark Kerr noted wryly many years ago.

But, in my view there is no alternative to changing our ways, to learning to do precisely what we have not done before. In truth, most institutions in this country have recognized this reality. Most are trying to figure out how to do things differently. None is yet ready to declare success. The issues I've discussed today are among the most important we face, but certainly not the only ones, and other commentators might certainly organize them differently. Nevertheless, if we can deal with them, if we can alter our course without losing our way or forgetting why we started out on the trip, I think we can look forward to adding to the proud record and continuing to serve both the nation and the world.

The Ongoing Evolution of the American Research University

Cornelius Pings

It is a special privilege to have been asked to participate in this important gathering of university presidents from Germany and the United States. We will find in these several days that we face many challenges in common; I hope we can identify the common opportunities and solutions.

Your theme is the "University in Transition." This afternoon I will dwell mostly on doctoral education and its intertwining with research in the 100 or so major research universities in the United States. But I will need to do this on this occasion in the context of the entire higher education scene in this country. I wish to begin with a bit of historical perspective in order to emphasize that the research university in the United States is really a relatively young institution.

We might think of the history of our U.S. research university in four eras:

– the early years;
– 1860s to World War II;
– World War II to 1995;
– 1995 onward.

I will talk mostly about the two most recent periods but touch briefly on the first two eras.

Harvard was already 140 years old when the Declaration of Independence was signed; and although Yale awarded the first Ph.D. degree, this did not occur until 1861.

The Morrill Act was passed by Congress and signed by President Lincoln in 1862. That Act established the land grant universities and

launched a broad program in agricultural research, arguably the most successful applied research program in the history of man.

The National Academy of Sciences was chartered at about the same time. The AAU – the Association of American Universities – was founded in 1900 with 14 member institutions: Harvard, Yale, Columbia, Cornell, Johns Hopkins, Princeton, Clark, Catholic University, Stanford University, and the Universities of California, Chicago, Michigan, Pennsylvania, and Wisconsin. There were about 42 U.S. Ph.D. granting institutions in 1900; but these 14 were aggregated into the AAU.

By 1935–36, total annual research expenditures in U.S. universities involved about U.S. $50 million, of which about U.S. $6 million came from the federal government, mostly for agriculture.

By 1940, higher education was still a relatively modest enterprise in the United States. Only about 10 percent of high school graduates went to college – 10 percent! 80 percent of them attended private universities and colleges, although the land grant network already had strongly established the roots of an emerging public system. Most of those students were male and most were Caucasian. There was very little presence of individuals from minority populations, and although women participated significantly in undergraduate education, there were very few females in Ph.D. programs and virtually none in most of the advanced professional degree programs.

In 1940, the graduate education enterprise was correspondingly modest. The AAU, which had started with those 14 members in 1900, had grown to 33 members by 1940. There were at that time 299 members of the National Academy of Sciences. If you think about graduate education in 1940, you would probably note that it had been only about ten years since most serious, advanced students of chemistry and physics had gone to Germany for degrees or postdoctoral studying. Research was very much an activity of individual professors, with a graduate student or two supported largely by institutional funds, with a scattering of industrial support.

So, higher education had been slowly evolving at that point. It probably would have continued to evolve at that pace, but something happened: The nation went to war and the nation's colleges and universities were asked to change. And change they did.

Take a look only three years later, in 1943. The civilian educational activity had been almost entirely shut down and replaced by a massive program of training of military personnel. To this day, many of our colleges count among their proud alumni those who passed through officer candidate programs. But the faculty were not all the same as they were three years before. Many with backgrounds in science or engineering had moved to other campuses, such as MIT (Massachussetts Institute of Technology), or could be contacted only by way of a post office box in Santa Fe, New Mexico. They moved into group work, with legendary successes in atomic weapons, radar, electronics, rocketry, and propulsion.

But let's take another snapshot only four years after that, in 1947. By then the professors were back on the campus, and so were the students – in unthought of numbers. The GI bill had been signed by President Franklin Roosevelt in 1945. Some educators worried that this bill would debase university standards. Many politicians worried it would bankrupt the country. But higher education did respond. For example, the enrollment of Duke University nearly doubled in three years. Across the country dorms and classrooms were set up virtually overnight. And it would still be a rare campus you would walk through today without finding some remnants of the "temporary buildings" of that era. The program did not bankrupt the country: In fact, President Clinton last year said the GI bill's legacy was "... the world's largest middle class, and the world's strongest economy." Nor did the massive changes from 1940 – 1947 ruin higher education in this country or erode standards. To the contrary, we emerged with demonstrated capabilities to perform distinctive research and the capacity to educate a growing fraction of an expanding population.

Now let me fast-run this tape to see where we've ended up in the mid-1990s. Let me give you a few facts about higher education in the United States, and then comment on some important changes over these recent decades. Postsecondary education in the U.S. is a large enterprise today, carried out in diverse institutions. There are about 3,700 colleges and universities. You can get a different number if you include some of the vocational and trade schools. The enterprise includes large research universities, about half public and half private. It includes large state colleges, many small colleges – primarily devoted to teach-

ing, and mostly private; and many junior colleges, two-year institutions; and others. Collectively, these institutions enroll about 14.5 million students, with 67 percent of all high school graduates entering some institution of higher education. 10 percent in 1940, now 67 percent – how we have changed! And we have also changed by one other very important measure. College and university populations now include more than 17 percent underrepresented minorities and 55 percent women, who now also participate significantly in nearly all Ph.D. programs and most advanced professional degree programs.

At the advanced graduate level, almost 42,000 Ph.D. degrees are granted each year, 2,000 in chemistry alone. A small group of research universities, perhaps 80 – 100 depending on how you make the cut or define it, carry out a massive program of research in the pure and applied sciences. These institutions perform about 65 percent of all basic research done in the United States. There are now 62 AAU institutional members. There are 2,000 members of the National Academy of Sciences and there is a separate Academy of Engineering, which itself has 1,800 members.

I don't know what all of this costs, and I can't find anybody to give me a good answer, but my engineering estimate might yield somewhere between U.S. $200 billion and U.S. $300 billion a year spent by those collective institutions. If so, that is a perceptible part of the total U.S. economy – perhaps 5 percent. It is less than, but the same order of magnitude as, the annual outlays for health care, and you might take note of that.

In summary, higher education in the United States has grown, expanded, changed, indeed exploded, over the last 50 years. It seemed an ideal set of working relationships, did it not? Large numbers of students were educated and turned into the workforce. The nation's research got done, and everybody got a bargain because of the shared endeavor and the distributed cost. But something seems to have gone wrong, and rather abruptly so, over the last three or four years.

After 50 years of a Golden Age, what is special or different now? Here are what I sense to be the symptoms of unease. There are several; they are overlapping and they are reinforcing. First of all, most of the 50 states have moderated or even reduced annual budget appropriations because of economic hard times. Second, the private universities have seen a virtual revolt over tuition costs. On the research front, the

federal government is quibbling ever more about paying for the research it wants done on our campuses. And the chaos in the health care arena has thrown into question the use of patient care dollars as a source of support for research and teaching in our medical schools. In addition, there are parallel changes in the business and industrial sector – changes of unprecedented scale and rapidity in the size of companies' research endeavors and technical employment. Finally, a revolution in digital information technology both threatens us and offers new opportunities in the ways we teach and store and transmit knowledge. I will return for further comment on these several factors.

Another symptom of our times is that the media and opinion makers are increasingly calling upon colleges and universities to change. Change to what or why is often not made clear, but the pressure for change persists.

Now let me expand briefly on this pressure for change.

First let me comment on the elementary and secondary education system in the United States. I have spent some time here talking about the great success story of higher education, both public and private, over the last half-century. By contrast, the public K-12 system has been a disaster, a shocking deterioration of a once quite competent enterprise. I raise this here because almost all students entering our great universities come from the K-12 system, which is in disarray. Too much of the capacity of our college and university system is being devoted to remedial work or teaching the fundamentals of writing, mathematics, and global awareness.

I am observing that more and more of my colleagues in leadership positions at our universities are devoting time and resources to attempts at arresting the decline in that basic public education sector. Those are resources perhaps better spent on research and advanced teaching. But many feel that they have no choice but to try to help national and local leaders who endeavor to rescue this essential underpinning of education in the United States.

Back, then, to specific issues for our major research universities: There is growing concern about the stability of funding from the federal government for our research enterprise. As I noted earlier, most of the basic research in the U.S. is performed on university campuses. And most of the financial support for that research comes from the federal

government through appropriations for the National Science Foundation (U.S. $3 billion), the National Institutes of Health (U.S. $11 billion), and smaller but very important allocations for research in a variety of mission oriented agencies: the Department of Defense, the Department of Energy, and the Department of Agriculture. That pattern of support has gone on for years.

But we face a very threatening change, namely a broadly supported political commitment to balance the federal budget by 2002. That goal is embraced by both the White House and the Republican Congress. No sane politician today would speak against that goal, whether they believe in it or not.

If that budget objective is to be met, there will be great pressure to reduce spending on that part of the annual budget that contains almost all of the research programs.

We face an enigma. Is higher education still appreciated? Is research still a priority? The answer to both is yes. We have many friends and few if any enemies in the White House and the Congress. But there simply is not the money available that we had become used to, certainly not resources to feed the open ended expansion that fueled the growth of higher education and research from 1945 through the early 1980s. The 50 state budgets have been constrained also, and may be under increasing pressure as the federal government shifts burdens, particularly for welfare, to the state level.

Higher education and research remain strong priorities, but we face the possibility that total available resources will be shrinking.

On another financial front, our universities are under increasing pressure to moderate costs to our students and families – a great outcry, mostly from the press so far, to do something about the charge we make for tuition and fees.

Many of you may have seen the cover story in last week's "Time" magazine accusing colleges and universities of "gouging" students. I do not read "Time" magazine, but I am told that article was hysterical and incomplete. It particularly ignored the recent moderation in tuition prices and seemed to reflect little awareness of the significant cost savings that have been realized on almost all campuses in the last five years or so.

One could dismiss such articles as simply irresponsible journalism,

but I don't think that will make the problem go away, or lead to better understanding.

All of higher education in the United States is critically dependent on the income stream generated from tuition fees. Even the well endowed private institutions could not operate without tuition income. As a community we have to do a better job of explaining our financial operations before we entice a political intervention which would seek to regulate or limit our sources of income.

Let me turn to graduate education, particularly at the Ph.D. level. I wish to touch upon three prevalent myths:

– Human Bondage;
– Too Many Is Not Enough;
– Broad-Based Specialist.

The myth of Human Bondage derives from the alleged oversupply of Ph.D. recipients. Whether we have too many Ph.D.s, in total or in some fields, will continue to be debated. That should include several questions, including what does "too many" mean, who will decide, and if so, what should be done. There are occasional suggestions of some kind of rationing or other controls on input. The latter gives me great pause. I spent 46 years on several campuses as a student, faculty member, graduate dean, and provost. In that time and since, I have never heard of a single case of an individual being forced into a Ph.D. program against his or her will. Mind you, as Graduate Dean at Caltech I had to cope with several instances of Ph.D. students claiming that they were being held captive by thesis supervisors. But students enter Ph.D. work of their own will. Perhaps they are sometimes underinformed or hold unrealistic expectations about ultimate career paths. But no one is being taken unwillingly into bondage.

The next myth of Too Many Is Not Enough also stems from the presumed oversupply phenomenon. We are being told at numerous conferences variations on a theme that run something like this:

– there are unemployed or underemployed physicists, many U.S. citizens;
– there are large numbers of students from abroad resident in U.S. graduate schools;
– we should reduce the number of foreign students and increase domestic participation.

It is not clear, to me at least, how restricting access to students from abroad will lead to more domestic students entering graduate work. And if it does, how does that help the oversupply problem?

There is a parallel theme, namely, regardless of numbers, we are undermining the U.S. advantage in the marketplace by training foreign students at an advanced level and then sending them home to help build competitive economies.

There must be some truth in this concern, but it appears it is swamped by an inverse brain drain – many of the best foreign students stay here and build our R&D capacity and increasingly populate science and engineering faculties in our universities.

Let us turn to the myth of the Broad-Based Specialist.

The Ph.D. degree has always been a research degree, and recipients presumably have successfully done research on a specific problem and solved it or elucidated the surrounding body of knowledge.

For years industrial firms have sought graduates of our advanced programs, probably for two reasons:

– There was a tacit screening process that assured that they were hiring a bright and diligent person.
– They also were hiring someone who had shown capacity to identify a problem, work independently, and get a solution.

But in the last three years, there has been a growing complaint from industry that our degree recipients, particularly at the graduate level, are too narrow and do not work well in groups.

The COSEPUP (National Academy of Sciences) report a year ago jumped on that theme and toyed with some recommendations, such as:

– Be less focused on a single problem.
– Have a broader base of information and knowledge.
– Be better able to work in teams.

Hence my myth that we are being enticed to change our Ph.D. programs so that we turn out the Broad-Based Specialist.

Reality: There are too many Ph.D. programs.

I am not going to belabor this one. But I ask you to take another look at the National Research Council report, released in 1995, on quality and ranking of Ph.D. programs.

In most fields there is a stunning number of programs offered na-

tionally. Many are marginal in size; many lack distinction – or even are of suspect quality.

Is it not time for review and consolidation? If resources are indeed constrained, we need to focus the dollars and the human talent where they will have most impact.

Then let me get to my last story, which is in a somewhat different category, namely, our interaction with industry. Things are changing and I see both opportunity and some real dangers.

During the 50-year postwar growth of the research universities, there was a parallel emergence of stunning research and development capacity in U.S. industry.

The best examples were the giants – the great research labs at IBM, GE, DuPont, Bell Labs, Mobil, RCA, and many more, large and small.

These labs did distinctive work both basic and applied. They hired our graduates, and they competed intellectually head-on with the best of our research universities. In the process they fed new discoveries and new technology into their own corporate world. And their sophisticated personnel were a magnificently efficient interface with universities and facilitated transfer of science and engineering from the campus into the corporations and to the marketplace.

Alas, almost all of these labs are now gone – victims of downsizing, mergers, and the worship of the quarterly bottom line. There are exceptions, notably in the emerging biotechnology industry.

There is an enigma in all of this. During this same interval of radical cutbacks in in-house industry research, U.S. high tech and medical technology companies learned the hard way that they had to be swifter and more effective in incorporating new technologies into products, new or revised, and getting them to the marketplace.

They simply had to be more effective in reducing the cycle time for turning new discovery into technology and for turning new technology into product development.

And there has been considerable success. Granted, we have lost some industries altogether – particularly in consumer electronics. But we have come back in computer chips, disk drives, automobiles, and steel; we have maintained dominance in airframes and avionics, some chemicals and plastics, and agriculture. And we are way out front in biotechnology.

But these gains are all ephemeral, and our position three years from now will start to slip if we lag at all in those cycle times for exploiting new knowledge and technology.

Why am I belaboring this in the context of the research university? Because having pulled way back on their in-house research capacity, many companies believe they can continue to compete by acquiring much of the necessary new knowledge from the major research universities. Hence my myth of Just-in-Time Knowledge.

For industry I believe that this approach is fraught with *naiveté* and presumption. For universities this presents both opportunity and some considerable danger.

I expect that the campuses will be confronted with an increasing number of requests to take on research sponsored by individual companies or industry groups. At first look that may seem very appealing, particularly with a leveling of research support from the federal government. But you had better hope that the relationship will be as enlightened.

By and large, the federal government has been an ideal patron for university science and engineering. Funds were competitively available and they usually went to those with the best proposals. The government did not expect anything more than avid pursuit of the promised research and prompt publication in the public domain. Furthermore, any patents that happened to emerge were assigned to the university, including the right to a profit if something eventually went to the marketplace.

Most industrial relationships are not likely to be so favorable. The company will want its Just-in-Time Knowledge and probably will want it on an exclusive basis.

So I would not discourage good match-ups. These can even be pedagogically advantageous, especially in engineering.

But here are my cautions for both sectors:

1. Make sure that what faculty and graduate students are doing is really research.
2. Avoid testing and job-shop contracts.
3. Insist that the work not be done in secret; we must sustain an open intellectual atmosphere.
4. Beware of constraints or delays in publication, release of theses, or scheduling of thesis exams.

5. Insist on reasonably shared positions in patents and licenses.
6. But do not let your faculty turn into patent whores.

There are several forces contributing to yet another factor, one of frustrated expectations. The baccalaureate degree from a U.S. university has become essential to compete in an information age, but it no longer is an assured entry ticket to a stable and rewarding lifetime career. And finally, there's a force we need to acknowledge that transcends the universities but surely touches them, namely, a growing cynicism, even antagonism, towards established institutions – towards government and politicians, the church and the clergy, the university and its faculty and officers. Beware, indeed, if you are in an institution that asserts some claim to excellence or quality or leadership; watch your language or you will be accused of arrogance.

I have only two more major issues to mention. The first of these is the matter of tenure. I will deal with this only in passing since Dr. Peter Magrath just two weeks ago published a provocative article on tenure in "The Chronicle of Higher Education." If he does not raise it in his remarks, you may wish to engage him on the issue in the discussion period. I only want to contribute my personal greatest concern: Our system must evolve so that we assure we continuously bring young people into the faculty ladder each and every year. We cannot afford a lost generation of new scholars.

The second final issue I want to raise is the revolution in digital information technology. I use the word "revolution" advisedly, for changes that have been promised or prophesized for 20 years are now suddenly upon us in 18 months. We have been changed and will be changed rapidly in ways not now easily predicted. Yet we are dealing with immense opportunity and change.

So I have attempted to set the research university in context. Although I reached back a bit in history, it should be apparent that our current graduate education and research enterprises have largely evolved since 1945. And I tried to give you a sense that those 50-year old foundations are being shaken by forces not yet totally clear as to source, magnitude, or persistence.

Therefore, our lesson for the day might well be to note that this research university system which we admire and defend:

1. is not that old;

2. has no origins in the Constitution or higher authorities;
3. evolved and drew support because it served useful purposes; and
4. although successful, is probably even today not well understood by the broad public and by opinion makers.

May I then end with a thought of caution, if not contradiction.

Our universities are institutions of great stability and continuity. We have unique responsibilities in education and research, and at times we seem to be the sole seats of rational analysis and discourse.

We need to evolve, but let us change for good and known reasons, not at the whim and goading of political leaders. Indeed, let us change in order to secure our foundations as the locus of unfettered inquiry and discovery and as teachers of a new generation.

Development, Problems, and Reform Issues of the German System of Higher Education

Rainer Künzel

Introduction

The aim of this contribution is to provide an overview of the structure and development of the German higher education system and its funding. By sketching out the associated problems and the solutions currently being mooted, it is intended to explain the strong pressure for change the system is exposed to at present.[1] Many of the issues discussed will be dealt with in detail at the subsequent committee meetings of this conference.

Legal Framework

In the Federal Republic of Germany the *Länder*, or states, are responsible for the entire domain of education. In keeping with this federalist principle, the federal government for a long time exerted no influence at all on the development of higher education. Policies that had to be coordinated nationwide were, and still are, worked out at the level of the Standing Conference of Ministers of Education and Cultural Affairs of the *Länder*. Private money never gained a significant role in any segment of formal instruction in Germany.

1 See also Rainer Künzel, *Political Control and Funding – The Future of State Support*, German Universities Past and Future: Crisis or Renewal, forthcoming publication from Berghahn Books, Providence RI.

As the financial requirements of the expanding academic sector began to grow beyond the means of the *Länder* in the latter part of the 1960s, the German Constitution was amended to institute joint tasks of the federal government and the *Länder*, particularly in the field of education and science. Since that time the federal government has borne 50 percent of the cost of investment in building and research equipment for institutions of higher education. In addition it is involved in educational planning, in financing the German Science Foundation as well as non-university research institutes (such as the Max Planck Institutes, the Helmholtz Centers, the Fraunhofer Institutes and the so-called Blue List Institutes) and it provides 65 percent of support for needy students. As co-legislator of the basic legislation of 1976 covering higher education (*Hochschulrahmengesetz*), the federal government takes advantage of its legislative powers to make the individual states adhere to common guiding principles of postsecondary education. The main legal and financial responsibility for higher education rests, however, with the *Länder*.

The German system of postsecondary education is based on the notion of equal educational opportunity for everyone whose general qualification for higher education has been formally certified by school leaving examinations. Consequently, all establishments of higher education offer, as a rule, free tuition of (nominally) equal quality. The underlying idea of education and science as a public good not only implies public funding of and free access to institutions of higher education, but it assumes that the personal benefit to the individual is complemented by a benefit to society as a whole, which finds expression in effects on its productive and innovative powers, on its members' ability to participate in the democratic process, on their social and communicative skills and on their critical faculties.

Likewise, the predominantly tax revenue based funding of university research accords with its primary focus on basic research and on the essentially public nature of that research.

In point of fact, however, student admission is restricted in certain fields (e. g. medicine, pharmacology, biology, psychology, etc.) and there are more or less pronounced disparities in the quality of education and research at the various German universities and colleges, even though basic regulations governing courses and examinations are laid

down jointly by the *Länder* and the higher education institutions in order to maintain equivalence in terms of comparable formal requirements in the various courses of study.

The quality of research is controlled by peer reviews if third party funds – be they public or private in nature – are involved, but the amount of research being carried out differs not only among departments but also among universities.

As the German higher education system expanded between 1965 and 1990, admission restrictions and disparities in quality tended to increase rather than decrease, even if one looks only at those higher education institutions which are modeled after the Humboldtian idea of the research university. However, the problems characterizing the current debate on higher education policy are primarily a consequence of too little rather than too much differentiation within and among institutions. Furthermore, these problems can only be ascribed to a limited degree to decreasing funding of higher education.

Development of the German Higher Education System

Western German *Länder*

In the *Länder* of the former Federal Republic of Germany the higher education sector has expanded greatly since the mid-1960s. The proportion of those qualified for admission to higher education in an age cohort rose from 8 percent in 1960 to 37.2 percent in 1994.[2] Since demand for higher education remained continuously high, the number of first year students therefore multiplied and the total number of students rose from 384,400 in 1965 to 1,676,100 in 1994.

State expenditure on staff and material resources and on higher education construction programs kept pace with this trend only until the mid-1970s. After that, growth in the number of first year students exceeded the rate of increase of funding threefold. In the period between 1977 and 1993, state expenditure on higher education actually

2 BMBF (Federal Ministry of Education and Research), *Grund- und Strukturdaten* [Basic and structural data] *1995/96*, Bonn 1995, p. 85.

decreased relative to gross national product by a total of 22 percent.[3] In the past three years the resources available have fallen by up to 20 percent owing to job cuts, bans on the filling of vacant posts, and state interventions in current budgets.

The consequence has been a steady deterioration in faculty/student ratios, in the space available per student, in the available material resources for teaching and study, and in the basic provision of funds for research. Uniform subject specific formulas for calculating maximum intake capacity, which has to be fully utilized given appropriate demand, have since then allowed only inadequate minimum standards of staff supervision for students.

The trend toward an increasingly advanced level of education is continuing in all *Länder* and it is therefore to be expected that the number of first year students will rise by over 25 percent by the year 2010. Even a significant reduction in the average length of study will not bring the total number of students throughout Germany down below the present level of 1.85 million.[4]

German Unification

As for the former German Democratic Republic, the number of first year students and of students in higher education as a whole remained stable from the early 1970s up until 1989. The opening up of access to the higher education entrance qualification, the *Abitur*, and to study in the higher education sector following German unification caused the number of first year students to increase from 32,000 to 42,000 and the total number of students from 130,000 to 200,000 by 1995. This trend is set to continue since, at 23.6 percent, the proportion of any one age cohort embarking on higher education is still well below that of the western German states.

After 1989 two problems had to be tackled: firstly, how to "de-indoctrinate" a greater part of humanities, social sciences, law and eco-

3 HRK (Standing Conference of Rectors and Presidents of Universities and other Higher Education Institutions), *Zur Finanzierung der Hochschulen – Dokumente zur Hochschulreform* [Funding of higher education], 110/1996, p. 5.

4 Ibid., p. 21.

nomics teaching at universities in the former GDR and, secondly, how to effect the institutional integration of the two academic systems.

This de-indoctrination process was carried out by examining the personal suitability of individual academic faculty members and by virtually rebuilding the ideologically warped disciplines from scratch. Institutional integration consisted, on the one hand, of converting and expanding numerous *Technische Hochschulen* (institutes of technology) into *Fachhochschulen* (colleges of professional studies) or universities and establishing new or re-establishing old higher education institutions and, on the other hand, of disbanding the Academy of Sciences – which resulted in considerable problems even for some of its skilled academic staff. A total of about 170 non-university research institutions have been established, of which 108 are jointly financed by the federal government and the *Länder* (predominantly as Blue List Institutes); about 40 are run as federal institutes and 20 as *Länder* institutions. Of the 140,000 employees of the tertiary sector, ultimately only about a third kept their jobs in the academic system. With the gradual expansion into Eastern Germany of the Max Planck Institutes, the Helmholtz Centers and the Fraunhofer Institutes, the academic systems of western and eastern Germany are starting to converge in the non-university research sector, too.

Relatively little additional funding was made available for renewing and integrating the higher education system of the eastern German states and it was provided only for a limited period. Under the higher education renewal program scheduled to run for ten years up to 1999, a total of DM 2.4 billion (U.S. $1.6 billion) was earmarked for this purpose together with an initial annual amount of DM 300 million (U.S. $200 million) for investment in construction and large items of equipment. This latter was, however, soon declared to be part of the rise in the total amount employed for the construction of higher education institutions in all of Germany. In particular, improvements to university buildings, student dormitories and dining halls cannot be carried out in the foreseeable future with the level of funding currently earmarked for building projects.

Institutional Structure of the German Higher Education System

In 1996 the German higher education sector was made up of the following number and types of higher education institutions:

	state/public	non-state/private
Universities	82	6
Gesamthochschulen (Comprehensive universities)	1	0
Pädagogische Hochschulen (Teacher training colleges)	6	0
Theologische Hochschulen (Theological colleges)	0	17
Kunsthochschulen (Colleges of art)	44	2
General *Fachhochschulen* (Colleges of professional studies)	96	40
Fachhochschulen for public administration	31	—
Total	260	65

These 325 higher education institutions offer 987,000 places at which 1,101,600 men and 754,900 women are studying. Of these, about 198,000 graduate annually, while 22,000 complete their doctorate. At 88,500, the *Fachhochschule* share of first year students is 33.2 percent; this is equivalent to 444,700 students or 24 percent of all students at German higher education institutions. The proportion of students at non-state higher education institutions is 2.7 percent.

The growth of the west German higher education system has occurred not so much because of the rising numbers of *Fachhochschulen*, the new type of higher education institution, but because of the considerable expansion of existing universities and the establishment of new

universities. The development of the university sector has not only been a consequence of rising demand for places in higher education and of the upgrading of institutes of technology into universities, but has also been a result of the integration of the formerly independent professional colleges. This applies especially to the teacher training colleges (with the exception of *Baden-Württemberg*), but also colleges of philosophy and theology, medical academies, agricultural colleges and higher education institutions for the study of economics and social sciences. Numerous colleges of art and music have obtained university status by gaining the right to confer doctorates and postdoctoral university teaching qualifications (*Habilitation*) and have modeled themselves on the academic ideals of universities.[5]

If one includes the approximately 2.6 percent of students who are enrolled at these special higher education institutions with university status or at the teacher training colleges in *Baden-Württemberg*, the university system bears about three-quarters of the educational workload of tertiary education. Universities are also responsible for postgraduate education. The courses offered are geared to the structure of disciplines which has evolved and, as the course progresses, increasingly stress the research element of teaching. Accordingly, university programs lead only to qualifications that encompass in all cases what are referred to in the U.S. higher education system as graduate studies. The standard recommended period of study leading to a *Diplom*, *Magister* or state examination is four to five years. However, the actual study period is usually much longer.

Holders of a good university degree are entitled to apply to take a doctorate, which is not usually linked to a prescribed study program. Structured postgraduate study programs are, however, offered within the around 240 postgraduate colleges (*Graduiertenkollegs)* approved and assessed by the German Research Society (*Deutsche Forschungsgemeinschaft*). Those who have gained a doctorate and wish to pursue a career as a university teacher must complete another major research project or several smaller publications and take another examination, known as the *Habilitation*.

5 cf. Wissenschaftsrat [Science Council], *10 Thesen zur Hochschulpolitik* [10 theses on higher education policy], January 1993, p. 13.

Adaption of the range of university courses to the diversity of academic disciplines does not rule out the possibility that particular study programs are intended to qualify for specific occupational fields – along the lines of American professional schools. This applies, firstly, to courses of study leading to the state examinations for doctors, veterinarians, chemists, lawyers and teachers of all levels and types of schools and, secondly, to architects and to some engineering professions and artistic specializations.

Universities and Institutions of University Standing

The concept of the German university remains based on the notion that the post of university professor embodies the unity of research and teaching. The term "research university" is, however, a pleonasm in German not only because combining teaching and research is fundamental to the work of professors and the vast majority of other academic staff but also because research claims the same status as teaching in terms of the university's institutional tasks. This places demands on the required provision of laboratories, libraries, research equipment and staff. Through the resultant costs in a rapidly expanding university system the issue of how many of these, thus defined, "university" academics, courses or institutions Germany needs and can afford has been brought high up on the higher education policy agenda.[6]

Fachhochschulen (Colleges of Professional Studies)

Alongside universities a new and specifically German type of higher education institution, the *Fachhochschule*, emerged in the early 1970s as a result of the upgrading of what were advanced technical colleges for engineering, social work and commercial occupations. Their hour came when in the mid-1970s it turned out that the attempt to use *Gesamthochschulen* (comprehensive universities) to offer different educa-

6 cf. Wissenschaftsrat, op. cit, p. 17.

tional paths within one institution, following the North American model, had not been an unqualified success.[7]

The *Fachhochschulen* established themselves alongside the universities as institutions of tertiary education that were "different but (formally) of equal status" and at which the courses offered were more closely related to occupational fields than to academic disciplines. Although the state's academic policy promoted *Fachhochschulen* as an addition to the institutional diversification of tertiary education, their growth fell well short of demand because the expansion program for 27 new universities was already too far advanced to be revised without the danger of wasting considerable capital expenditure.

The aim of courses at *Fachhochschulen* is to convey vocationally oriented knowledge on an academic basis. Students are therefore required to obtain at least six months' vocational experience in the relevant field of study. The general higher education entrance qualification in the form of the *Abitur* is not a compulsory requirement for study at a *Fachhochschule*; those who have attended school for at least ten years, gained a school-leaving certificate and then completed an apprenticeship are also entitled to study at a *Fachhochschule*.

In Germany, 63 percent of all students earning a degree in engineering and 37 percent of all students earning a degree in business administration are graduates of a *Fachhochschule*. In addition, social workers, architects, agronomists, computer scientists, designers and a wide range of well-qualified professional specialists are products of a 3.5 to 4-year course at a *Fachhochschule*.

A special admission procedure allows those with exceptional *Fachhochschule* degrees to take a doctorate at a university. However, since the right to confer doctorates lies solely with the university, it reserves the right to determine the type and scope of the qualifications required in addition to the *Fachhochschule* degree, the rules relating to the assessment of the doctoral thesis and the execution of the oral examination. The supervising *Fachhochschule* professor merely plays an advisory role.

Professors at professional colleges must be suitably qualified academically, usually proved by possession of a doctorate, and they must

7 op. cit., p. 14.

also have held a senior post in the professional world for several years. Their considerable teaching load combined with the general lack of a staff and material infrastructure for research within *Fachhochschulen* means that professors there can carry out research and development work only to a very limited degree.

However, government expects them to at least engage in ongoing cooperation related to their teaching activities with institutions in the occupational field for which they train their students.

Funding of the German Higher Education System

Teaching

At present the federal government and the *Länder* jointly spend about DM 32.5 billion (U.S. $20.7 billion) on higher education,[8] of which DM 26.6 billion (U.S. $17.7 billion) goes to research and teaching at universities and university hospitals and DM 2.3 billion (U.S. $1.5 billion) to support for research and postgraduate studies through the German Research Society. An additional DM 3.6 billion (U.S. $2.4 billion) is made available for the support of needy students and for funding postgraduate work of particularly gifted students. Only about DM 450 million (U.S. $300 million) – less than 2 percent – of the resources spent on higher education comes from the private sector. *Länder* budgets provide 89 percent of total expenditure whereas less than 9 percent comes from the federal government's budget. The expansion of the higher education system (the university system) in the western German states in terms of the number of first year students in 1996 compared with 1977 came to 35 percent (23 percent); in terms of the number of graduates the rise was 53 percent (42 percent). Since spending on higher education institutions increased by only 17 percent over this period (in 1980 prices) and about 68 percent of university expenditure (excluding university hospitals) (64 percent of *Fachhoch-*

8 Statistisches Bundesamt [Federal Statistical Office], *Finanzierung der Hochschulen 1994* [Funding of higher education], Wiesbaden 1996, and Wissenschaftsrat, *Eckdaten und Kennzahlen zur Lage der Hochschulen – Stand: 1996* [Key data on higher education institutions], Cologne 1996.

schule spending) went on academic staff, this reflects a drastic deterioration in faculty/student ratios. Thus the ratio of "students per academic post at universities and institutions of university standing (excluding medicine)" rose in the period from 1975–1994 from 13:1 to 24:1 and at *Fachhochschulen* from 16:1 to 40:1.[9]

On the other hand, in connection with the growth in graduate figures, this is also an indication of a substantial rise in the efficiency of higher education institutions. In the past 20 years, the number of graduates has increased twice as fast as the number of students, albeit with a temporary increase in the length of study and an unsatisfactory success rate overall. Of the around 198,000 students graduating from German higher education institutions every year, 127,000 completed their studies at a university or institution of university standing in an average of 6.3 years. The 71,000 *Fachhochschule* graduates successfully completed their courses in an average of 4.2 years. Of the 65.6 percent of first year students who took up study at a university, about 30 percent left the higher education institution after an average of 5.2 semesters without a degree. This is either because they were unable to cope with the demands of study despite having changed course, often several times, or because they succeeded in entering the profession of their choice without a university degree. The average age of university graduates is 28 years and of *Fachhochschule* graduates 27.7 years. However, 32 percent of them (62 percent of *Fachhochschule* graduates) have completed non-academic vocational training before they take up their studies.

Research

Research in the higher education sector has been impaired not only by high teaching and examination workloads but also as a result of falling basic funding for universities relative to their expansion. Although universities nominally increased more than fivefold the third-party funds acquired for research purposes in the period from 1970–1993,

9 HRK, *Zur Finanzierung der Hochschulen* [The funding of higher education institutions], p. 11.

raising them from DM 630.6 million (U.S. $420 million) to DM 3.355 billion (U.S. $2.237 billion), the proportion of basic provision for research and teaching made up by this additional funding has fallen by over 25 percent.[10] At DM 14.9 billion (U.S. $9.5 billion), 18 percent of total public and private expenditure on research and development in the Federal Republic of Germany is devoted to research in higher education.[11] A shift of research activities to non-university research institutes has been a continuing trend for over two decades.[12] Despite the general expansion of the higher education system, university research capacity has been impaired due to a fall in the average basic provision of funds per professorship.

The development of higher education research in terms of content and quality has not been determined by society's need for research or by research specific performance criteria. Instead, the two main factors of influence were:

1. the subject specific allocation of resources according to student demand for places in higher education and
2. the principle of "incremental" funding universities on the basis of "historical expenses."

This has led to disparities in financial provision between large and small and between old and new universities and subjects, which cannot be justified in research or education policy terms. It has also meant that the principle of the unity of research and teaching is no longer so effective in safeguarding the quality of university output.

International Comparison

Comparative international studies carried out by the OECD also demonstrate that the funding of German higher education is, on average, inadequate. For example, a comparison between total expenditure on the higher education sector (including university grants) and gross domestic product for 1993 ranked Germany in 17th place among 21

10 cf. HRK, *Zur Finanzierung der Hochschulen*, p. 13.
11 *Bundesbericht Forschung 1996* [Federal Report on Research], pp. 531–533.
12 HRK, *Zur Finanzierung der Hochschulen*, p. 13.

highly-developed countries, and in a comparison of the proportion of total state spending on education, Germany actually came last. Whereas the average figure spent per student per year in OECD countries is U.S. $9,326, the figure in the Federal Republic of Germany is a mere U.S. $6,322.[13]

Problems and Reform Issues

Expansion, structural development and scarcity of resources have led to problems, the solution of which is obviously beyond the *ex ante* control of higher education exercised by the state to date. The following have been cited in the public debate time and again as being indicative of a system that has lost its way:

- courses of study which last one to three years above the international norm until the first professional qualification is gained;
- the relatively high average dropout rate of about 30 percent;
- at 30 percent, changes of course subject are too frequent and are usually carried out too late;
- lack of coordination between the range of courses of study and the "needs" of the labor market;
- underdevelopment of the range of continuing education courses in higher education;
- inadequate cooperation between higher education institutions and industry in research and development;
- the marked decline in the appeal of German universities to university applicants and especially to doctoral candidates from abroad.

Apart from the usual attempts to pass the buck for these functional deficiencies of the system back and forth between the higher education institutions and the ministries of science or between the *Länder* and the Federal Ministry of Education, there is one point on which those involved in the debate can agree: The root of the obvious problems was

13 OECD Centre for Educational Research and Innovation, Education at a Glance, *Bildung kompakt – OECD-Indikatoren* (OECD Indicators), Paris 1994, p. 64 et seq., quoted in HRK, Finanzierung der Hochschulen, p. 31.

the primarily quantitative response (in terms of study places and courses of study) to the rise in demand from 5–30 percent of each age cohort. The insufficient adjustment in terms of functional differentiation of institutions and programs of higher education must be regarded in turn as evidence of control deficiencies within the system, leading inevitably to the question of whether such shortcomings can be surmounted by fine-tuning of the long standing political and bureaucratic planning and control mechanisms or only by deregulation of higher education, allowing institutions to compete against each other as largely autonomous units.

This debate, which has been going on now and increasing in intensity for eight years and whose agenda is essentially determined by the Standing Conference of Rectors and Presidents of Universities and other Higher Education Institutions and the Science Council, albeit with positive contributions from individual *Land* ministries and working groups of the Standing Conference of Ministers of Education and Cultural Affairs of the *Länder*, has helped to publicize the view that the future effectiveness of German higher education will depend crucially on ensuring that higher education institutions are able to govern their own affairs within a reliable legal and financial framework. At the same time, there appears to be broad agreement that the relatively high level of qualitative homogeneity in the individual segments of the tertiary education sector should not be jeopardized by a transition to an open education market similar to the Anglo-American model. State influence, already exercised through the funding of higher education, will therefore continue to exist in the form of supply planning at the *Land* (system) level, determining the number, type and location of higher education institutions and the type and total number of places in higher education to be made available. In addition, the criteria for admission to higher education and the standard of academic degrees must be regulated nationwide to ensure that transfer between various elements of the system as a whole remains possible.

For this to happen, the further development of organizational law governing higher education institutions is vital. Only professional university management and deans with increased powers can meet the demands associated with competition between largely autonomous higher education institutions. This is especially true with respect to

the scope and responsibilities which result from across-the-board funding of higher education institutions based on input and output indicators.

Subsequently I shall summarize the problems regarded as crucial to the forthcoming reform of the German higher education system and the measures being discussed to resolve them. German participants in this conference will be raising some of these problems for detailed discussion over the next few days.

Admission to Higher Education, Structure of Courses of Study, Academic Degrees

The transition from a system devoted to training a relatively small elite to tertiary mass education necessitates changes to the rules governing higher education, the structure of the range of courses and the type of academic degrees offered.

Whilst general entrance examinations are widely opposed, a subject specific weighting of *Abitur* marks or supplementary aptitude tests for certain courses of study ought to increase the element of selection in the admissions procedure. Intensive counseling with tests in the first year of study and the compulsory use of intermediate examinations for all courses of study would help correct at an early stage inappropriate choices made by students. Admission to postgraduate courses of study should be tied to entrance requirements to be set by higher education institutions individually.

Doctorates which have not been preceded by a doctoral program ought to be conferred only in exceptional cases; the *Graduiertenkolleg* can be regarded as a model in this area.

Greater emphasis on modular courses of study, the awarding of credit points for course components and a comprehensive range of part-time courses are recommended for all subjects.

In order to ensure improved coordination between course goals and the abilities and preferences of course applicants and also to improve the international comparability of degrees gained from German higher education institutions, there are frequent calls for the first degree qualification to be taken at an earlier stage. To this end, undergraduate, grad-

uate and postgraduate studies culminating respectively in a bachelor's degree, *Diplom* or master's degree and a doctor's degree could be taken at universities.

Not only the vocationally oriented nature of study at the *Fachhochschule* but also the specific recruitment conditions for *Fachhochschule* professors and their, at best, incidental involvement in doctorate procedures underline the extent to which *Fachhochschulen* are "different." *Fachhochschulen* are not designed to be undergraduate schools for universities; therefore, they can tackle only to a limited degree the problems arising from the lack of university provision at the undergraduate level.

However, alongside courses of study leading to the *Diplom*, *Fachhochschulen* could offer vocationally oriented academy type programs allowing those employed to study while continuing to work, should the *Berufsakademien*, the independent institutions offering dual vocational and academic education, fail to become more widespread in the tertiary sector.

More extensive differentiation between institutions in the tertiary education sector is seen as a possible consequence of increased competition between autonomous higher education institutions, possibly resulting in the emergence of additional types of higher education institutions alongside the universities and institutions of university standing, *Fachhochschulen* and *Berufsakademien*. At the same time, the regional merging of higher education institutions of the same or differing types into higher education systems with a single administration might become an option for reasons of cost effectiveness.

In contrast to functional differentiation, however, the creation of a qualitative hierarchy among similar courses of study would raise the question of the legitimacy of using public funds to finance institutions or study programs of inferior quality.

Quality Assurance

Thus, great importance is being attached to the problem of quality assurance in a higher education system which continues to be primarily supply oriented.

In order to guarantee the extensive qualitative homogeneity of similar courses of study in a system of postsecondary study programs which is sufficiently differentiated in terms of type, objective and standards required, it is necessary to undertake periodic evaluation and accreditation of such programs.

The principle of the unity of research and teaching must be protected and enhanced by:

- periodic checks of the entitlement to teach independently and renewal only if evidence of successful research activities can be produced;
- rewarding successful teaching with the allocation of resources for a limited period and especially successful research with a short-term reduction in teaching commitments;
- tying salary and academic staffing levels to teaching and research activities.

Fachhochschule professors, too, should be obliged to become involved in research, development, and technology transfer in order to ensure that teaching is up to date and of a high quality. For this reason the level of teaching commitments must be reduced appreciably.

In order to monitor both the relevance of study programs to the employment system and the quality of study, regular surveys should be carried out into the whereabouts and professional success of graduates.

Within universities the establishment of centers of excellence for research and for the promotion of postgraduates should also be encouraged through vigorous intra-institutional research promotion and through the application of a targeted personnel policy aimed at establishing a distinctive institutional profile.

Centralized and Decentralized Control Instruments

In order to combine the tasks of quality assurance, the establishment of a distinctive profile and strategic development, individual higher education institutions require centralized and decentralized control instruments. However, these instruments can only be effective if the state refrains from bringing its influence to bear on the day to day deci-

sion making processes in higher education institutions through detailed legal provisions and discretionary interventions. Existing legal regulations at the federal and regional level must therefore be reduced considerably. This applies in particular to the state's powers of intervention with respect to budgetary and financial issues.

It is necessary to give a tangible expression to the state's funding decisions by supplanting the method of budget item specific funding with reference to "historical expenses" by across the board budgeting based on real costs, performance, and quality criteria. This is dependent on the development of a system of sophisticated input and output indicators and their valuation in terms of "prices," which are derived from representative studies of cost structures.

Additional resources must be allocated by the state in a competitive environment on the basis of public tenders and appraisals.

The introduction of tuition fees would also exert effective control, even if fees were set at a relatively low level compared with the costs of study and if the permissible range of fluctuation were kept small.

Despite the indisputable and desirable allocative effect of tuition fees and general acknowledgement of higher education institutions' difficult financial position, the debate in Germany has done little to counter widespread opposition to tuition fees. (Only "long-term students" in *Baden-Württemberg* are to pay a fee of currently DM 1,000 (U.S. $650) per semester after the 14th semester of study.) Two reasons were decisive in this regard:

1. It was feared that discriminatory interpersonal and intergenerational effects would arise since social clauses and/or adequate equalization of family burdens could not be guaranteed.
2. It was regarded as inevitable that basic state funding of higher education would be reduced by the amount raised from tuition fees, meaning that ultimately nothing would be gained.

In higher education, too, the use of financial incentives and sanctions serves to encourage effective control.

Use of instruments of this kind requires, however, the elaboration and updating of an economic plan on the basis of a system of cost accounting and the application of modern methods of operative and strategic controlling. In some federal states these modern control methods are being tested in pilot schemes.

Autonomous higher education institutions will only be able to manage their own affairs effectively if they can operate within a regulatory framework on which they can rely in the medium term. Therefore, contractual agreements on expected services and financing must take the place of the hierarchical command relationship between higher education institutions and the state.

Management, Self-Governance, and Personnel Policy

The ability to enter into contracts is dependent on the authority to act and take decisions responsibly. The necessary link between expertise, decision making powers and personal accountability is provided only to an inadequate degree by the present management and organizational structures at German higher education institutions. This applies both to the higher education institution's governing body and to departmental management. The independence of managing bodies must be consolidated and their sphere of responsibility extended. Enhancing the financial attractiveness of managerial posts is the prerequisite for ensuring the availability of a sufficient number of highly qualified people who will exercise office in a professional manner – and that means for a relatively long period.

However, executive action amounts to rather more than efficiency oriented managerial decision making. It must also help to strengthen the corporate identity and responsibility of all members of the higher education institution through communication and participation. If the university is to provide a positive example of an educational institution within a democratic society, professional management must be guaranteed without, at the same time, depriving groups within the institution of their specific rights of participation. These rights must, however, be restricted essentially to advisory and control functions.

From the point of view of linking authority and responsibility with competition as an effective control mechanism in teaching and research, the question arises as to the best possible organizational and staff structure for universities.

– Whilst the organization of research in research institutes or research groups has undoubtedly proved valuable, the organization of inter-

disciplinary study programs by departments or schools requires examination.[14]

– Competitive relationships within institutions are incompatible with the principle that careers must progress and standard remuneration rise according to a monotone function. Therefore, flexible arrangements should make it possible to adjust pay, staffing and contractual arrangements in a negative or positive direction, depending on the quantity and quality of the work performed and on the type and degree of responsibility held.

  When initially appointed, professors should not be granted life tenure automatically. On the other hand, the German ban on academic "in-house careers" should be relaxed by allowing in-house personnel to be awarded vacant posts as long as they compete favorably against external candidates.

Combating Underfunding

The reinforcement of higher education institutions' autonomy, competitiveness and ability to manage their own affairs are necessary yet insufficient measures for safeguarding the quality and efficiency of the system. The shortfall in funding within the German higher education system – recognized even by politicians – amounting to at least DM 6 billion (U.S. $4 billion) at 1993 prices[15] (i.e. 23 percent of annual net expenditure by higher education institutions in 1993) cannot be made good by improvements in efficiency. Unless this underfunding will be overcome, quality will suffer in the long-term. There are three ways of rectifying the situation:

– by increasing state and private sector expenditure on higher education institutions;
– by selling teaching and research services;

14 Hans Brinkmann, *Der Fachbereich als überforderte Grundeinheit für Lehre und Forschung* [The department – the overburdened basic unit of teaching and research], Wissenschaftsmanagement [Higher Education Management] 1/1996, pp. 11 – 18.

15 See Bund-Länder-Arbeitsgruppe [Federal Government-*Länder* Working Group], *Eckwertepapier zur Vorbereitung des vorgesehenen bildungspolitischen Spitzengesprächs 1993* [Preparations for the top-level talks on education policy], Section E, Bonn, May 5, 1993, p. 33 et seq.

– by reducing the range of services provided by higher education institutions whilst keeping expenditure constant.

Additional state funding which does not come from current tax revenue is possible through the conversion of state assets into academic foundations (e. g. the *Volkswagen* Foundation). This is equivalent to establishing public foundations for individual higher education institutions. If higher education institutions are allowed to accumulate corporate assets, income can be gained from the utilization of such assets.

A private source of additional funding for higher education institutions is private foundations, the establishment of which would have to be assisted by the appropriate amendment of legislation governing the taxation of foundations. The level of private assets due to be inherited over the coming years in Germany (amounting to about DM 200 trillion or U.S. $133.3 trillion) could be a source of optimism if it proves possible to influence the public debate on the importance of education and science to the country's future and to reshape the legal framework accordingly.

More recent attempts to create the basis for periodic fund-raising campaigns through the establishment of alumni organizations have been of only limited success in Germany. Very few graduates feel any special obligation towards their alma mater because academic education is not based on an educational contract under private law and professional success is associated at most with an academic education per se but not with study at a particular institution. Only if employers begin to discern greater qualitative distinctions between institutions, will alumni become more willing to support their alma mater with substantial donations.

Additional financial resources could be tapped by selling academic services (research and development, advisory services, sophisticated analysis) to an increased degree and by charging tuition fees. As long as free tuition for study leading to a first professional qualification remains a fundamental principle of German education policy (for which there are good reasons, provided other equivalent steering and control mechanisms are applied), tuition fees can be charged only for continuing education courses and for second, complementary and supplementary courses of study. Postgraduate programs should, however, be financed from the research budget of higher education institutions in view of their contribution to research output.

Quality assurance through optimization and quantitative adjustment of total output to the available resources depends on strategic planning[16] in three dimensions:

1. Through internal consolidation of the "units of production," teaching and research capacities can be reduced to a sound, affordable level. Each higher education institution must highlight its own strengths that have evolved over time, increase the creative potential of its range of disciplines and take into account possible competition from neighboring higher education institutions. This strategic approach of creating a distinctive profile[17] as a response to the scarcity of resources depends on the abandonment of the German university's traditional claim to universality, which translates "*universitas*" as "the totality of all disciplines under one roof."[18] On the other hand, this strategy calls for examination of the minimum extent of course offerings and subject ranges, with a view to the attractiveness of the range of study programs and the possible innovative benefits of research alliances.
2. Through comprehensive cooperation between neighboring higher education institutions in research, teaching, and continuing education, synergistic effects can be achieved which compensate for the negative effects of scarce resources.[19] Cooperation is dependent on the qualitative comparability of the teaching and research activities on the departmental level, not necessarily on the level of the institutions as a whole. Such cooperation on the basis of intra-institutional differentiation can be regarded as an alternative model to the increased qualitative demarcation between institutions.
3. Dwindling *Länder* budgets for higher education make nationwide optimization of the structure and range of courses offered in the

16 cf. HRK, *Thesen zur strategischen Planung der Hochschulen* [Strategic planning of higher education], document for submission to the meeting of the standing committee for planning and organization on December 2, 1996.

17 cf. HRK, *Pilotprojekt – Profilbildung der Hochschulen* [Pilot project – formation of distinctive profiles for higher education institutions] I, Bonn 1993, II Bonn 1994, III Bonn 1996.

18 Jürgen Mittelstrass, *Abschied von der vollständigen Universität* [Farewell to the complete university], Deutsche Universitätszeitung 23/1996, pp. 13–15.

19 See for instance: Peter Müller, *BENEFRI – Gemeinsame Ideen finden* [BENEFRI – Finding joint ideas], Deutsche Universitätszeitung 23/1996, pp. 16–18, or the Cooperation Agreement between the Universities of Heidelberg and Mannheim of June 16, 1995.

tertiary education sector a pressing issue. Safeguarding quality must take priority over the aim of offering as many places in higher education as possible. In order to overcome attempts by local politicians to block the decision on regional distribution of educational opportunities in the tertiary sector, it is advisable to bring in neutral experts. Since priorities have to be set and structural decisions with financial implications taken time and again, the establishment of an academic council at *Länder* level (as in Bavaria, *Baden-Württemberg* and soon in Lower Saxony) or of a planning and budgeting committee (as in Israel, England, Scotland, the Netherlands and Scandinavia) can guarantee greater objectivity and reduce conflict.

Conclusion

Not only when measured against expenditure on the postsecondary education sector, but also in an international comparison, it may be maintained that the German higher education system remains effective. However, global competition demands both excellence and tertiary qualifications for the many. In order to meet these demands, the provision of additional resources – however urgently required – is not sufficient in itself.

A fundamental reform of the way in which the system functions, i. e. of its legal and financial framework, must be regarded as the vital prerequisite for long-term success. In order to push this reform forward, higher education institutions must not, however, rely (solely) on politicians' recognition of the problem; they must take the lead in the debate on this issue which is important not only to them but to society as a whole, and force through the practical reforms required in a concerted campaign. It is only when they find effective tools for tackling their own problems and use them successfully that they can start to regain an influential role in other issues facing society today.

Strategies of Formation and Implementation of Research Missions

Structures of the German Research System

Dagmar Schipanski

The system of higher education and research in the Federal Republic of Germany is somewhat complicated; the saying goes that even experts sometimes find it difficult to explain its features to outsiders. Nevertheless I will try to give you a survey now.

I will therefore skip one or the other of the details and give you a rough sketch of the overall situation with as little number crunching as possible. Starting with those who conduct science in higher education and research facilities, I will then deal with those who organize and fund the system. In order not to make things too complicated, I will concentrate on the public sector, although, of course, with an occasional glance over the fence into the private sector. In the concluding part I will make some cursory remarks on current and future developments within the system.

As you all know, in Germany there is a strong tradition of integrating teaching and research. The principle of "*Einheit von Forschung und Lehre*" or "unity of research and teaching" up to now remains the cornerstone of the system of science and scholarship in Germany. Despite some cracks and fissures owing to developments in the last decades it remains firmly in place, at least in theory ...

On the basis of the Humboldtian principle of "unity of research and teaching" the universities occupy the central position, both in the system of higher education and in the public research system. The approximately 90 state universities which offer courses in about 1100 different subjects still produce the majority of the graduates coming from the higher education system. The universities' role as the back-

bone of the whole research system is further supported by the regulation that only the universities are entitled to confer Ph.D. degrees, the prerequisite for those who want to embark on a research career. Since the early 1970s the number of *Fachhochschulen* or polytechnics has grown considerably. Generally speaking one can say that the universities stress research oriented forms of training and study, whereas the polytechnics concentrate on advanced vocational training.

Private universities and private polytechnics play a minor role in higher education, and both in numbers and academic weight they are far inferior to public sector institutions. As in other countries, the massive influx of students in the 1960s into universities and polytechnics has created a number of problems in higher education. It may therefore be that organizational features of a private university system could play a bigger role in the future.

Generally speaking one can say that university research in Germany is mostly basic research, that means research aiming at the production of new knowledge. But this is only a very general statement which needs some qualification. In universities, especially in technical universities, a lot of applied research is performed, while a certain share of highly innovative basic research is performed outside the universities, especially in the institutes of the Max Planck Society. A further qualification may be added for the polytechnics which do a certain amount of research in order to support and foster technology transfer.

In recent years, a shift in university research toward technological areas can be observed. Apart from the traditional technical universities like Aachen, Dresden, Stuttgart, Munich or, for example, my own university at Ilmenau, a number of universities which did not engage in technical research until now have opened up engineering departments and have thus somewhat changed their overall profile. In general, however, one can still say that the majority of non-technical universities concentrate on research in the natural sciences (including medicine), social sciences and humanities. Medical research and research in the humanities, in particular, maintain strongholds within universities since there are not many institutes in these fields outside of universities.

Not surprisingly against the background of the overwhelming German tradition of tightly integrating higher education and research, the role research outside universities should play today is one of the favor-

ite bones of contention in German research policy. Since the second half of the 19th century the extramural research sector has been steadily growing. During German reunification parts of the Academy of Sciences of the former GDR have been transformed into such independent institutes as well.

Most of the research done outside the universities represents different shades of applied research. This ranges from strategic research in the National Research Centers or National Laboratories over medium-term precompetitive research in Blue List Institutes, to short-term contract research in the Fraunhofer Institutes. I'll come back to these different types of institutes after I have said a word about Max Planck.

The Max Planck Society (*Max-Planck-Gesellschaft zur Förderung der Wissenschaften – MPG*) is the most important organization for basic research outside the higher education sector. The research staff is about 3,000. The legal status of the society is that of a private non-profit organization, although most of its financing comes from the federal and state governments. (I'll come back to the question of funding in the second part of my presentation). Max Planck Institutes are devoted to fundamental research with a special emphasis on new fields in the natural sciences which for different reasons are not so suitable or not yet ready for being researched in a university.

The institutes of the Fraunhofer Society (*Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung*, that is Fraunhofer Society for the Support of Applied Research – FhG) may be placed on the other end of the broad spectrum of public research institutes outside universities. This society, named after Joseph Fraunhofer, a glass-grinder and physicist who lived in Munich in the late 18th and early 19th centuries, is an organization mainly performing applied research and development. Its aim is to encourage the use of new technologies in the corporate sector. The society today employs about 3,000 researchers in its institutes and has recently set up branches in the United States and in Malaysia. As is the case with Max Planck, the administrative headquarters is in Munich. The 46 institutes and special application centers operate at 31 different locations (more than ten of them in former East Germany). They carry out their respective work as independent profit centers in close partnership with regional industry. The total volume of research in 1996 was valued at DM 1.1 billion.

The 16 national research centers, most of them located in the western part of Germany, are united in the recently restructured Hermann von Helmholtz Association of German Research Centers (*Hermann von Helmholtz Gemeinschaft Deutscher Forschungszentren, HGF)*. They perform R&D in specific areas of long-term national and industrial interest requiring large scale interdisciplinary cooperation and the concentrated use of manpower, equipment and financal resources. Presently, they employ around 20,000 people, including some 6,000 researchers. The first national research centers at Karlsruhe, Jülich and Geesthacht were established in the mid-1950s to do nuclear research and to develop nuclear technologies. A facility for high energy physics, the *Stiftung Deutsches Elektronen-Synchrotron (DESY*) in Hamburg, followed in 1959. The third stage in the development of national centers in the mid- and late 1960s was characterized by the establishment of facilities for space research, data-processing and computer sciences, heavy ion research, cancer research, molecular biology and biotechnology. After the reunification three national research centers have been established in the new *Länder*, among them the *Geo-Forschungszentrum* (Geophysical Research Center) in Potsdam.

Most heterogeneous among the various types of research institutes outside the universities are the so-called Blue List Institutes. The name of these institutes (which will probably be changed into Leibniz Institutes in the near future) refers to the original listing of these institutes in 1970 on blue paper. These institutes – or rather institutions because there are a number of museums and other establishments among them which, strictly speaking, may not be termed “research institutes” – are independent establishments either for research or with a service function for research. Their work has to be of supraregional importance and in the interest of national research policy. Currently there are 82 of these institutions, many of them in the new *Länder*. This is a result of the transformation of considerable parts of the GDR Academy of Sciences into this type of institute. Altogether, they employ more than 4,000 researchers. The fields covered range from economics to various technological specialities. Some research museums are also included.

Apart from the different types of public research institutes outside the universities there are a number of others, such as the government

research institutes run by either the federal or state governments. These institutes play a certain role, but their importance is not comparable to, say, the national research centers or Max Planck Institutes. Suffice it to say that for the humanities there is a so-called academy funding program which, to a certain extent, serves as a substitute for those not very numerous large scale extramural research institutes in the humanities. This program is used to finance long-term research in the humanities, with most of the research being done on campuses.

Now, who makes the rules and who pays in order to make this whole mechanism work? This brings me to the second part of my talk which deals with the organizing and funding agents of the German research system.

Roughly speaking, the German research system is run by three types of organizing agents:

– research organizations and agencies;
– federal and state governments, and a type of actor I would like to call
– "mediating agencies" which in one way or other help the other organizing agents to find their way through the complexities of the system.

As in other countries, the most influential organizing agents in legal terms are of course the federal and state governments. Since, however, in Germany we have a strong tradition of "scientific home rule" I would like to start my remarks on the organizing agents with a few words on research organizations.

I have already mentioned a number of organizations which also play a role in scientific research. The Max Planck Society, the Fraunhofer Society, the Hermann von Helmholtz Association of German Research Centers and the Federation of Blue List Institutes do more than just this, however. These organizations also play an important role as organizing agents. They do this by formulating administrative guidelines and policy initiatives for their own institutes and by participating in general discussions over science policy matters. In doing so, they are largely independent of direct government influence.

Max Planck and the others represent only one part of the corporate interests of science. There are a number of other organizations which represent other parts of the system and whose voice therefore must

also be heard by the governments. Among these other organizations are:

1. the Rectors' Conferences, which exist both on the federal and state levels and which represent the corporate interests of universities and polytechnics;
2. special funding agencies such as the German Academic Exchange Service, which serves both Germans and foreigners, and the Alexander von Humboldt Foundation which supports researchers from abroad who work in Germany and which has done much to improve international scholarly cooperation since its inception in the 1950s.

The single most important science organization not yet mentioned, however, is the *Deutsche Forschungsgemeinschaft* or DFG. In legal terms the DFG is a registered society, originally founded in 1920 as "*Notgemeinschaft der Deutschen Wissenschaft*." Though traditionally dominated by the universities, the DFG's membership also includes most of the other important participants in our national research system. The Max Planck Society as well as the Fraunhofer Society and some of the National Research Centers, for example, are also members of the DFG.

The *Deutsche Forschungsgemeinschaft* is the central German funding agency serving all fields of science, humanities and the arts by financing individual or collaborative research projects. The DFG funds quite a number of applied research projects and there has been a certain tendency in recent years to assign to it the administration of some more or less pre-defined programs. However, it can still be safely stated that the DFG's funding activities are mostly directed to the support of basic research, including basic research in engineering. The investigator who initiates research projects remains at the center of the activities of the DFG. The organization has a sizable staff of about 500. Its constitution, however, provides that all the funding decisions are made by scientists and scholars themselves, with administrative and political interests also being represented on the relevant committees. The operation of its peer review system based on nation-wide elections of referees is free from any direct outside interference.

Its broad membership, its stress on investigator initiated research rather than on program driven research, and its peer review system give

the DFG a strong voice in research policy, a voice probably even stronger than that of some of the other research organizations and certainly a voice which has to be taken into account by government.

How do the federal and state governments come into this picture of self-assured research organizations? Basically there are two types of arrangements which ensure that the governments (and of course, the parliaments) remain in control:

1. constitutional and legal arrangements;
2. financial arrangements.

All of these arrangements have two aims:

– to circumscribe the role of government in relation to the research system and
– to define the respective roles of federal and state participation.

It is impossible to go into the details of all the relevant constitutional and legal arrangements in this short a presentation. Mention, however, must be made of one of the central provisions of our constitution, or *Grundgesetz*. According to the constitution cultural affairs in general and the higher education system in particular come under the jurisdiction of the 16 states. This is of course a tribute to the strong German tradition of regionalism and federalism which goes back to the middle ages. But it is much more than this. These constitutional provisions establish a whole range of legal and financial arrangements which in one way or other specify the basic division of responsibilities between the federal and state governments.

Though in general it would be safe to say that the states or *Länder* control the universities and polytechnics whereas the federal government has a strong and in some cases dominating influence over the research institutes outside the universities, this is only speaking in very rough terms. Let me illustrate this by giving a few examples.

Far from playing a merely passive role, the federal government also has considerable influence over the higher education system. First, despite many regional variations, because higher education legislation of the states has to conform to the general norms laid down in the Federal Framework Law on Institutions of Higher Education (*Hochschulrahmengesetz*). Second, because according to the Federal Law on Investment in the Higher Education Sector (*Hochschulbauförderungsgesetz*) half of all the major investment in building and equipment in

the higher education sector comes from federal funds, with the other half being provided by the state governments. Needless to say that the federal government uses the powers given to it by law and in the fund allocation process in order to somewhat outbalance the powers given to the states by the constitution.

At the same time, the states are far from having no say in the organization of non-university research. The overall funding arrangements for the different kinds of non-university research institutes in particular ensure the influence of the states over this part of the research system.

Presently we have the situation that the budget of the Max Planck Society and of the Blue List Institutes is shared on a 50:50 basis between the federal and state governments, whereas the budget of the National Research Centers and the Fraunhofer Society is shared on a 90:10 basis. In fact, the Fraunhofer Society obtains more than 10 percent of its funding from state sources, because investment funding is shared on a 50:50 basis. A similar situation prevails for the funding of the *Deutsche Forschungsgemeinschaft*, though on the whole it can be said that the DFG is funded on a 50:50 basis by the federal and state governments.

Table: Basic Data on German Research Organizations (approximate data only)

Organization	Institutes	Research Personnel	1996 Public Funding (in billion DM)	Federal/ State Share
Max Planck	60	3,000	1.5	50:50
Fraunhofer	50	3,000	0.5	90:10 (50:50)
Research Centers	16	6,000	3.0	90:10
Blue List	80	4,000	1.3	50:50
DFG	none	none	2.0	50:50
Total		16,000	8.3	

As one might expect, this complicated network of legal and funding arrangements linking an array of performing and organizing actors with different interests and power potentials yields far from spontaneous conclusions. In this institutional environment a top-down "national science policy" binding all the participants does not exist; science policy can only be a more or less well structured patchwork put together in a bargaining process linking the policy potentials and initiatives of all those involved.

This brings me to the last type of the organizing participants in our research system, the type I call "mediating agencies."

The system outlined so far is characterized by a number of generic coordination gaps:

1. The states control the higher education system. In doing this they follow different policies. These policies have to be coordinated, but because of the constitution this coordination cannot and should not be assigned to the federal government.
2. The institutional setup provides for a strong role for the individual research organizations *vis-à-vis* the government, but there is no provision for achieving high level consensus on general policy matters involving all the major players: science organizations, state governments, the federal government.
3. The constitution lays down a rather clear-cut division of responsibilities between the federal and state governments, but neither the state governments nor the federal government are able to fulfill research respective tasks without the support of the other side.
4. The whole system has a strong bent toward basic research. Though many ideas have been tried out to improve the linkage between the research system and industry, much remains to be done.

Over the years, a number of institutional structures have been set up which aim to bridge these coordination gaps. A partial list includes the Standing Conference of State Ministers of Culture (*Ständige Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland, KMK*) and the Joint Federal State Commission for Educational Planning and Research Promotion (*Bund-Länder-Kommission für Bildungsplanung und Forschungsförderung, BLK*). Particular reference must be made, however, to the Science Council and the Council for Research, Technology and Innovation.

As in other countries, it already became evident in the 1950s that more needed to be done for research and higher education to ensure national competitiveness in the already dawning age of knowledge based economies. The far-ranging decisions which had to be taken in this context had to be based on a high-level consensus not only of the federal and state governments, but also of the science community. In order to achieve this consensus, in 1957 the state and federal governments established the *Wissenschaftsrat*, a science policy advisory council.

The Council, which is presently headed by myself, has 54 members in two commissions. The 32 members of the Academic Commission, each of them holding a personal vote, are appointed by the President of the Federal Republic: 24 of the members are chosen from among candidates nominated by the major research organizations. They are outstanding academics representing the major disciplines; the other 8 members come from public life and industry. The remaining 22 members of the Council belong to the Administrative Commission and act as representatives of the federal and state governments; they also hold 32 votes. Each of the 16 states has one representative, usually its Minister of Science and Education, the other half of the votes is reserved for the Federal Government. The General Assembly of the Council, which meets four times a year, makes the final decisions and elects the Chairperson from among its academic members. The Office, headed by the Secretary General, prepares the reports and recommendations of the Council. At present it has an academic staff of 25.

In the 1960s, the Science Council was particularly involved in the massive expansion of higher education by giving advice on the governments' plans. Giving advice on investment in the higher education sector up until now remains one of the central tasks of the Council. After reunification the Council worked out a blueprint for restructuring the East German science system. Governments have adhered to this blueprint to a very high degree. In this context institutional issues of extra-university research, which had already begun to play a major role in the Council's work in the 1970s and the 1980s, were of central importance. Majors issues presently dealt with by the Council include:

– an evaluation of the Blue List Institutes;

– a cross-disciplinary evaluation of energy research;
– a pilot study in research oversight.

As mentioned before, our science system has a strong bent toward basic research. The Council for Research, Technology, and Innovation called into existence by the Federal Chancellor in early 1995 is a new instrument of cooperation and consultation linking politics, the science community and in particular the industrial sector. Its mandate is

– to draft situation reports on potential applications, opportunities, obstacles and action requirements in important areas of economic innovation,
– to initiate broadly based debates on the future development of technologies, including related social issues,
– to improve the acceptance of new technologies, and finally,
– to make recommendations for specific action to be taken by those involved in the innvoation process.

The first issue addressed by the Council was the information society, the next will be the biosciences.

The Science Council recently has established a working party which is going to deal with the future development of the German research system. It is much too early to make any statement on the outcome of this new working group. From the ongoing developments, however, some of the future tendencies in the system are already quite clearly discernible. They include:

1. a stronger mission orientation of the constituent parts of the system: the activity profiles of all institutions engaged in higher education and research will be sharpened and thus become more clearly defined in this process;
2. improved cooperation between the major players in the system, including the continued growth of international cooperation, especially with European partners, and finally
3. stronger competition between the constituent parts of the system, such as, for example, stronger competition between the universities for limited funds. This brings me back to the university in transition, the topic of our conference. We have to think about the changing role and structure of universities in the context of the whole research system.

In the conference much has been said about the changing relationship

between basic and applied research. Our German system is based on the idea of a separation between the two. So we have to think about the consequences of this development for our scientific system.

I have tried to give a survey of the complicated structure and interaction of the German research system. Summarizing, I think it is a well-defined system, it has rules for everything, but there is a lack of innovation, of new spirit. We have to enhance flexibility, as Chancellor Tien explained to us in such an excellent manner. We'll think about it.

Strategies of Formation and Implementation of Research Missions

Werner Meißner

This paper's prime concern is the maintenance of quality in teaching and research while preserving the autonomy of the researcher. The similarities and differences between the German and the American systems of higher education are taken into account, but primary emphasis is given to the German experience.

Looking at the German situation, this paper questions the concept of "mission" and elaborates on the increasing difficulty of research universities to meet society's expectations.

A second concern is the growing difficulty of research universities to reconcile teaching, research, and the training of young talent, a trend shown to be exacerbated rather than solved by the ideology of globalization.

Thirdly, a short overview of the promotion of research in Germany shows it to be by far more compatible with the principles of university research than anything suggested by the advocates of globalization.

Size, basic funding, and the organization of research universities are identified as areas of primary concern, and, therefore, the need to develop new strategies for the promotion of research is challenged. Instead, the necessity of conceiving of a new university is emphasized, in which research, teaching, and the training of young talent may be again reconciled.

Finally, to gradually build this new type of research university the management concepts of centrifugal motion, guided competition, and decision bound dialogue are suggested.

Preliminary Remarks

Undoubtedly, the term "mission" rings differently in German and American ears. Mission may simply mean "go and do a job," but it may also mean you are chosen to go and proselytize.[1] Today, however, no decent enterprise thinks it can do without "mission statements" and "visions." Such general usage, it is true, has made all religious connotations disappear from these terms, but it has also inflated them. Therefore, I for one, prefer to speak of "expectations" rather than of "missions," particularly in regard to expectations universities and society have in relation to one another with regard to teaching and research. Society expects us to contribute to its economic progress, to its international competitiveness, and to its need of highly qualified manpower and leadership. Society also expects us to contribute to solving social and cultural problems, providing the appropriate statistics and scholarly analyses. And society, more so governments, expect us to support politics through analyses of the past and prognoses of the future.

Generally speaking, the universities in turn simply expect society to cover their ever-growing expenses and to respect their autonomy in defining what is most appropriate in teaching and research. That is why the relation between universities and society has never been and will never be free of tension. I believe that this tension is vital both for the universities and society.

For, only by keeping their distance and by acting as if they were something like a transcendental point of reference, universities are able to meet, at least partially, their society's expectations. What is more: If universities let go of their fictitious detachment, their supposed transcendental observer's quality, and identify completely with society, they are lost, above all for society itself. So, let us remember just this: As much as universities are part of their respective societies they have to maintain their distance to them just as much and stick to their "organized skepticism," as Robert Merton once put it.[2]

1 We are here in mission country, Carmel is not far away, and I am perfectly aware of the fact that Americans usually find no fault in combining religious or secular-religious convictions with technical achievements.

2 Robert K. Merton, *Science and Democratic Social Structure*, *Social Theory and Social Structure*, 1957, pp. 604–615.

The Task of Research Universities and the Ideology of Globalization

Today, however, when exacerbated internal conflicts and increasing external pressure on universities seem to make them more vulnerable and self-conscious than ever, it has become increasingly difficult to maintain this "organized skepticism." Both in Germany and in the United States research universities are struggling to live up to a threefold task: performing top research, providing higher education to ever-increasing masses of students, and training future research personnel.

All German universities have always been supposed to engage equally in teaching and research. Until recently, it has mostly been up to individual faculty whether he or she preferred to be a "teacher" or a "professor." Teaching centered and practice oriented polytechnics called *Fachhochschulen* have only developed since the 1970s.

In the United States, however, a more clear cut division of full research universities (less than 3 percent of all institutions of higher education), teaching centered colleges, and some undecided institutions has been in existence for a long time.[3]

Mass demand for higher education has led universities, both in Germany and in the United States, to put more emphasis on teaching. In most cases, teaching meant just teaching, not teaching through research or teaching how to do research.[4] The traditional and prestigious combination of research and teaching as well as of research and training of young talent is dissolving. Politics, government, and industry are contributing heavily to this dissolution. Research, if not closely tied to the nation's progress, has become suspect. Teaching the masses of students, otherwise faced with growing unemployment, has become immensely popular. And funding is based more and more on quantitative input-output parameters.[5]

3 As the struggle of reconciling research, teaching, and training research personnel is most visible in research universities, I want to concentrate my comparative remarks on these.

4 Very often, teaching also meant making up for students' deficient high-school education, and in many cases even graduate programs were designed to cater the ever-growing demand of professional training through non-research "taught Master's Degrees."

5 Funding and the internal distribution of funds is more and more organized according to numbers of students enrolled, percentage of female students, examinations conducted, graduates and Ph.D.s produced, and additional funds acquired.

Side by side, university research proper and its funding is oozing out to non-university research institutions. American ORUs (Organized Research Units) for example seem to have become more popular than ever.[6]

Whereas Germany has a couple of institutions exclusively devoted to the funding of research, traditionally such funding in the United States is spread over a greater number of agencies and institutions the primary aims of which are not research (such as the National Institutes of Health, NASA, the Department of Energy and others). The U.S. National Science Foundation which comes closest to the German Research Association (DFG) has lost some importance after severe budget cuts during the Reagan era.

The American model of research funding, it is said, has its value because it makes science compete for funds with non-science. This prevents science from losing touch with so-called reality. The problem, however, such diversified and down-to-earth research funding generates is the difficulty, maybe impossibility of coordinated priority setting and the strong bias it has towards natural and applied science. Under these circumstances, it is perfectly understandable that as early as 1992 the Senate Appropriations Committee brought some pressure to bear on the National Science Foundation, so far ready to support all sorts of research, to invest more in industrial-commercial payoffs.

This development takes us right to the question of how far universities, too, are already in the grip of what I call the ideology of globalization. I shall not elaborate here on the factual globalization processes transforming stockmarkets and transnational industries, national monetary policies, or labor markets. I will also refrain from qualifying this transformation.[7] Let me just characterize it in a few words: downsiz-

6 Their profile of interdisciplinary, practice- riented, and capital-intensive work in selected fields like biotechnology, microelectronics, artificial intelligence, and material research seems to tie in neatly with what politics and industry expect from modern research. Only recently, the German Rectors' Conference complained about the German Research Council's shifting attention and funding to non-university research institutions.

7 This transformation is either condemned as a somewhat irrational "race to the bottom" or praised as the most reasonable post-modern answer to economic and social stagnation.

ing, outsourcing, and reengineering.[8] What ought to call for our attention is the process through which these concepts seem to merge to become the dominant and all pervasive ideology worldwide.

I feel that our internal conflicts and the external pressure we get as universities from society and politics have been increasingly exacerbated, indeed, by the ideology of globalization. Already, university reform debates in Germany, the United Kingdom, Japan, and in the United States are in the thrall of this new religion.[9] Today, hardly any proposal for reform of German universities refrains from highlighting worldwide competition among universities and from suggesting bits and pieces of the supposedly more advanced American or Japanese models.[10]

However, those really familiar with different university systems readily acknowledge that this kind of reasoning does not get you very far. Specific traditions and systemic interrelations have to be taken into account and used to prevent easy exports or imports. Those familiar with Japan, for example, know that university research is not particularly strong there, and that after a period of investing in applied science Japan is heavily investing in basic research – following the German model. Those familiar with the United States know that in genuine research universities the evaluation of teaching has no significant impact

8 Under the absolute reign of demand and supply and the paramount importance of time and efficiency downsizing, outsourcing and reengineering entail mergers, privatization of public institutions, the undercutting of prices, worldwide competition, and the dwarfing of bureaucracy, politics, and trade unions.

9 The grim practical consequences of applying this ideology to a university system can already be studied in the United Kingdom. Some research ought to be devoted to "Ms. Thatcher and Her Universities."

10 To give a few examples only:
Look, the academic global players say, they almost have no tenure. Why must our professors be civil servants?
They evaluate their teachers regularly and with sometimes painful consequences. Why don't we control what happens in our classrooms?
They invest heavily in applied science for the benefit of their economy. Why must we always stick to this uncertain, never-ending, and bottomless basic research?
They have powerful deans and swift decision makings. Why not get rid of our inefficient mock-democratic way of moving things?
They produce graduates of 22 or 23 years of age. Why allow our students to stay that long in our universities?
They have tuition fees and thereby feed their budgets. Why must we cling to the outdated idea of higher education being a public benefit and therefore free?

as compared to the evaluation of research activities, publications, and acquiring research grants. And yet, the same arguments recur over and over again. I presume this tenacity to stem from ideological rather than from rational sources.

We, therefore, may conclude: The imposition of the ideology of globalization on organizational and financial strategies for running research universities is exacerbating their internal problems and thereby seriously challenging their survival and their unique function for their respective societies, equally in view of the expectations societies have toward their universities, in the light of the delicate balance these universities have to strike between research, teaching and the training of young talent, as well as with regard to the organization and size of funding of university research.

Principles of University Research and the German System of Promoting It

I will start with a few sobering statements on the principles of university research. I will then present the most salient features of German research promotion, and I will demonstrate that it conforms miraculously well to these principles and exempts us, therefore, from dreaming up completely new strategies for the formation and implementation of research missions.

First: In contrast to industrial research, the overwhelming majority of research activities in universities is auto-generated, auto-dynamic and very often purely accidental, the practical outcome of which is difficult to predict.

Second: All efforts of priority setting and target funding contain a strong element of arbitrariness and, therefore, cannot produce but limited results.[11]

11 Neither the most qualified research personnel nor any dean or university president, let alone government, are able to predict any long-term development of research objectively. Only extensive auto-controlled peer review, even if it contains some log rolling, can accomplish this task.

Third: Instead of futile endeavors to engineer and direct university research topdown, all efforts of university management must be considered as measures of reinforcement rather than of creation.[12] Advertisement and the promotion of research share the impossibility of making people buy what they hate and the possibility of whetting already existing appetites.

Fourth: For the sake of meeting society's expectations, the orientation and promotion of university research has to take into account the "two cultures" of research to prevent the science model from imposing itself on the humanities.[13] Teamwork, interdisciplinarity, student participation in research, and international cooperation must not be declared the one and only paradigm of research.

Fifth: Cooperation with non-university research institutes and industry with an exchange of personnel is useful only as long as it does not lead to an uncontrolled brain drain of young researchers, to an unwarranted influence in university research policies, or to inexorable financial dependence.

Sixth: The value of competition among faculty, departments, universities, and research institutions is acknowledged without reservations.[14] However, academic competition must by no means be blended with economic competition to make universities industrial enterprises with customers, products, or market shares, the credit standing of which is eventually evaluated by Moody's.[15] Planning and promotion of re-

12 And they must include the possibility of saying "No" to programs alien and detrimental to the university's autonomy. To be informed about what is going on and when the formation of "critical mass" in research requires special attention and support is, therefore, paramount to university management.

13 The borderline does not separate basic from applied research or industry funding from government funding, but the *science* model from the *humanities* model, even though mixed models in social sciences and economics exist. To meet society's expectations both science and the humanities have to be cultivated.

14 It has never been absent from research universities anyway.

15 University decision making, it is true, is not totally exempt from applying quantitative criteria such as time (faster), money (cheaper), output (more) and organization (more efficient). The overall criterion, however, has been and continues to be quality (better). The clash between quantitative and qualitative criteria must not be resolved by ideological impositions.

search in universities, therefore, applies to a fairly limited sphere, and has to take into account a great variety of legitimate targets.[16]

I believe that the traditional German system of promoting university research as best represented by the work of the German Research Association conforms almost perfectly to the preceding principles. The difficulties of German research, teaching, and the training of young talent lie elsewhere.

The German Research Association is an agency exclusively devoted to the promotion of science.[17] Its budget comes almost entirely and in about equal portions from local and federal governments. For the year 1996, it amounted to more than DM 2 billion.[18] The Association's Government (*Präsidium*), its Standing Policy Committee (*Senat*), and its numerous bodies of elected experts and advisors (*Gutachter*) are committed to support basic research and to foster the training of young research talent.

Its funding strategy combines bottom-up individual research promotion in whatever discipline, as long as it is favorably reviewed by the experts, with middle-range research promotion in specific fields of interest selected by its *Senat* on advice of Germany's Science Council (*Wissenschaftsrat*). It does not, however, provide funds for basic equipment, rooms, and academic or clerical staff. Its principles of individual initiative, peer review, and quality based competition for limited funds have so far produced very satisfying results for all parties concerned.

Within the so-called "normal application procedure" every professor or young scientist may apply to the Association for research grants to cover the costs of additional personnel, materials, equipment, travel,

16 They have to be executed fully aware of society's legitimate broad expectations. They have to take into account the universities' obligation to reconcile research, teaching, and the training of young research talent. And they have to counter the push and pull effects of the ideology of globalization, tending to impose a uniform market oriented model of teaching and research on all higher education.

17 cf. Deutsche Forschungsgemeinschaft, *Perspektiven der Forschung und ihrer Förderung 1993–1996*, Weinheim 1992.

18 Out of these 2 billion, about 900 million went to individual research funding, 270 million to priority programs, 635 million to "special research fields."

publication, scholarships or fellowships, workshops or conferences. If a university feels like improving its research profile by forming so-called "research groups," it may also apply to the Association for six-year funding.

Whereas individual professors or universities are supposed to take the initiative in these programs, usually a group of highly qualified experts formulate the proposals to the Association's Senate for establishing another middle-range "priority program" (*Schwerpunktprogramm*) open to competition. Another instrument of research promotion is the so-called "special research areas" (*Sonderforschungsbereiche*) in which groups of scientists and young researchers from different disciplines and different institutions work together for up to 15 years. Meticulous analysis of proposals and serious periodic evaluation of progress make these programs highly selective and consequently highly prestigious.

In addition, the Association provides a variety of funds for already established or young research talents: Leibniz-Awards, Hess-Program, Heisenberg-Program, Graduate Program (*Graduiertenkolleg*), and several postdoctoral programs offer ample opportunities to get on with research and one's own career.

Finally, important sums (roughly DM 72 million in 1996) are given by the Association to allow the purchase of expensive big machinery, computing setups, and to modernize library services. The list may not be complete, but it is sufficient to give you an idea of the scope and volume of the Association's work.

It goes without saying that there are numerous other institutions and agencies exclusively devoted to the promotion of German scholarship. I will just mention the Alexander von Humboldt-Foundation, the German Academic Exchange Service, the Association of Foundations *(Stifterverband)*, the *Volkswagen*-Foundation. They all respect the universities' autonomy and the structural limits and possibilities of their research. Nowhere has science to compete with non-science for funds. In comparison with public funding, industrial funding of research, basic or applied, plays a minor role both in Germany and in the United States, technical institutes and universities excepted. This may change in the future, for it is already acknowledged that the policy of buying research results worldwide instead of investing in one's own research has not

really paid off for German industry. So, in order to keep research costs down and yet come back to doing its own research, industry may consider intensifying cooperation with public research institutes and universities. In some cases, this may turn out to be an ambivalent affair for universities: They may get more funds than before, but their autonomy may also be curtailed.

There are already research programs emanating directly from the German Ministry of Research, Technology, Education and Training, special research programs imposed by local governments[19] as well as research funds offered by the European Commission which are saturated with political zeal, assume competence for setting priorities, and do not conform to universities' research principles at all times. All in all those programs are relatively short lived and financially unstable.

Generally, however, the situation of university research proper is still fairly satisfactory. Only minor improvements are suggested once in a while. Recently, the German Rectors' Conference, for example, proposed merging existing research institutions (*Wissenschaftskollegs*) with graduate groups (*Graduiertenkollegs*) to both intensify the training of young talent and research proper in what they call a "*Forschungskolleg.*"

Those qualified researchers who want and need additional funding can get it, those who don't, are left alone. Top researchers gather in "special research fields" or other interdisciplinary research units, both in science and humanities, while others prefer to write their *opus magnum* at home. Universities cooperate with non-university research institutes, with industry, and with other institutions of higher education. When they distribute funds among departments and faculty, research accomplishments and the acquisition of additional research money are given bonuses. The problem we still have to solve is how to make researchers in fields that do not draw much outside funding avail them-

19 In the State of Hesse for example we had state research programs on women, ecology, north-south relations and on the consequences of modern technology. Last year they were cut back, this year they have disappeared altogether. Other examples of rather dubious value are Reagan's Strategic Defense Initiative, Germany's flop with the Fast Breeder of Kalkar or the heavily financed adventure of cold fusion research. More positive federal efforts aim at the Human Genome Project or the research on the superconducting supercollider. Positive mention may also be made of the NSF's support to the backbone of the Internet.

selves of additional research money. Before long most universities will have what is called "global budgets" allowing them to transfer funds from one fiscal year into the following, and to use dormant money from vacancies more freely to cover material cost.[20] Attractive research profiles made out of "research groups," "priority programs," "special research fields" or "graduate groups" help universities in recruiting promising new faculty. In the coming years, almost half of our faculty has to be replaced. The chances to modernize, to set new priorities, and to reorganize are there without resorting to coercion.

So, we may retain the simple and perhaps surprising message: All in all, researchers at German universities have nothing to complain about. The German system of promoting science and research is almost perfectly geared to their specific structure and their potential. There is no need to develop new strategies for the promotion of science. What we need is a new vision of research universities.

Research, Teaching, and Training of Young Talent in a New Setting

Increasingly, research universities have difficulties in meeting their societys' expectations because they can no longer live up to their triple task of top research, teaching through research, and training of young research talent. Increasingly, research universities are torn between those tasks, weakened and, therefore, easily falling prey to the ideology of globalization despite its obvious incompatibility with their very nature.

Still, however, research universities in Germany dispose of an excellent and appropriate system for the promotion of research and young talent, but can no longer fathom its high potential. If this diagnosis is halfway correct, the problem cannot lie with research or with incompat-

20 This will be a major step towards increasing universities' autonomy, because personnel turnover in universities is considerable, and the funds earmarked for personnel are no small potatoes. Using these funds, however, to bridge non-personnel costs will only work if government does not put its hands on these funds to stop its own budget gaps whenever they feel like it.

ible strategies for the formation and implementation of research missions. The problem, affecting all aspects of our activities as research universities, lies in size, basic funding, and organization.

First: Size

Modern societies' ever-increasing need to have masses of well trained young people simply cannot be denied. Reducing the number of students, therefore, cannot be but counter-productive. Research universities, however, are obviously no longer in a position to meet the needs of mass education so that teaching and research are integrated. Therefore, this education[21] has to be imparted in a more differentiated way, under certain conditions even at other institutions of higher education.

This division of labor will be beneficial for all parties concerned. For the research universities this means that they can concentrate once again on fulfilling their triple task of top research, teaching through research, and training of young research talent. For the teaching oriented sections of universities or teaching colleges that means they can concentrate on efficient practice oriented imparting of certified knowledge and methods of problem solving. For the majority of students which is neither interested in or qualified for research careers but wants swift and economical professional training it means the opportunity to do so. For advanced young talents who are eager either to improve their basic training or to commit themselves to research, they will be able to do so. This will be the end of the fiction that teaching and research can be combined even under the conditions of mass education. It will also confirm that top research and the task of producing graduates out of an ever growing mass of students in an ever shorter time with ever decreasing costs cannot be reconciled any longer only by universities and faculty by making full use of their resources. Most of

21 Although more thinking has to be given to the criteria by which certain disciplines and sections of universities may be identified as non-research areas, it is quite clear that most of what belongs to professional training, hence practice oriented teaching and learning lends itself easily to such operations. Debates have to clarify whether teacher training, law, business administration, nursing, and similar courses need research input in teaching.

what the present German debate on the reform of universities offers, however, seems to cling to this fiction.[22]

Universities and colleges cannot stop unemployment or the devaluation of labor, but they can very well prevent young people from investing in illusions.[23]

In other words: The future of higher education does not rest on everybody doing what everybody else does. Only a division of labor within big institutions or even among different institutions of higher education, I believe, will safeguard both future mass education and university research.

Second: Funding

So far, almost all over the world, university funding has depended on the number of students. Under these conditions, mass education has been viewed as a primary source of income whether from government, private donors or through tuition fees. This is a fallacy, eventually leading to an endless spiral of rising costs and rising student numbers. In research universities, any dominance of criteria based on student numbers ruins the quality of teaching and seriously impairs research.

It is true, universities do have a reputation of being insatiable monsters. However, so far nobody has seriously taken pains to calculate the enormous cost unemployed, underemployed, badly educated or badly trained generations mean for societies, their economic progress, their social systems, their moral cohesion. I presume that once those costs are tabulated against present investments made in higher education the irresponsible gap will become all too obvious.

22 Make students pay, and everthing will be alright. Select your freshmen, and you need not worry any longer about students' qualifications. Increase professors' teaching loads, and teaching will become more effective. Pay professors according to individual performance, and overall performance will increase. Introduce permanent evaluation of teaching and research, and inefficiencies will be weeded out. Let boards of governors decide on the university's policy, and the ivory tower will crumble. If applied, these suggestions would transform universities into enterprises – and that would be the end of the university.

23 The increasing devaluation of Master's Programs in the United States has certainly not contributed to creating more jobs, it has only contributed to lowering standards and at the same time to making education more costly.

The division of labor within and between different institutions of higher learning I am advocating is not free, it does not even relieve the burden on public funds. To finance small, well-equipped, and high-yielding research sections in universities with low student teacher ratios has its price. And to assure efficient mass education in university teaching sections or fully fledged teaching colleges would need additional massive investment. In contrast to the American model, I believe that college education for the masses ought to be free. However, in Germany, too, research universities should be allowed to ask advanced students for tuition fees. The need to step up funding of higher education, however, remains indisputable. I therefore insist on seriously weighing economic losses and gains, the outcome of which cannot be but favorable for higher education.

Third: Organizational Reforms

If well-equipped and financed, societies would need only a few "new research universities." Competition is open as of today. In the United States where this differentiating process is already more advanced than in Germany, the odd hundred research universities may consider perfecting their policy and strive to form a new elite within the elite. American research universities may also consider bringing some pressure to bear on government to strengthen the National Science Foundation, and to pool state and federal research funds. Finally, American research universities may consider stopping the devaluation of Master's Degree programs. In Germany, however, much more is required. The call for more competition just would not do.

First, we would have to patiently introduce the idea that everybody will lose if everybody keeps doing what everybody else does.

Introducing Bachelor's Degrees into the German system of higher education would be a promising endeavor, indeed, because it will help to spread the idea that solid mass education and training is feasible without clinging to traditional concepts of research based teaching. Fostering new degree courses in polytechnics to compete with similar courses at universities may be another possibility. Supporting practice oriented professional training programs in order to make them stand

out more visibly as a "foreign substance" in research universities may be another. Initially, explicit support instead of a pushing back these programs is vital for change to be effected.

Different profiles of faculty as "teachers" or "professors" have to be brought about gradually while recruiting new personnel and by specific ways of distributing research money. Attention must be given to distributing research money to "researchers" and teaching bonuses to "teachers." Experiments with special admission exams for advanced studies (after the B.A. or B.Sc.) would help to rub in the idea of differentiation. Eventually, under certain conditions all elements strictly and most obviously not belonging to research universities may even be cut off to go to other institutions of higher education in the neighborhood and in visibly different locations.[24] Cautiously calculating, this task is not likely to be accomplished before the year 2025 or even later. With all the uncertainties surrounding us, this may seem to be a rather frightful perspective. However, to know what we are heading for, will certainly help in meaningful day by day decision making. That is what visions are made for.

One last remark: That this vision is definitely not a nostalgic attempt to try to resuscitate old academic glory associated with names such as Johns Hopkins or Wilhelm von Humboldt is shown clearly when you connect it with the most recent development of the most modern gadget the world knows, the Internet.

The Net started out as a tool for research and science. America's National Science Foundation financed its backbone, heavy public subsidies all over the world went into it to make it popular, industry and on-line services have lured people into it with cheap prices. People have responded, and to such a extent that the moment the Internet will be used to capacity is not far away.

Now efforts are already underway to build Internet Two, a high-yielding, highly selective, and not gratuitous system for those who need it for meaningful and productive work. You need not overstretch the analogy to see certain parallels.

24 With the perspective of building a completely new campus, the only campus downtown in the whole of Germany, on the premises of the former IG-Farben complex, Goethe-University has a unique chance to demonstrate the suggested division of labor also in terms of architecture.

Managerial Requirements – A German Suggestion

Presenting a reasonably sound diagnosis of the problems of today's research universities, having a courageous idea of how a differentiated research university would have to look like in order to live up to its tasks, and knowing what to do in order to realize this idea is fine. However, it is not enough. Therefore, some thought ought to be given to the principal agent called upon to enact this reform, the management of research universities.

Until the late 1960s German universities were divided into four big faculties, and were governed by powerful professors, a less powerful board of governors, and weak deans and rectors. Students and assistant teachers or researchers had no say. It was a closed shop for professors.

The big university reform of the 1970s side by side with the opening of universities to all qualified high school graduates introduced democracy to university campuses. University parliaments, committees, quotas, and even politically oriented groups of students, assistant teachers, and professors with their respective floor leaders came into existence. University presidents became prime ministers of a sort, the deans stayed weak. Local ministries, real ministries, made sure that the democratic microcosmos "university" did not become too independent and autonomous. By now, this model of university management has reached its limits. Participation and commitment have slackened both among students and faculty. Committees tend to stall decisions rather than take them. Unsatisfying compromising reigns, and former fights for "common causes" have given way to a new egoism or "*sauve qui peut*" mentality. Today, university management has to be rethought.

As government legislation is not very likely to drastically modify or even abandon the present system, changes in management would have to be introduced gradually by the management itself. Reducing the number of committees and departments or strengthening the role of deans may help, but much more depends, I believe, on what university presidents do in order to modify the system from within.

I do not have an elaborate blueprint for new management. What I can offer, however, are a couple of rather simple suggestions of how to go about this task. These suggestions are based on three central concepts only, the idea of motion, the idea of competition, and the idea of

decision bound dialogue. Accordingly, the most important tasks of university presidents seem to me are to keep the ball rolling, to assure that the rules of the fight are respected, and to hear everybody before taking the final decision.

To keep people on the move by constantly chipping in new ideas and suggestions, no matter whether they refer to big or small issues, is promising indeed. Ideas and suggestions are coming back, purified or enriched, and go out again. Thus, a sort of centrifugal motion is generated among faculty, departments or committees. This motion prevents stagnation and fosters competition. Competition, however, very often tends to degenerate into a free for all with no holds barred, especially if egoism is as widespread as I think it is in present-day German universities. So, adequate measures have to accompany this management of centrifugal motion to make sure that the competition it has triggered remains a guided competition. Guided competition simply means that also those who are structurally, but not individually weak have their chances.

Now, when this centrifugal motion and the guided competition it has provoked starts separating the solid from the liquid, the more formal and time bound process of hearings has to begin. These hearings may include all sorts of interest groups, formalized or not. At all times, however, special attention must be given to the danger of log rolling. Hearings need to be concluded according to a time table defined by the president, binding decisions have to be taken, and after protests ignored.

The management of centrifugal motion, of guided competition, and of decision bound dialogue seem to be adequate alternatives to both outdated managerial models and modern entrepreneur-like models suggested by the followers of the ideology of globalization. They are superior because they are firmly grounded in reality and yet allow going beyond it.

Sustaining the Research Mission of the University of California

C. Judson King

My mission today is to talk with you about the situation of research funding in both the United States and the University of California. I would like to start with a few facts and figures which describe the environment within which research operates in the United States. First of all, if you take all university research in the United States, it is presently 60 percent supported by the federal government. That is down from 68 percent supported by the federal government in 1980, more than 15 years ago. The remaining support comes from industry, from foundations, from private gifts, and to some extent from institutional sources themselves. This number of 60 percent applies also to the University of California, forgetting for a moment the three large national laboratories which we manage. If the labs were included, the percent of federal support would be far greater than 60 percent.

Federal support of university research and development is concentrated into three agencies of the federal government. The largest amount by far comes from the National Institutes of Health, amounting to 53 percent of federal support to university research. That means that there is a very large proportion of medical and biological research in universities in the United States. The proportion of that in relation to, say, physical science and engineering is much higher in the U.S. than most other countries. The second largest support for university research comes from the National Science Foundation, about 15 percent. And the third is the Department of Defense, which is 12 percent, which is not far behind that of the Department of Energy.

How about industrial support of academic research and develop-

ment? That was 4 percent of the total percent in 1980, and it has risen to 7 percent in 1995. So, there has been a period in which there has been a rough doubling of the proportion of academic research supported by industry. And then another interesting part is the institutional share, the share that comes from the resources of the university itself for supporting academic research. According to the *Annual Indicators Report* of the National Science Foundation, the institutional share of support for academic research grew from 13.8 percent in 1980 to 18.1 percent in 1995. That is, it has increased by a substantial proportion, too. This relates to growing concerns on the part of the federal government that there should be some sort of pledge of faith or true interest by the institution in a research project, and that, therefore, the institution's own resources must be pledged in a real way to the research project. When you start looking at what the institution's own resources are, you find that the institution will tend not to have resources that are pegged for that purpose, so they have to budget for that purpose. This is a source of some strain on university budgets and a major current concern.

Federal grants are the primary source of support for graduate students in the fields of science and engineering. Federal grants that come from mission-oriented agencies, i.e., agencies that have other concerns than research, and are intimately tied to the nature of postgraduate training and to the issue of what academic research is. Finally, there is an increasing role for academic research within the total research and development of the United States, and it is R&D not just R that I'm talking about. In 1980 U.S. $6 billion were spent on academic research and that was about 10 percent of total U.S. R&D. By contrast, in 1995 U.S. $22 billion were spent, and that was about 12.5 percent of total U.S. R&D. This in part, in large part, reflects the winding down or redirection of industrial research. 30 years ago, we had many large corporate laboratories with fundamental research missions. Think, for example, of Bell Laboratories and IBM, and in my own field DuPont, Exxon and Shell Development. All of these have redirected their internal research to much shorter time frames and in most cases much smaller research budgets. There has been an interesting question of the extent to which academic research can take the place of fundamental industrial research. It cannot do so completely, because academic research goes

only so far, to the point of discovering, developing of new ideas and codifying knowledge. There remains beyond that the need for a company to pick up new knowledge and mold and extend it for the company's own development and implementation of new technology.

Recently in the United States the federal funding of academic research has been strongly affected, indeed threatened, by the drive to balance our federal budget. Research is in what is called the discretionary portion of the federal budget. That is the portion that Congress can actually do something about. The rest of the budget is mandated in ways that require far more fundamental changes in order to affect the funding. The American Association for the Advancement of Science, the AAAS, has conducted studies over the last two years which project a decrease of about 25 percent in the funding of academic research from the federal government, by the plans of either the Republican or the Democratic Parties for the coming five to seven years. Interestingly enough though, present outcomes are different. Politicians are prone to say that they will balance the budget over five years or seven years, but that they will do most of the balancing in the out years. It is also true that both political parties in the United States have been recently stressing the importance of research in a sort of "I can do better than you can" approach to it all. The result is that the current budget under discussion with the President of the United States, has a 2 percent increase for research which is a little below inflation, but for the National Institutes of Health and the National Science Foundation, it's a 3 percent growth. And even the out years of the lowest budgets under consideration, it's a 1 percent increase, which is again below inflation but nothing like the 25 percent reduction that was projected not so long ago.

We, like all universities, worry about how to sustain our research mission and research role and the health of our research in this current situation. The University of California is a public university. It is accountable to the state. It derives some of its funding from the state government, interestingly, somewhat less than from the federal government. And therefore we have a concern about demonstrating the worth of our research to the State of California, to its people. We also need to demonstrate the worth of our research to the federal government. Because, much more, the funding of research, by the federal

government is based upon measures and concepts of positive results to the economy and to society from that research. This calls in some sense for a renewal of a land grant mission, a concept peculiar to the United States.

In the 1860s the historic Morrill Act created the wherewithal for public universities in the United States. It created a pact with society, whereby it was expected that the public university would provide great access to education and would as well, in such areas as agriculture and mining, make available the new advances that would develop the economy in those areas. We went from that to a situation where over the last 50 years the defense budget and the defense needs of the United States was what the research mission would support. With the end of the Cold War that has become less of a driver. We have therefore been, for a number of years now, in a situation nationally where the work of research, what the research addresses, what our national mission is, and the major remaining defense mission are all subjects of vigorous debate. I think that the need to reestablish the land grant pact in terms of what the research universities should be doing today is a very basic and fundamental need. It is also one that applies as much to private universities as it does to public universities because of the fact that the argument has to be made for the federal support of research. The federal support of research does not differentiate between public and private universities. So we have a major need to make our ivory tower more permeable to the outside world.

One thing we have done at the University of California the last couple of years is to stress the development of an industry-university cooperative research program. For about 15 years, we have had a very successful program called the MICRO Program, which brings the university and industrial companies together on core research in microelectronics and computing hardware and software. That program has been funded by about U.S. $5 million a year from the state budget. It waives overhead for industrial participants. The industrial firms partner with the university and state in financial support of the research. At present the program brings in about U.S. $10 million of private funding in industrial money per year to pair with the U.S. $5 million from the state. Also the program is over-subscribed and competitive. The recipients of the grants are selected by a process in which a company and

the university researchers submit a proposal jointly with the company's portion of the cost coverage indicated in the proposal. And this then goes before a board that selects the grants to be funded.

We are now taking this concept and extending it to several other areas. The first of these has been biotechnology, where we have a program of comparable size that has been in business for about a year at this point. The state and university have been willing to invest in that to the extent of U.S. $5 million a year. And we have put together a board of people from the business world and from the university with the mission of selecting which field comes next, as hopefully the state becomes able to fund this program at a higher level. The selection criteria for fields will have much to do with what will drive the economy in California. And so we look locally in the State of California for what it is that we are trying to develop. Obvious candidates after biotechnology and microelectronics are industries like multimedia, communications and transportation.

Another thing we have started doing recently with some success is to document the effect of the university's research on the state economy. It so happens this can be done rather readily in some cases. We have done it in the field of biotechnology, where you can actually look at the flow of inventions through patents to the starting of companies and the development of those companies. You can look at the flow of people by following specific persons who started the industry and how they came out of the university. And you can measure where the industry is; a very high proportion of it is within 30 miles of a University of California campus. This is a good story, and I think it's been important for generating the support within our state government that has led to the industry-university cooperative research initiative.

We do, of course, need think about whether in gaining industrial partnership support we are preserving the nature and freedom of basic research. That need exists on the one hand, while on the other hand we need to be able to demonstrate and explain the value of that research to the public sufficiently. Those of us in the research world know the importance of serendipity. It's wandering in research and finding something that you would not have thought beforehand that you were going to find. The case for that has to be made, too. I think this has become a little easier when we recognize that in some of the more active fields of

research, and I will again pick biotechnology, the nature of interactions and the ways in which ideas flow from university to industry have changed. The relationship between the university and the industrial world has become more intimate with regard to the development of new concepts and the ways in which they feed business endeavor. If you will, classically there has been a linear, or sequential, model in which research is done first, some of it is further developed, and some of that goes on to industrial commercialization. Now there are more recycle loops, and often you can't say who's doing what within a university-industry partnership. And so it has become a more intimate engagement with business development while still, I think, retaining the fundamental and "lure of the chase" aspects of research.

I should say a few words about how the research agenda is set within the university. That of course implies that it is somehow set! A story that occurred to me in this context is one that came from Mike Heyman, a former chancellor of the Berkeley campus. He liked to tell often of how, when he came into the chancellorship, he searched for the levers of power – big polished handles. And he pressed the levers of power and manipulated them, and discovered they weren't attached to anything! This is similar to our trying to set the agenda for research in a university. So how do we do it in fact? And we do do it to a significant extent. One thing we do in university planning is to decide in what fields we are going to hire faculty. Within the University of California it is typically the field of research within the discipline which the department defines and sells, if you will, to the combination of the Faculty Senate and the Administration in order to get recruitment offers. That is a 30 year decision, in that the faculty member remains active in that field, albeit with projects and approaches evolving over the years. Those are very important decisions and have everything to do with the research agenda of the university. Those faculty, once hired, then pursue the ends of intellectual excitement; the lure of the chase in research, and they go where they go. They have to partake in the lure of the chase in order for research to be research.

There is another thing that sets the agenda considerably in this country and that is the federal agencies – what their budgets are and what they choose to stress. Even in the National Science Foundation, there is turnover in the positions that head the various directorates. Often the

person who comes in on one of those turnovers has an entirely different view than the predecessor as to what is important to stress. So there is some change, and not always well designed change, in the research agendas of the federal agencies, and they will then put out corresponding requests for proposals, RFPs, in whatever area defined as important for that year.

So what can a university such as the University of California do about influencing the research agenda? The first thing that we can and do do is work to influence the federal research agenda. We work with other universities through organizations such as the Association of American Universities (AAU). The second thing we do is internal planning. We do encourage, in fact require, campus departments to have plans – five year plans, ten year plans, etc. Colleges within the university may also have such plans. And in these plans, the patterns of recruitment are analyzed and set. We can also exercise and support priorities through Organized Research Units. There is an organized research budget within the university. It can be moved around from one area of research to another, not easy to do but it is within our capability.

Then, at the University of California we have nine campuses, and in many ways we function as one university. In other ways we are nine quite independent and competing universities. One area where we need to be one university is the library, particularly as we go to electronic libraries. We don't need nine of those: One will do just fine. We obviously need to have considerable cooperation among the campuses in that area, and we are indeed starting such a venture.

Another thing that we have been looking at is how we could get more synergistic planning among the nine campuses, while retaining the individual autonomy and the wherewithal of each campus piloting its own path to the top, which I think has been much of the secret of success at the University of California. What has worked best so far has been a cooperative effort of the academic vice-chancellors of our nine campuses. They meet monthly and have an agenda dealing with all sorts of very pragmatic system-wide issues. Recently they also started talking among themselves about what they saw as the situations for their campuses with regard to academic development. This was a natural topic when very severe state budget problems had developed,

yielding about a 20 percent decrease in dollars and a 33 percent decrease in workload funding. We absorbed much of this budget cut with a series of voluntary early retirement programs. 28 percent of the Berkeley campus faculty retired during the three waves of this program. Those retirements occurred in a quite random fashion. Some departments were thoroughly depleted, and others were not touched at all. It just depended on who was at the age and condition to have sufficient incentive for early retirement. So there was a need to recover from this situation, particularly in some areas where there are numerous sub-disciplines. Campuses were faced with the fact that they could not rebuild to the breadth of disciplinary coverage that they had previously had. So the vice chancellors had several conversations on this point, and then started a series of endeavors where they met with those deans having responsibility for certain areas. This has happened in about eight different areas at this point, including history, physics and education, among other fields. They have followed different courses of subsequent action for different disciplines after these conversations with the deans.

The area that has gotten the furthest so far is history, where there are large numbers of sub-areas. There has now been a retreat of history chairs and history faculty. Another one is coming. There are now system-wide meetings of medievalists, historians in science, and so forth, to have conversations. As a result of departments and campuses being open with one another as to what their aspirations are, it has been possible for campuses and departments to see where there is an opening, an opportunity. And so we have cases where history departments on particular campuses have discovered the other campuses aren't going to be covering a certain field, and so have chosen that for development themselves.

Another area in which these efforts have been successful is physics. There are two essential differences, however. One is that there is no interest in physics departments in carving up sub-disciplines among the campuses. They don't want to do that collectively. And they also will do it themselves, thank you. They have also come up with numerous activities designed to stimulate research interactions across the campuses and national laboratories.

One final aspect that is specific to the University of California and

that we have tried to work with as a national model, is this matter of interactions between the national laboratories and the universities. The three national labs that we manage have among them a combined budget of about U.S. $2.3 billion per year. We have looked for ways in which we can be a catalyst for cooperation, not just between U.C. campuses in the labs, but also to try to create situations that can accomplish cooperation between those labs and the universities of the United States in general. I think we even have been able to influence the Department of Energy's mission priorities to some extent in this way. Certainly many other factors came in on this as well, but I think U.C. has influenced the development of a recent initiative known as ASCI that comes from the Assistant Secretary of Energy for the Defense Programs. This is a major research program, a partnership, between the defense nuclear weapons program and universities, seeking to stimulate cooperation and interaction between the two.

So what I have tried to do in a few minutes here is to give you some idea of the environment within which United States' academic research finds itself, and the concept of having to reestablish the land grant pattern for all sorts of universities. I have outlined how we do serve societal needs and some of the ways in which we serve California in particular. And I have indicated how the United States and California go about planning for research generally.

Launching a National Research Endeavor in the United States

Patricia J. Gumport

I am honored to address this group of distinguished colleagues and guests about our current research on higher education policy issues in the United States.[1] My perspective is that of director of a multi-million dollar, federally funded research center. My remarks will focus on the political and process oriented dimensions of launching this complex research endeavor. I will include some general description of the research agenda, but I will not go into depth on the challenges of pursuing research in specific domains. As you will soon learn from my remarks, we face an ongoing set of challenges that may be of interest to higher education researchers, policy-makers, and university leaders in other countries.

In September of 1995, those of us who study higher education in the United States faced an unprecedented opportunity. The United States Department of Education's Office of Educational Research and Improvement (OERI) announced that a five year grant of U.S. $12.5 million would be available to establish a national center to conduct research and development on improving postsecondary education. The grant was to be administered by the National Institute on Postsecondary

1 This essay is drawn from my presentation entitled "Strategic Choices for Higher Education Research and Policy in the United States" at the Universities in Transition Conference, March 20, 1997. I wish to acknowledge Dr. Hans Weiler for inviting me to contribute and for suggesting parameters for this essay. The writing of this essay was, in part, supported under the Educational Research and Development Center program, agreement number R309A60001, CFDA 84.309A, as administered by the Office of Educational Research and Improvement (OERI), U.S. Department of Education. The findings and opinions expressed herein do not reflect the position or policies of OERI or the U.S. Department of Education.

Education, Libraries and Lifelong Learning. While there have been other national centers addressing postsecondary education issues established through this agency, this was the largest to date for higher education researchers and policy analysts to come together in a collaborative venture. My colleagues and I won the competition, and our center has been in operation for a year and a half.

Assembling the Grant Proposal

The Request for Proposals was widely distributed from the Department of Education. By the time we received it, we had only eight weeks to prepare a technical proposal, budget, budget narrative, and supporting materials.

The Request for Proposals served as a guide for proposal preparation. It included thematic expectations and functional requirements as well as information on logistics. Of the former, there was a General Absolute Priority for a national center to do the following: to conduct research and development of national significance, to develop and advance theory, to conduct scientifically rigorous research, to conduct work to provide definitive guidance to decision makers and policy makers, to address issues of equity and excellence, and to document, report, and disseminate information.

If this mix of expectations was formidable, the mandate for research issues was daunting. Two features were particularly striking: the emphasis on doing research that would improve quality, productivity and outcomes of postsecondary education and the wide range of issues that we were asked to address. It was also stipulated that the research and development activities must relate to three or more of the following specific issues: improving transitions from school to work; improving students' participation, academic achievement, and employment; enhancing professional development; improving learning and assessment; and containing costs while improving productivity and accountability.

Responding to these expectations in the Request for Proposals with a coherent plan was only possible if we could assemble a national team of collaborators across universities. Based upon what we knew of one

another's respective strengths, we formed a team of distinguished researchers with a wide range of scholarly perspectives and professional expertise. We invited colleagues at Stanford University, from the Center for the Study of Higher and Postsecondary Education at the University of Michigan, and from the Institute for Research on Higher Education at the University of Pennsylvania.

Devising a detailed five year plan is challenging, and doing so in an eight week period is a most ambitious undertaking. Like me, each senior researcher was a faculty member and had to juggle those responsibilities while drafting research plans and budgets for the center proposal. We met once at Stanford to discuss how we could bring our resources together most effectively; otherwise we collaborated via telephone, fax, and electronic mail. The major intellectual and financial challenge was to lay out the research plans and tie them to a detailed five year budget of U.S. $2.5 million annually.

My colleagues and I faced the challenge of knitting together separate research plans to amount to a compelling and comprehensive proposal that addressed the government's expectations. We agreed that a major premise for the center was to suggest that postsecondary education in the United States is facing a set of extraordinary challenges, for which policy makers, administrators, faculty, students, employers and funders need research. We also agreed that environmental demands are at once competing and not easily reconcilable. Such demands range from containing the costs of higher education to restructuring internal processes, from accelerating the education of remedial students to improving student transitions between education and employment, from demonstrating academic and employment-related outcomes of higher education to improving the quality of teaching and learning. We agreed that our aim was to provide research that could inform policy and practice for the improvement of postsecondary education in its diverse institutional forms across the United States.

From this common framework, we devised a strategy to both link and differentiate our research projects. The linking would occur thematically through delineating the environmental demands on a specific part of the postsecondary enterprise. At the same time, the research agenda was divided into six areas, each serving as an umbrella for several research projects that would vary in duration from one year to

all five years. The first research area was to provide an overview of research and theory on how colleges and universities in the U.S. adapt to shifting environmental demands. The remaining five areas were to correspond to those identified in the Request for Proposals: Transitions in Education and Work; Postsecondary Achievement and Employment Outcomes; Professional Development to Enhance Teaching and Learning; Student Learning and Assessment; and Improving Quality, Productivity and Efficiency. Several of the senior researchers were already well-known for doing research in these areas, and we sought to leverage that work by applying the lessons that had already been learned to the most pressing contemporary issues facing us today.

Another key component at this stage was to envision the center's infrastructure. With myself as Executive Director, we could house the new center at Stanford University as the major project within the Stanford Institute for Higher Education Research, for which I serve concurrently as Director. We needed to build a staff that could anchor the center's operation at Stanford, for example to manage the grant's research projects and budgets, to act as a liaison and handle reporting to the government, and to provide leadership for dissemination and outreach efforts. For oversight of the center, we established a six-person Executive Committee comprised of senior researchers from each university, and we assembled a Board of Senior Schools, 14 distinguished researchers and national leaders in postsecondary education who were willing to guide the center's work.

In the last two weeks of the proposal preparation, we enlisted the assistance of several of our graduate students, a professional writer, and staff people to help write, edit and proofread the 400-page document that was to become our proposal. We worked around the clock to complete it. On December 14, we sent via overnight mail to Washington, D.C. five boxes containing 13 copies of the proposal. Its reproduction for the government, reviewers, and principal researchers amounted to a copying cost of over U.S. $1,500. The Dean of Stanford's School of Education supported this and other proposal preparation costs; those at our collaborating universities also gave generously of their time and funds as needed.

Building an Infrastructure

In February of 1996, I received a phone call informing me that our proposal to establish the National Center for Postsecondary Improvement (NCPI) was enthusiastically reviewed by the reviewers and selected as the grant recipient. I hired an administrative assistant, and we were off and running. Just as proposal preparation requires a team effort, building an infrastructure necessitates dedicated staff members who are willing to start from scratch, think creatively, and believe in the center's mission. We have been fortunate to find such individuals, who together as a team possess much perseverance and resilience.

As one might expect, the early stages of setting up the national center entailed a number of surprises. The surprises necessitated repositioning a number of our resources and revising our plans.

The first surprise was to change the start date, to begin in April rather than June as proposed. The rationale was that Congressional funds had already been appropriated, and there was some concern those funds needed to be distributed right away. As you can imagine, the difficulties were many, since our senior researchers were already committed with teaching and research responsibilities. At the same time, the second surprise was that we only received one quarter of the first year's funds. This meant that we needed to scale back our goals for the first year dramatically. Four months into the year, we ended up receiving the rest of the Year One funds, and then accelerated our planning. Nonetheless, this disruption in Congressional funding had a ripple effect that we are still aware of today. The third surprise concerns some uncomfortable dynamics that arose within the small professional community of those who identify as higher education researchers. As colleagues selected one another to serve on their teams, some individuals were of course left out. Moreover, once the results of the competition were announced, some of those who did not win raised questions with the funding agency regarding its review procedures. While these dynamics may be present in any competition of this type, I believe that the magnitude of this grant amplified them. Thus, in the aftermath of the grant competition, I think it will be challenging to locate peer reviewers who can serve as both knowledgeable and impartial judges of the progress and, ultimately the success, of our center's contributions.

At the same time that we worked on these initial challenges, during the first year of operation, we built the infrastructure at Stanford, Michigan, and Penn. This entailed hiring graduate research assistants and administrative assistants, locating office space, and setting up budget and accounting procedures.

Working closely with one another across campuses, the project area directors worked with their senior researchers to launch their projects. Each project area identified one or more unifying questions. They are described below:

Postsecondary Organizational Improvement: Restructuring and Beyond

How do colleges and universities adapt to shifting environmental demands? Project Area One examines how individual campuses as well as state systems of public higher education are responding to demands for cost containment, increased accountability, and affordable access. In the contemporary era, such demands call upon postsecondary organizations to examine the outcomes they produce, to justify the resources required to produce them, and to reconsider the design of academic and administrative structures and processes. Through analyses of national data bases and case studies, the projects also aim to provide insight into how colleges and universities are handling internal tensions in academic program change and governance, alongside dilemmas of academic planning. The overarching objective is to identify reorganization and resource reallocation strategies of successful campuses and state systems.

Project Area One is led by Professor Patricia Gumport of Stanford University.

Transitions in Education and Work

How can we improve students' transitions between school and work – especially in light of changing economic and workforce demands? Can we create more effective links between educational institutions and

employers? By examining the flow of young people through various institutions, the problems they face when they move from school to work, and the ways they respond to signals from the labor market, this project area will inform initiatives that can significantly improve transitions from the classroom to the world of work.

Many of the research activities in this project area will draw on existing survey data of employers and employees and on new data to be collected from three national surveys conducted with the Bureau of the Census in collaboration with the Consortium for Policy Research in Education (CPRE): The National Employer Survey, which will ask employers detailed questions about their workforce's education and training; The National Employee Survey, which will assemble a sample of workers drawn from establishments participating in the Employer Survey; The National Survey of Heads of Households Aged 35–55, which will include the experiences of students' parents. These surveys aim to capture the employment outcomes associated with postsecondary education as well as the value that employers, employees, students, and parents attach to schools, colleges, universities, and other training and education providers.

Project Area Two is led by Professor Peter Cappelli, Chairman of the Department of Management at the University of Pennsylvania's Wharton School and Co-director of the Center for Human Resources, and draws on the expertise of several noted policy analysts.

Postsecondary Achievement and Employment Outcomes

How does a student's educational experience affect his or her academic achievement? And how does it influence his or her employment choices and success? Our primary goal in Project Area Three is to quantify the academic and employment related outcomes of a student's postsecondary education. Through data collected at the individual and institutional levels, the project tracks the paths of students as they progress through a college or university. It will then relate their experiences – the kind of institution they attend, the curriculum they choose, co-curricular activities, enrollment patterns, financing issues, and work experiences – to their overall academic achievement and later employment.

We will also investigate the effects of a higher education market shaped by student choices, including how "college quality" affects students' future opportunities, focusing in particular on community colleges, which have been significantly understudied. These findings will comprise a "tool kit" that will provide institutions with a set of benchmarks against which to measure their own students' performance.

The research team is led by Robert Zemsky, Professor of Education and Director of the Institute for Research on Higher Education at the University of Pennsylvania.

Professional Development to Enhance Teaching and Learning

How can we create a more powerful culture of teaching? And how can we accelerate the education of underprepared students? In an effort to improve teaching and learning, we seek to investigate the effectiveness of a number of professional development initiatives within community colleges and comprehensive postsecondary institutional settings.

Led by Lee Shulman, Charles E. Ducommun, Professor of Education at Stanford and recently-appointed President of the Carnegie Foundation for the Advancement of Teaching, Project Area Four's research activities refine and test several innovative teacher development strategies that have been successful in both the higher education and K-12 school areas. These include enhancing the culture of teaching in colleges and universities; the redefinition and assessment of postsecondary scholarship; improving learning performance of underprepared students through acceleration; and encouraging professional commitments to educating low-income students. Joining Professor Shulman are Pat Hutchings and Mary Huber of the Carnegie Foundation, Stanford Professor of Education and Linguistics John Baugh, and Stanford Professor of Education Henry Levin.

Student Learning and Assessment

What are the assessment mechanisms that enhance students' learning? How do institutions respond to external and internal pressures for

assessing student learning? Project Area Five examines the effectiveness of assessment mechanisms as they relate to improving student learning from three distinct vantage points – from outside the institution through state policy and accreditation practices, from within the institution as it seeks to respond to change, and from the perspective of faculty and students, whose lives are affected by the shifting composition and preparedness of the nation's student population.

Led by Michael Nettles, Professor of Education at the University of Michigan's Center for the Study of Higher and Postsecondary Education (CSHPE), the team of researchers include Eric Dey, Sylvia Hurtado, and Marvin Peterson, all faculty and CSHPE researchers at the University of Michigan's School of Education. The aim of their research is to discover connections across state, campus, and individual levels and to develop recommendations for improving student learning and instructional quality.

Improving Quality, Productivity, and Efficiency

How can we transform the environment within academic departments to drive the kind of real change that will improve undergraduate education? How can we improve both the quality and productivity of academic institutions? The focus of Project Area Six is on how colleges and universities can transform themselves to simultaneously improve the quality and productivity of undergraduate education. The project applies quality process concepts to the academic enterprise, examines the potential of information technology as an enabler of change, and explores other approaches to achieving quality assurance and accountability within the context of cost containment.

Project Area Six is led by William Massy, Professor Emeritus at Stanford University. The research team is collaborating with several professional organizations to identify, benchmark, and disseminate best practices for improving quality while containing costs in colleges and universities.

Becoming a Center

After a year and a half of operation, the National Center for Postsecondary Improvement (NCPI) is in a new phase of implementing our plans. Since the aforementioned research projects are well underway, we have turned our attention to two major challenges, one related to dissemination, and the other related to internal vision.

Mindful of our mission to improve postsecondary education, we are committed to disseminating our research to a broad array of stakeholders including students, parents, faculty, administrators, employers, funders, and policy makers. In collaboration with OERI and other organizations, NCPI conducts seminars, focus groups and conferences in which interested academics, policy audiences, and constituencies assist the center in exploring salient issues and reframing our research activities. NCPI utilizes a variety of mechanisms that enable the public to access research findings and communicate with NCPI researchers and staff. These include print publications and an Internet website (http://ncpi.stanford.edu). Much of this interaction with our stakeholders is intended to foster a dialogue. Given the decentralized nature of our national system of higher education, we hope that in a small way these mechanisms may begin to fill the policy vacuum that exists for postsecondary planning in this country.

At the same time, NCPI faces another challenge, which for lack of a better term, I have named "becoming a Center." Although NCPI funds almost 60 researchers around the country, few have yet to internalize a deep sense of the Center's mission. Our challenge in this regard is to have them not only understand and articulate the urgency of our national mandate but to work actively to translate their research into a form and language that is meaningful for our stakeholders.

In order to meet the challenge of establishing this internal vision, we will soon be hosting an inaugural NCPI Fall Forum at Stanford. This occasion is the first time all members of the NCPI research team have been invited to present their research, identify common themes, and discuss how research can better meet the pressing issues on the horizon for postsecondary education. I am optimistic about these efforts, and I look forward to keeping you apprised of our progress.

In conclusion, the establishment of the National Center for Postsec-

ondary Improvement coincides with a time of unparalleled changes for higher education and its stakeholders in the United States. In the wake of 50 years of rapid expansion, colleges and universities now face a changing mix of local, national and global pressures. While they previously asked, “Are we doing things right?” colleges and universities must now consider an additional question, “Are we doing the right things?” With this in mind, there is great urgency for higher education institutions in this country to determine not only how to adapt, but also how to improve and thrive amidst the fast-changing environment of postsecondary education. As recipients of this grant, we take seriously the urgency of our mandate, and we are honored to contribute in this way to the national dialogue with our ongoing research activities.

Interdisciplinarity: A New Academic Culture – Conditions for Its Success

Interdisciplinarity, and Its Problems

Jutta Fedrowitz

Interdisciplinarity – A Trendy Key Word of the 1960s, A Phantom in Science, Humanities and Education in the 1990s?

The increase in knowledge in academia and science is strongly connected with the diversification of disciplines and their atomization into sub-disciplines.[1] Because of this it is increasingly difficult to obtain an overview of particular disciplines. New knowledge is strongly connected with the evolution of sub-disciplines or new disciplines, yet the department structure does not tend to support such an evolution. Specialization and spatial separation isolate disciplines in such a way that they do not communicate, as well as being separated by new professional terminologies and by the walls (and budgets) of institutes. If philosophers hardly ever speak to historians, how, then, can the "two cultures," humanities and science, described by C.P. Snow in the 1950s ever be overcome?[2] Would philosophers ever talk to neurobiologists who are on their way to explain human consciousness? Would interdisciplinary cooperation ever become reality or is it a phantom, a hallowed academic ritual, no more than after dinner rhetoric, as Konrad Jarausch suspects?[3]

1 Jürgen Mittelstraß, *Interdisziplinarität oder Transdisziplinarität,* in: L. Hieber (ed.), *Utopie Wissenschaft,* Profil Verlag, München/Wien 1993.

2 C.P. Snow, *The Two Cultures: and A Second Look,* Cambridge University Press, London 1959, 1963.

3 Konrad Jarausch, *Clio and German Studies – Reflections on a Tenuous Relationship,* this volume.

To look at the (virtual) reality of interdisciplinarity (and if one regards the Internet as the new universal and ubiquitous source for quick and general information), a search of the Internet can be expected to result in information on the existence of interdisciplinary institutions, programs and publications. With the help of the Yahoo! system an Internet search for the key word "interdisciplinary" resulted in seven category and 389 site matches. Obviously interdisciplinarity is alive. What were the results?

Not surprisingly, colleges and universities represented the biggest category of institutions offering interdisciplinary courses and programs. To give some examples: The Stanford University's School of Humanities and Sciences offers interdisciplinary programs in feminist studies, a human biology program, mathematical and computational sciences and symbolic systems; its School of Engineering offers interdisciplinary programs. The California State University has a School of Social Sciences and Interdisciplinary Studies; the University of California, Berkeley, College of Letters and Science, offers Undergraduate and Interdisciplinary Studies; and the Western Connecticut State University's Social Science site describes B.A. and B.S. degree majors in anthropology and sociology, economics, political science, and interdisciplinary social sciences.

To give an overall impression of more specific activities, the list can be enlarged:

– University of Minnesota, Twin Cities: Interdisciplinarity of Archeological Studies;
– Wesleyan University offers a cross cultural, interdisciplinary, and critical program that explores the variety of religious experiences and expressions;
– State University of New York, Stony Brook: an interdisciplinary graduate program in biophysics with an emphasis on understanding molecular structures and functions of biological molecules;
– University of Connecticut, Institute of Materials Science: interdisciplinary programs in metallurgy and polymer science;
– University of Illinois at Urbana-Champaign: interdisciplinary graduate/faculty group discussing neuroscience, cognitive science, distributed artificial intelligence, and computational science issues for artificial neural networks;

– U.C. Los Angeles promotes interdisciplinary and cross cultural studies of early civilizations;
– Yale University, Center for Combustion Studies, an interdisciplinary research center, uses experimental, computational, and mathematical techniques to deal with the fundamentals of chemically reacting and multibase combustion systems.

Applied mathematics is an interdisciplinary course in Virginia State University, nutritional sciences at the University of Washington in Seattle, and catalytic upgrading of biomass derived materials at Michigan State University. American universities seem to offer a broad range of courses or programs with an interdisciplinary approach. These courses are connected to traditional disciplines like archeology or mathematics, or they can have a general approach like cultural studies. The label "interdisciplinary" seems to fit with both. If there is so much interdisciplinarity in teaching, what about research?

Interdisciplinarity – Reality in the Humanities, Boundaries Crossed in Science and Everyday Academic Life in Colleges and Universities?

Apart from courses and programs, the Internet search listed several research centers:

– the Earth Resources Center at U.C.B. serves as a site of interdisciplinary innovation in the field of non-renewable resources and the environment;
– the Center for Special Needs Populations at Ohio State University, Columbus, was established to provide interdisciplinary support for projects that focus on diverse topics related to social needs or at-risk populations;
– the Center for Transportation Research at Virginia Polytechnic Institute and State University is an interdisciplinary center focusing on intelligent transportation systems;
– the Center for the Study and Prevention of Violence at the University of Colorado at Boulder is an interdisciplinary foundation for understanding and preventing violence including a literature database, technical assistance and empirical research;

– the Sustainable Development Research Institute at the University of British Columbia focuses on the linkages between the environment, the economy and social institutions;
– the Stanford Transducers Laboratory is an interdisciplinary group dedicated to the development and application of micromachined sensors and actuators;
– Virginia State University has an Interdisciplinary Center for Applied Mathematics,
– the Institute for Materials Research at SUNY (State University of New York) Binghampton supports education and research in the interdisciplinary materials area, including chemistry, geology, physics and engineering;
– the Institute on Education and the Economy at Columbia University is an interdisciplinary research center with a focus on vocational education, school-to-work, on-the-job training, and employment;
– the American Indian Studies Research Institute based at Indiana University represents an interdisciplinary center for research projects relating to American Indians.

Though most interdisciplinary units are listed at U.S. universities, there are also some centers in Europe mentioned:

– the University of Kent in Canterbury has established a center for interdisciplinary research;
– the University of Würzburg supports a biocenter, an interdisciplinary institute for learning and research, comprising six biological, one chemical and three medical departments;
– the University of Limerick established the Advanced Sensors Research Unit, an interdisciplinary unit involved in the research and development of novel physical, chemical and biochemical sensing devices;
– the Interdisciplinary Center for Mathematical and Computational Modelling is situated at the University of Warsaw;
– the ETHZ Interdisciplinary Center for Supercomputing is located at the *Eidgenössische Technische Hochschule Zürich*.

More centers can be located off campus:

– the Fields Institute for Research in Mathematical Sciences in Toronto is a research center for applied mathematics and statistics, computer science and interdisciplinary collaborations;

– the Institute for Urban Family Health, New York, is focusing on the provision, development and education of interdisciplinary care;
– the Netherlands Interdisciplinary Demographic Institute is engaged in the scientific study of population and demographic trends.

Again, in some cases the "interdisciplinary" research centers are extensions of a discipline (i.e. mathematics or transducers as a subtype of electrical engineering), in most cases, however, the title of the institution indicates a field of research a single discipline could not cover (earth resources, materials research, sustainable development). In research, it seems, there has been some progress in establishing institutions with an interdisciplinary approach. What about the next higher degree of aggregation, interdisciplinary organizations?

Interdisciplinarity – Bringing Science into Society or Synonymous with Quackery?

The Internet listing of interdisciplinary activities also revealed organizations connected with the label "interdisciplinary" which follow various missions:

– the Society for Utopian Studies, an international, interdisciplinary association which aims to study utopianism in all its forms;
– the Association for Politics and the Life Sciences, an international interdisciplinary association for scholars, scientists, and policy makers concerned with problems or issues that involve both politics or public policy and one or more of the life sciences;
– the David M. Kennedy Center for International Studies, an interdisciplinary center for the study of international relations and culture;
– the Human Behavior and Evolution Society, an interdisciplinary society of researchers from social and natural sciences who use evolutionary theory and studies of animal behavior to better understand human nature, behavior and sexuality;
– the Critical Thinking Community promotes interdisciplinary educational reform;
– the LAB, a non-profit interdisciplinary artists' organization which supports experimental, visual, performing, media, audio, and literary art in San Francisco;

– the Rural Institute, an interdisciplinary organization supporting the full participation of all rural residents with disabilities in community life;
– the *Bayerischer Klimaforschungsverbund* is an interdisciplinary co-operation for research on climate changes in Bavaria and their effects on microorganisms, plants, animals, and man;
– and, last but not least, the Society for Interdisciplinary Studies is a U.K. based organization which claims to be the oldest and most up to date society for catastrophic information and research.

Among the interdisciplinary organizations listed on the Internet, which certainly does not cover all existing organizations, there are few scientific organizations as the *Klimaforschungsverbund* or the David M. Kennedy Center. In this group, the majority of organizations follow non-scientific missions such as utopian studies, "critical thinking" or catastrophic issues. The three lists of examples show that there is a demand for interdisciplinarity in education, science and society. In the field of education, the examples prove that interdisciplinary programs are normal for American universities and colleges. In general, there are few to no listings from Europe. To summarize, all efforts can be roughly divided into three groups:

1. In many cases they seem to give an overview or an introduction into scientific fields, as do the Berkeley, Stanford and California State University undergraduate courses.
2. Often they represent extension programs crossing the boundaries of a given discipline or to introduce problem oriented studies which cannot be offered by the disciplines (regional studies, gender studies, ethnic, environmental studies).
3. In other cases, most of them found on the list of organizations, they just seem to use "interdisciplinary" as a fashionable keyword to obscure arbitrary contents.

Expectations of Society Toward Science

During the second half of this century society or better global societies are confronted with a number of complex problems. Environmental problems such as global warming or pollution, poverty and migration, are problems global economies have to deal with and, if possible,

solve. Politics alone cannot effectively take action without a solid basis of data and information. New technologies have to be assessed for their costs, profits and consequences for society and nature. Often, ethical questions have to be taken into account before making decisions. Even relatively simple decisions such as building a new highway call for experts from different fields to consult with the decision makers.

The new opportunities in medicine and technology offer to patients and physicians new kinds of decisions unthinkable only ten years ago.

To whom shall new methods of prenatal diagnostics be offered? To risk groups, to mature mothers older than 35, to all pregnant women to make sure no children with chromosomal aberrations will be born? What is the relation of risk (of wrong diagnosis), advantage (for the future mother who can make sure her child has normal chromosomes), and costs (for the diagnosis itself or for additional diagnosis in case of non-standard results or for therapy of parents panicking because of these results)?

What medical, psychological, and social consequences would e.g. be caused by a do-it-yourself AIDS test?

General practitioners will certainly need some scientific updating of their education if confronted with new diagnostic methods. But more, these questions are not only problems of science and medicine, they demand interdisciplinary answers also from psychology or sociology.

If we just think of basic needs such as food, water, communication, transportation, health and education everybody can immediately imagine societal problems connected with these needs which demand scientific research and results to improve the situation. Unfortunately these problems refuse to reflect the disciplinary structure of the sciences and arts system. Again, only interdisciplinary research can give the answers.

Interdisciplinary Experience in Germany

In Germany, the research system is very diverse, as Dagmar Schipanski, former head of the German Science Council explained.[4] Only a few categories of institutions with an interdisciplinary profile exist. The first

4 Dagmar Schipanski, *Structures of the German Research System*, this volume.

category comprises mainly research institutes with a defined scope of activities in applied research such as Fraunhofer institutes for materials research, atmospherical environmental research, or biomedical technology. The second category comprises national research centers (Hermann von Helmholtz Association of German Research Centers). Again, these institutes have a defined field of disciplinary research activities which require a certain amount of interdisciplinary cooperation. The third category is an exception: those insitutions which foster interdisciplinary cooperation in general rather than confined to a single discipline. Three institutions may serve as examples for different approaches within the third category: the Center for Arts and Sciences in Düsseldorf, the Center for Interdisciplinary Studies on Technology in Darmstadt, and the Center for Interdisciplinary Research at the University of Bielefeld.

The *Wissenschaftszentrum Nordrhein-Westfalen* (Center for Arts and Sciences North-Rhine Westphalia) in Düsseldorf is outstanding in initiating interdisciplinary dialogues attempting to bridge the gap between the "two cultures." The Center for Arts and Sciences was founded in 1985 as an institution of the State of North-Rhine Westphalia and does not carry out research but is connected to the University of Düsseldorf by its president, who simultaneously is the *Rektor* (head) of the university. Its mission is to organize the dialogue between science and arts, the economy, politics and society. It defines themes of interdisciplinary interest where more and intensified cooperation is needed. Questions of societal demands, ethics, technology assessment and cultural change are connected with recent developments in science, technology and medicine. In this respect, it also serves as a consultative resource for the North-Rhine Westphalian government. Working parties, discussion groups, workshops and conferences as well as a journal are the instruments to enhance the discourse. Three examples for projects of the center, which have been regarded as successful by experts, politicians and the media, are major conferences such *as "Kultur und Technik im 21. Jahrhundert*" (Culture and Technology in the 21st Century),[5] an interdisciplinary conference discussing the changes brought

5 Gert Kaiser, Dirk Matejovski, Jutta Fedrowitz (eds.), *Kultur und Technik im 21. Jahrhundert*, Campus Verlag, Frankfurt/Main, New York 1993.

about by two main fields of technological development: information and communication technology as well as bioscience. The second example is the "*Ökolog*"[6] conference, a public dialogue between ecologists and economists which had been missing in Germany for a long time.

The third example is the "Neuroworlds" conference,[7] in which an interdisciplinary dialogue between brain researchers, philosophers, neurobiologists, theologians and psychiatrists took place. This conference asked the question whether neurobiologists are on their way to answer questions about the consciousness of being human philosophers have been asking for centuries. It gave first answers to the question whether new ethics are needed regarding progress in brain research.

The meetings and conferences of the Center for Arts and Sciences clearly showed some existing problems of interdisciplinary cooperation. The first problem is to find experts who are not only renowned experts in their field but have experience in transcending their discipline and are willing to seriously discuss with experts from other disciplines, not fearing to be discriminated against by their peers. The second problem is the different scientific concepts, notions and methods of the respective disciplines which have to be understood and accepted as independent and valid. As Konrad Jarausch points out,[8] even within the humanities communication is lacking: "Germanists once again consider historians only useful for providing a temporal framework, while historians tend to think literary critics merely helpful in sketching the intellectual atmosphere of the period. Individual exceptions notwithstanding, neither side takes the other's methods or paradigms seriously."

Gerhard Roth, biologist and philosopher, former head of the Institute of Brain Research of the University of Bremen and now Director of the *Hanse Kolleg* in Delmenhorst, pointed out the difficulties in understanding other disciplines in his provoking contribution to the Neuroworlds conference "Does brain research need philosophy?"[9]

6 Michael Henze, Gert Kaiser (eds.), *Ökolog*, Campus Verlag, Frankfurt/Main, New York 1993.

7 Jutta Fedrowitz, Dirk Matejovski, Gert Kaiser (eds.), *Neuroworlds: Gehirn – Geist – Kultur*, Campus Verlag, Frankfurt/Main, New York 1994.

8 Konrad Jarausch, *Clio and German Studies – Reflections on a Tenuous Relationship*, this volume.

9 Gerhard Roth, *Braucht die Hirnforschung die Philosophie?*, in: Jutta Fedrowitz, Dirk Matejovski, Gert Kaiser (eds.), *Neuroworlds: Gehirn – Geist – Kultur*, Campus Verlag, Frankfurt/Main, New York 1994.

According to his experience, a philosopher would need about three years of close contact to a neurobiology laboratory to understand what neurobiologists are talking about. This, of course, is true vice versa and demands time, interest, good will and, last but not least, funding, just to mention another obstacle for interdisciplinary cooperation.

However, such efforts would be rewarded by a positive resonance in the public, which might even improve the funding situation for interdisciplinary efforts. The Center for Arts and Sciences succeeds in being a catalyst for interdisciplinary dialogue. For the implementation of continuous interdisciplinary research, other institutions have been created.

The Center for Interdisciplinary Studies on Technology at the Technical University of Darmstadt was founded in 1987 to "examine the social and ecological consequences which flow from industrial applications and to examine possibilities for monitoring general trends in technological development" as Evelies Mayer, one of the founders of the Center, describes its mission.[10] Scholars from different fields, mainly technical and social science carry out short or medium term projects. The Center is supported by the university and connects its projects to research in university departments, giving input also to teaching programs of the university. Its structure as a Center within the university tries to overcome three main problems of interdisciplinary cooperation: time (for a sustained exchange between the disciplines), structure (flexible and independent of the departmental structures of the disciplines and their control of research content), and money (commitments by university and funding organizations instead of budget cuts). Especially the latter has been a problem during recent years.

The third interdisciplinary institution of note is the ZiF *"Zentrum für interdisziplinäre Forschung"* (ZiF, Center for Interdisciplinary Research) at the University of Bielefeld. Of the three institutions it has the longest established tradition. Founded in 1967 as a separate unit close to the university it has been not only a scientific center of the university but also an internationally renowned institution. Understanding that one main problem of interdisciplinarity is a linguistic one, it has from the beginning invited international scientists and scholars, presuming that language differences are much easier to overcome than terminological

10 Evelies Mayer, *Interdisciplinarity: The Endless Frontier*, this volume.

differences. The mission of the ZiF could be described by "getting different disciplines round the table on a long-term basis in a relaxed atmosphere" as a counterweight to the extremely high degree of specialization in academia.

It concentrates on set topics, for this reason the work at the ZiF is not characterized by developing a theory about interdisciplinarity but by subject oriented research. Research "at" the ZiF and not "of" the ZiF is another unique trait of this center: Research groups of 15–25 members from different disciplines cooperate for about a year. Apartments and studios enable the scholars (and their families) to live and work at the ZiF for a period without entering a contractual relationship, but on the basis of salary compensation or visiting professors positions. Research groups are invited in accordance with the scientific directorate's (consisting of four professors of Bielefeld University) research agenda. They deal with very different topics, e. g. "Biological Foundations of Human Culture," "Interaction of Oriented Molecules," "Practices and Social Order," or "Fuzzy Logic and Neural Networks." Special facilities such as meeting rooms, a plenary room and a club room for discussions "at the coffee machine," an indoor swimming pool and the proximity to the university and its library and laboratories have been creating – according to Norbert Elias – a college atmosphere for more than 25 years.

Because of this tradition the ZiF is a model institution in Germany. It has been working quietly and continuously without fanfare so that politicians, the public and the majority of the respective scientific communities are not continously reminded of its achievements. A sad consequence is that politically motivated funding often goes to create new institutions without reviewing the needs of existing institutions as the ZiF. A renowned institution such as this must be enabled to continue its work with new topics of basic research *inter disciplinas* and to enhance working groups following topics of societal demand.

Societal demands of course differ from the demands of academic communities, and funding for science and education is more and more restricted. Thus, choices have to be made by governments and universities to define university profiles, their knowledge production and their curricula. These choices are also crucial for the success of interdisciplinarity.

What Choices are There? – International Perspectives and Conditions for the Success of Interdisciplinary Research and Teaching

The question of what kind of university the international societies of the 21st century will need is strongly connected with the question of what choices students, professors, and higher education admininistrators will make concerning knowledge and curricula of universities. These choices belong to the central themes of higher education development in most countries. An informal survey on interdisciplinarity was conducted early in 1997 by asking higher education administrators and specialists from several countries for their opinions. 200 experts from higher education research and higher education policy took part in a small study of interdisciplinary approaches in their respective countries. 13 percent of the target group answered the questionnaires by giving their national, professional and personal views of choices to be made in knowledge and curricula with regard to interdisciplinarity.[11] The following summary of these views reflects statements from Australia, Austria, Belgium, Canada, Denmark, France, Germany, Hungary, Israel, Japan, Latvia, Lithuania, Mexico, the Netherlands, Norway, Russia, Sweden, Switzerland, the United Kingdom and the United States of America.

Question 1:
Society demands solutions for major and complex problems which do not have a disciplinary structure (e.g. environmental problems, problems of unemployment, social security problems, problems of migration). How can higher education, research and teaching react to these problems and provide appropriate knowledge? Is it necessary to develop new curricula?

11 200 international conference delegates of the conference "What Kind of University?" which took place in London, June 18–20, 1997, have been asked three questions concerning interdisciplinary choices. The conference was organized as a joint venture by the Open University (U.K.), the Carnegie Foundation for the Advancement of Teaching (U.S.A.), the Center for Higher Education Policy Studies (CHEPS) (NL) and the CHE Center for Higher Education Development (GER).

There seems to be a range of opinions ranging from fears that universities may lose their souls while attempting to resolve today's social problems and questioning whether it is in the mandate of a university to respond to such problems. In some countries university systems are conceived as addressing the practical concerns of the country. In Israel, since its creation, universities have focused on research and teaching in areas with relevance to social, political, economic, agricultural and military issues. In Australia the government, in 1988, reaffirmed "its intention that an increasing share of total higher education resources should be directed to those fields of study of greatest relevance to the national goals of industrial development and economic restructuring."[12]

Generally, it is agreed that the transformation of society needs new forms of comprehension and analysis. In Switzerland this need is answered by the creation of *"Hautes Ecoles Specialisées (HES)."* This resembles a Russian point of view that not all interdisciplinary subjects are appropriate for the university, some of them are to be dealt with in other institutions. The Australian and Belgian perspectives, just to mention two examples, are that universities are required to direct their energies to addressing problems of the real world by multidisciplinary approaches instead of letting science divide complex problems into sub-problems and linking the solutions of the sub-problems together. New points of view, new theoretical approaches to the understanding of complex problems are needed. From Norway, the question is asked how higher education reacts in trying to contribute to solving complex problems which do not follow a disciplinary structure.

The problems of interdisciplinary or multidisciplinary approaches are also clearly seen: Higher education in the U.S.A. is said to be balkanized in the area of environmental issues. Curricula are too often "cafeteria-style melanges of disconnected ideas." The danger of vocationalizing liberal arts is mentioned. In Mexico, interdisciplinary curricula have produced poor results ("multi-disciplinary confusion").

Therefore most recommendations for new inter- or multidisciplinary curricula, which are generally agreed, demand disciplinary training before interdisciplinary cooperation, i. e. two years fundamental science

12 Dawkins, J.S., *Higher Education: A Policy Statement,* Australian Government Publishing Service, Canberra 1988, p. 8.

or knowledge acquired through structured progression in a discipline or interdisciplinary courses on a postgraduate level. It is also agreed that new curricula should be rooted in core subjects. Postgraduate interdisciplinary courses are part of new curricula emerging in Flanders. In Australia, especially the younger universities, the former Colleges of Advanced Education, offer relevant cross-disciplinary courses and even double degrees. In the Netherlands, general programs in social sciences, humanities and natural sciences as well as programs focusing on themes such as environment, language and information, communication and information, culture, etc. are becoming competitors of traditional single discipline oriented programs.

While interdisciplinarity is not disputed on the postgraduate level, a curriculum across disciplines for undergraduates should be included from the Australian perspective to prevent too early specialization. A U.S. perspective is that persons well equipped with intellectual and analytical skills who are generally educated can just as well adopt interdisciplinary studies and contribute to problem solving in many areas. Modular courses, teamwork, professional courses are often recommended to implement interdisciplinary education. However, a view from the U.K. is that modularization runs the risk of losing the broader context raising a question about whether students will understand the whole field. More systematic undergraduate programs are needed, based on the idea that the first degree is a generalist one. Problem based learning is an important keyword in the debate. Teaching and research can be integrated into multidisciplinary projects or, as in Austria and many other countries, into theme or problem oriented units.

This leads to the respondents' answers concerning interdisciplinary research. In many countries such as Australia, Britain, Canada, Germany, Japan, the Netherlands and the U.S. research structures of different shapes enable research on complex problems. In the Netherlands, interdisciplinary research seems to occur naturally in loosely coupled networks as well as in institutionalized research centers. All kinds of organizational entities beyond conventional departmental or faculty structures are mentioned by the international experts who responded, from centers with separate budgets, centers of excellence, research projects or multidisciplinary research teams approaching certain subjects (e. g. in Australia: ecosystem management, human and medical

genetics, occupational health and safety, aviation studies, forensic psychology, justice studies and public health administration) are suggested. A Hungarian expert prefers cooperation between departments and institutions.

Who Shall be Responsible for the Inter- or Multidisciplinary Approaches?

A Lithuanian suggestion is to let the universities be responsible for interdisciplinarity, while the faculties focus on disciplines. This leads to the question how management and administration of universities or other bodies can foster or hamper interdisciplinary knowledge. A participant from the University of California Santa Barbara summarizes that the reductionist point of view has grown in U.S. universities since World War II, fueled by research agendas and policies of research funding agencies. The loyalty of faculty has shifted from institution, school or college to departments, to disciplines and subdisciplines. Another American participant mentions institutional disincentives, impediments for good interdisciplinary research and teaching. These disincentives are the criteria for faculty promotion and tenure, budget architecture and core curricula. Problem oriented research also seems to be disadvantaged by most forms of peer evaluation by peers from traditional disciplines and by the Research Assessment Exercise in the U.K.

In Lausanne, Switzerland, the budget crisis limits new curricula. Here, the academic community as well as students strongly oppose private funding of new courses. The development of professional conditions, realignment and flexible non permanent units have been suggested as conditions which enhance gaining interdisciplinary knowledge for solving complex problems. This leads directly to the question of implementation:

Question 2:
How can interdisciplinary cooperation in research and teaching be implemented into curricula, departmental structures and research institutions?

From Germany, there is the suggestion to implement interdisciplinarity into curricula by modular postgraduate courses, student directed symposia or weekend block seminars. From Japan came the idea of introducing periodical seminars. Universities in the Australian state of Victoria integrate higher education and technological and further education courses. Teamwork in designing curricula or interdisciplinary student teamwork are other Australian suggestions. The development of graduate schools and graduate programs also crosses faculty boundaries and involves multidisciplinary teams. A suggestion from the U.K.'s Universities' and Colleges' Staff Development Agency says modular programs over departments are able to provide a range of degree routes, combinations, emphases and "construct your own" programs through independent study.

For research, the establishment of either research projects between departments (e. g. long-term – up to 12 years – funding in so-called SFBs, *Sonderforschungsbereiche*) across several departments and universities (Germany), flexible non permanent units complementing departments (Austria), centers, not shared facilities (U.S.A.), rather dynamic structures built around broad themes and fields (Belgium), creation and development of interdisciplinary laboratories and centers (Russia), large research projects across different disciplines (Denmark) are suggested. The primary impetus for increased interdepartment cooperation in research is the demand for the most up to date knowledge, thus research universities set the pace.

Current funding mechanisms seem to contraindicate interdisciplinary cooperation in the U.K. Competition for research money fosters dedication to the disciplines in many countries. This is contrasted by the Australian example, which provides funding for Commonwealth Cooperative Research Centers, Australian Postgraduate Awards (Industry) and Collaborative Research Grants.

Undoubtedly, the implementation of interdisciplinary cooperation needs appropriate structures, budgets and incentives. The former can be

obtained by restructuring departments, university wide steering committees, study program advisory committees, larger faculties or schools with minimum emphasis on departments. Often, the resources have to come out of traditional departmental curricula, the university administration has to provide the opportunities. Unfortunately, the current trend in administration policy toward decentralization, and the traditional university bureaucracy limits communication across the disciplines. Policy focuses on structure, not the content of disciplines.

Better communication channels between departments, institutes and academics are needed, because the tendency to own subdisciplinary languages, not subject to easy translation, create a "Tower of Babel" situation. Meeting points in conceptual frameworks have to be established.

Last but not least, the attitude of academic staff is important. Incentives towards movements between themes and departments, problem orientated professional development of faculty and staff may help. As faculty structures seem to have shifted to accommodate or even reinforce disciplinary phenomena (disciplinary peer groups, cross institutional and international exercise of collegiality by faculty on a departmental basis, especially in research universities), performance in interdisciplinary activities must be given a weight comparative to that given to disciplinary activities. That means that individual personnel who choose to participate in interdisciplinary activities must be "protected" by appropriate measures.

Question 3:
Interdisciplinarity often results in new disciplines (e.g. bio-chemistry, public health studies) and thus in increasing specialization and differentiation of knowledge. What kind of profile can universities shape between specialization on the one hand and integration on the other hand? How can universities develop flexible structures in order to combine increasing specialization and integration of disciplines/interdisciplinarity?

The respondents' answers to this question mainly focus on changes in structures and attitudes. A position from the Netherlands does not see any problem here, because many researchers do not move away from

the core of their discipline, even if they concentrate on special areas or apply their theories on special areas.

The answers also focus on research, recommending structures such as special research centers, often matrix organizational structures, specific research programs, problem oriented approaches or a forum at the university where representatives of the disciplines meet and share. Interdisciplinary centers also can introduce new courses and curricula.

A special example for new structures is the newest campus of the California State University in Monterey, which is an attempt to develop flexible structures. An academic master plan includes five academic themes plus a sixth centered around student service. Here, the different centers and institutions have been established in absence of strict disciplinary lines and the students are expected to map out their own programs.

Money and attitude are the most important prerequisites for developing new structures. Grants have to be allocated to non-specialists, the funding system has to be realigned, there have to be advantages for problem oriented approaches to make them popular. An "annual day of the researcher" and "science and society" meetings can be useful.

The most important issue is academic excellence: A university has to be best in everything it does, including interdisciplinary profiles.

Catalyzing Interdisciplinary Cooperation

Only universities contain all the ingredients needed for interdisciplinary cooperation: sciences and humanities, labs and libraries, disciplines and departments. Why are they so slow to react, why do the disciplines they represent tend to specialize more and more instead of integrating their knowledge? Why don't they respond to the complex problems of the real world (*Lebenswelt*) readily and voluntarily?

Running the risk of transferring chemical methods to non-chemical problems the answer would be: A catalyst is missing, or inhibitors have to be inactivated. As the Internet search for interdisciplinarity shows, most activities do already take place at (American) universities. Universities obviously are the appropriate vessels for the interdisciplinary reaction. What are the inhibitors?

Inhibitors have been identified as the disciplines themselves which jealously watch the research of their members and have established mechanisms to enhance and destroy careers by awards, funding mechanisms or structures such as academic societies. They define the fields of research, and interdisciplinary research emerges at the borders of the disciplines, where the genius and the charlatan are dwelling. How to discriminate one from the other? How to prevent interdisciplinary research groups from becoming the country of the blind, where the one eyed man is king?

A catalyst is a substance functioning via a special structure. Interdisciplinary cooperation can be catalyzed by special structures within or close to the university. They have to be organized in independent units or centers, with a professional management and basic funding. Research structures have to be flexible to be able to react to new developments on the one hand, on the other hand they must assure the time needed to overcome the linguistic, terminological and methodological problems of understanding other disciplines. Scientific advisory boards of external experts and experts of the university who have a standing in their discipline, and are at the same time personalities experienced in research in-between the disciplines are to select the topics and the research groups to prevent the “one-eyed-man” phenomenon. Experts with experience in science management and funding should complete such a board. Discussion groups can explore the field before a medium or long-term research project is started.

Incentives have to be given to researchers working at the interface between their discipline and others. Individuals making efforts in transcending the borders of the disciplines have not to be punished but to be rewarded by funding and by recognition of the academic community. University leaders, administration, politicians and funding organizations have to make financial commitments to make clear that an interdisciplinary enterprise is not just the hobby of a few outsiders.

If these obstacles in interdisciplinary cooperation can be overcome, interdisciplinary units will contribute to the profile of a university. It will become evident to the public and to politicians that this is not another ivory tower but a productive contribution of scholars, scientists and universities to find solutions for the complex problems of society.

Interdisciplinarity: The Endless Frontier

Evelies Mayer

Introduction

Whenever the word interdisciplinarity crops up, I am reminded of the fairy tale by the Brothers Grimm called, "The Boy Who Knew No Fear" – and grim it is indeed. Once upon a time, there were two brothers. The elder was smart and got things done. The younger was very stupid, learnt nothing and understood less. Unmoved by even the spookiest stories, he wished above all to know what fear was. Eventually, thanks to his simpleminded fearlessness, shot through with the occasional stroke of genius, he managed to rid the king's palace of all the evil spirits which had taken up residence there and won the hand of the king's daughter. The tale, of course, has a happy ending, unlike stories within the university which seem to be without end. The particular story of interest here is that of the battle of disciplines which both fight to retain their integrity while trying to promote interdisciplinary cooperation and transparency.

I will describe the various stages which led Germany in the postwar period to improving interdisciplinary cooperation within its universities. Second, I will set out the reasons why in the current context of developments in knowledge formation and research, a more resolute rejoining of disciplines, a crossing of borders of disciplines is required. Third, I will focus on a successful example of institutionalized collaboration, illustrated by the Center for Interdisciplinary Studies on Technology (CIT) at the University of Darmstadt. Fourth, I will go into greater detail about the conditions – organizational, structural and

financial – which promote successful collaboration among disciplines. My "happy ending" will take the form of a question: What promise does interdisciplinarity hold for a better future for universities?

Interdisciplinarity at German Universities

After World War II, one of the first moves towards interdisciplinarity came in the idea of "General Studies." During the post war reconstruction of German universities, General Studies were seen as completing the specialized curriculum and as a break with the universities' throwing in their lot with National Socialism. General Studies returned to the Humboldtian concept that education and critical judgment were best fostered by research and scholarship. A high degree of specialization should be complemented by a solid spiritual base. The traditionalism of this concept was obvious. The road to new structures in the university and new teaching methods remained closed.

During the 1960s, students revolted against deeply entrenched tradition, experiments flourished. By the early 1970s an important element in the activism for reform focused on interdisciplinarity. The weight of attention of reformers, however, lay with university teaching. For a short and experimental period interdisciplinary teaching programs were seen as a bridge between mass higher education and scholarship. Teacher training is a good example of this bridge. Its claim to be a scientific field of scholarly endeavor went hand in hand with the systematic participation of the social sciences and humanities. After the initial euphoria wore off, these latter fields sought a new identity on their own behalf – an identity which expressed itself in their "professionalization" or, alternatively, in the shape of the newly discovered concerns of the Schools of Education.

A more realistic view of interdisciplinary activities has emerged over the past ten years. It focuses primarily on research collaboration in natural sciences and engineering. The fusion and fragmentation of disciplines and sub-disciplines within these areas, especially in biochemistry or materials science, are often quoted as examples of so-called "inter-disciplines." They involve a host of different interactional forms, ranging from informal groups of scholars to well-established

research and teaching communities.[1, 2] Developments such as these served to overcome the divide between what C.P. Snow[3] termed "the two cultures" – between physical science and the humanities – a division as marked in teaching as it is in joint research programs.

Environmental research is among the best known example of this process. Born out of the natural sciences, it gradually grew to encompass engineering. In 1994, the German Science Council (*Wissenschaftsrat*) took a wide-ranging position involving environmental research both within universities and other research bodies. It recommended closer links between natural science and engineering programs and the humanities and social sciences.

Researchers in the social sciences initiated a new interdisciplinary area as a result of an interest in technology assessment which, as it developed, established links with engineering and in particular with computer science. And while research into the social context of technology has received less attention in the area of science policy, still a large number of universities which emphasize engineering fields and the life sciences, have set up interdisciplinary centers. More recently, this trend has been reinforced in the eastern parts of our country.[4]

Such interdisciplinary centers, it seems, are driven in the first instance, by the efforts of enthusiastic individuals. This is not surprising. To make changes in the time honored practices of universities, organized around disciplines requires both boldness and a rather naive love of novelty. Today, however, and in contrast to the idealistic initiators of interdisciplinary cooperation, the advocates of interdisciplinarity can count on a supportive wind blowing steadily from science and the research establishment.

1 Julie Thompson Klein, *Interdisciplinarity. History, Theory and Practice*, Wayne State University Press, Detroit 1990.

2 Burton R. Clark, *Places of Inquiry: Research and Advanced Education in Modern Universities. University of California Press.* Berkeley/Los Angeles/London, 1995.

3 C.P. Snow, *The Two Cultures and the Scientific Revolution,* Cambridge University Press, Cambridge, 1959, 1993.

4 Christian Schwarke (ed.), *Ethik in Wissenschaft und Technik. Erfahrungen und Perspektiven im interdisziplinären Dialog*, Forum Humane Technikgestaltung 11, Friedrich-Ebert-Stiftung, Bonn, 1994.

On Interdisciplinarity and a New Mode of Knowledge Production

Elements favoring the development of interdisciplinarity in research and training lie in the growing intensity of ties between university and society. These ties are to be seen in cooperative multidisciplinary knowledge production as described by Michael Gibbons et al.[5] on which the future development of the research university will rest. This new mode of knowledge production they describe goes well beyond the traditional frontiers of any of the disciplines. Its key is the application of knowledge to problem solving within a social context. It is driven by knowledge production beyond the university and is tied to the collaborative efforts of different disciplines in a common research endeavor. The new mode of knowledge, therefore, has a new organizational context. It is not compatible with existing disciplinary structures within the university nor with established systems of quality control. The "new" knowledge draws its strength from sources that are inter- or trans-disciplinary in nature.

Interdisciplinary Research and Training at the University of Darmstadt

There is strong evidence at many German universities of interdisciplinary cooperation which reflects this new mode of knowledge production. A good example is the Center for Interdisciplinary Studies on Technology (CIT) at the University of Darmstadt. I helped to create the center and was its Director for four years. After becoming Minister of Science I had it integrated into a consortium for interdisciplinary research into technology which included all the universities in the State of Hesse.[6] Because of my direct involvement, it may be that I am

5 Michael Gibbons, Camille Limoges, Helga Nowotny, Simon Schwartzman, Peter Scott, Martin Trow, *The New Production of Knowledge. The Dynamics of Science and Research in Contemporary Societies*, Sage, London/Thousand Oaks/New Delhi, 1994. David Dill and Barbara Sporn (eds.), *Emerging Patterns of Social Demand and University Reform: Through a Glass Darkly*, Pergamon Press for International Association of Universities, Oxford 1995.

6 Hessische Technikforschung, *Arolsen Tagung 1994*. Heft 1/2, 1995.

more positive about it than I should be, but it is fair to say that it is generally considered a success.

At the University of Darmstadt interdisciplinary cooperation is actively encouraged and supported by the university's administration. Particularly in the area of applied economics, joint study programs are offered in cooperation with engineering departments. Since 1977 a general statute of the University stipulates that all study programs should contain a component which extends beyond a specific field. Thus, the social sciences and the humanities have increasingly accommodated to the requirements of a university which is primarily technological and scientific. And, despite the present financial squeeze, a new interdisciplinary Department of Materials Science has been established. Since 1985 a special research program of the State of Hesse has encouraged and supported such areas as materials science, biotechnology, environmental research and integrated technology analysis.

It is in this favorable setting that CIT was founded in 1987. Its mission is to encourage "the cooperation of engineers, social scientists and humanists at the University of Darmstadt, to examine the social and ecological consequences which flow from industrial applications and to examine possibilities for monitoring the general trends in technological development." The Center's research program is coordinated by a steering committee and an advisory board. Research funds allocated by the provincial authorities support work on areas such as "Information and Communication" and "Technology and Culture." At the start, the budget was of the order of DM 500,000 annually. Seven research positions allow it to carry out projects of short to medium duration. These projects are interdisciplinary in focus and bring together scholars from different fields. Thus, the Center stands at the point of intersection in a network of interdisciplinary research projects which draws on almost all of the University's 19 faculties (*Fachbereiche*).

Not only is it active in interdisciplinary research and a prime agent for reflecting on the knowledge potential to be had from the disciplines working together, the Center also contributes to structural change throughout the institution. The results of research projects are often incorporated into new lecture courses. The federal authorities and the State of Hesse have jointly supported a major project on "Training for Ecology." A special research project (*Sonderforschungsbereich*) "De-

sign for Environment" launched with the Center's support has the backing of the German Research Association (*Deutsche Forschungsgemeinschaft*). Innovative work at the Center has paved the way for multi-disciplinary collaboration within the doctoral program (*Graduiertenkolleg*) in the area of "Technology and Society."

Conclusions from the first external evaluation report on the Center allow us to draw up an intermediary balance sheet. People from widely disparate fields such as engineering and the life sciences on the one hand, and from the social sciences and humanities on the other, have been brought into dialogue and have engaged in working together for short periods. Such a dialogue is possible only because the Center is committed to innovation in research and training. It does not forcibly seek to extract and to lay stress on the implications which might follow from this research for particular disciplines.

So much for the success story. Now for the obstacles involved in setting up an interdisciplinary research center in the universities of Hesse or in starting up a research project with the goal of being greater than the sum of the respective disciplinary results. I have deliberately avoided mentioning the problems of grasping the terminological differences among disciplines, or those that arise when one attempts to develop a joint theory.[7] How established disciplines control the development of research and academic careers is a thrice-told tale.

The road that leads on to interdisciplinary research techniques is not lacking brigands, ghosts or bogeymen who lurk in wait for the unwary researcher in an interdisciplinary land. And of course, it is the purse that is in greatest peril. Support by provincial authorities for innovative research recently has been cut to the quick including the Center's funding.

In Grimms' tale of the boy who knew no fear, the main character is at one point greeted with these words, "You whey-faced creature, soon you will learn what fear is. You are going to die." The stripling replies, "I am not going to die so soon. I've got to be there to see it."

Interdisciplinary research and training have reached the point where they must rely on their own intrinsic strength, on their financial resources, or on finding other sources of money. Through its own related

7 Stephen Jay Kline, *Conceptual Foundation for Multidisciplinary Thinking*, 1995.

projects, the Darmstadt Center has already tied in with traditional funding sources. Recently, it obtained support from the European Union. And, despite the general squeeze, the University is ready to cover most of the Center's research initiatives. So the Center for Interdisciplinary Studies on Technology and its "spin-offs" show that, despite cuts in funding, the outlook for interdisciplinarity in universities is still good. If these "frontier" interdisciplines are to flourish, the onus is on the German universities themselves to nurture them and to set up appropriate financial incentives and organizational structures.

Management and Role of Interdisciplinary Centers in the Research University

At American research universities an increasingly important part is played by ORUs – organized research units or centers.[8] With their own budget, with an independent management, with professional staff and a well defined mission, they finance their work externally, through government research grants and through industry and private foundations. They respond to the needs of society for the formulation of public policy and produce research which deals with economic, environmental, and social problems. ORUs can respond rapidly to changes in research interests. They can handle topics of interest to possible funding sources, though often of less interest to departments, the bedrock of basic research.

Such a supple structure lends itself marvelously to interdisciplinary research, because of its organizational framework. Here too, topics and disciplinary constellations vary considerably. The knowledge required to be able to secure the no-man's-land between disciplines and to cultivate them methodically can be better tackled within a Center than within departments where interest lies rather in bringing academic results to the disciplinary field itself.

Even more than the disciplinary based research center, a center for interdisciplinary research is under quite extraordinary pressure to justi-

8 Gerald J. Stahler and William R. Tash, *Centers and Institutes in the Research University: Issues, Problems, and Prospects,* The Journal of Higher Education. Vol. 65/5, 1994, pp. 540–554.

fy its existence, and the relevance of its work to different departments, particularly in times of tight money. Quality of output is not enough. At the start-up of an interdisciplinary project, this can rarely be foreseen. Time is needed for learning and mutual understanding to penetrate those representing different disciplinary traditions. During this period of maturation, an interdisciplinary center must build up its credibility with university heads and with departments. Their confidence has to be won, and to do this requires certain organizational, financial and qualitative preconditions.

Organization:
Suspended between the central university administration and the departments, interdisciplinary centers lead a precarious existence. Hence, their mission and objectives must be unambiguously defined to set them apart from the tasks executed by departments. It is best, however, to set the center's activities firmly within departments. Research programs can do this, as can joint recruitment of research staff. The research program itself should be shaped so as to fit in with the university's general research profile. Thus the center's research feeds and reinforces the university's research commitment. Those managing a center play a vital role.

Finance:
From the outset, an interdisciplinary center must secure sufficient basic funding and sufficient staff to carry it through the first few years. Understanding what goes on in the interstices between disciplines takes time. So interdisciplinary research should develop and win its spurs as far as possible without financial pressure. This, I believe, is the only way to master and to overcome the initial difficulties inherent in working together across disciplines. As time goes by skills and competence build up and allow the center's own work to draw in new funding. Moreover, the central university administration should make a clear financial commitment. Firm backing from university leaders shows without an iota of doubt possible that an interdisciplinary center is a university undertaking and not the private boutique of a few maverick professors.

Quality:
Criticism from departments is inevitable for interdisciplinary programs. Interdisciplinary work can always be attacked from a disciplinary standpoint especially when its advantages cannot immediately be shown. Furthermore, much of the type of work undertaken focuses on problems of application, implementation and execution within a social context. It is often held to be lightweight research for this reason. The sole riposte to such criticism and mistrust is to apply the most rigorous standards of quality to the work the center does, most particularly to the selection and funding of projects. Interdisciplinary centers should also be subject to regular evaluation. Performance criteria used in the evaluation will, naturally, take account of the particularities of interdisciplinary work and, parallel to disciplinary standards, will bear in mind its potential for innovation.

The Academic Culture of Change

Many aspects of German university life are currently under fire, not least the ossification of its more traditional structures. One forgets, however, that universities are also participating in new developments. By targeting its research funding strategy, the German Research Association has brought about real change within the structure of university research. Apart from funding individual research projects, special fields of research (*Sonderforschungsbereiche*), and doctoral programs (*Graduiertenkollegs*) are receiving sponsorship over considerable time. More flexible arrangements and organizational models for research and scholarly training have been introduced. A special funding program is under way to support research centers. In any case, incentives are given to research teams which put stress on the interdisciplinary dimension.

Universities courageous enough to create interdisciplinary centers in effect reinforce the drive towards setting targets for research funding. In this, they are in good company. They are not rushing up a blind alley. On the contrary, interdisciplinary programs once woven into the institutional fabric of research, give universities the opportunity to boldly go into unexplored realms of scientific inquiry; to venture into learning and exchange at a global level and to establish better ties

between scholars, scientists and society. To the extent such programs advance academic structures that are more flexible, to that same extent, they feed an academic culture of change.

Interdisciplinary centers are innovative in so many ways. Those like CIT keep a steady and unwavering scrutiny over research and ensure thereby that the university is seen to be committed to tackling the issues of our age. The young researcher who carries out work which nears the stage of application, assimilates through interdisciplinary cooperation attitudes which themselves already apply in research outside the university. Centers which are not content simply to position themselves and then to remain fixed like a barnacle on a rock, are surely the most appropriate milieux to open up new ground for research and training. Staff researchers who are themselves near to this cutting edge, may by working at the center, also help sustain new developments in teaching and research in their home departments. Last but not least, within the mainstream of specialized knowledge, interdisciplinary research creates small islands where spontaneous exchange and discourse – something that sadly is lacking in today's universities – may flourish.

Is this a utopia yet to come? Or a world we have lost? In our fairy tale, the boy who knew no fear, marries the King's daughter and becomes his heir. Mayhap, further adventures lie ahead of him. And trials, too. As it was for our fearless lad, so it is for the university, and especially so for those seats of learning that wish to retain a place for free-ranging thought and inquiry. Under the iron grip of the cash nexus, of the new managerialism[9] and their methods, the isles of the non-rationalizable could well be swallowed up by unpredictable financial eruptions.

9 Edward Shils and Hans Daalder, *Politicians, Bureaucrats and Universities*, Cambridge University Press, Cambridge (UK), 1981.

Clio and German Studies: Reflections on a Tenuous Relationship

Konrad Jarausch

How can one sub-field cooperate with two other disciplines to form a new hybrid subject? Common sense suggests that this is going to be a difficult challenge, since Clio, representing history and epic poetry, is perhaps the least sociable of the nine muses. If I had to imagine her in contemporary guise, I would see her as an uninspiring drudge, a bit dusty, bespectacled and wearing tweeds. Worse yet, the other subjects are not even represented by a particular muse, although Germanists might claim a tenuous connection to several. Metaphorically speaking, German Studies is therefore an intellectual mélange without personalization, unless it is thought of as one of the statuesque, turn of the century Germanias. Since a dowdy muse and a mythical goddess are unlikely to hit it off, it should not be surprising that the various parties involved are getting along somewhat indifferently.

During many after-dinner speeches, the rhetoric of interdisciplinarity has become a hallowed academic ritual. Its uplifting prose seems to serve as a kind of *digestif* that is supposed to dissolve mental indigestion. For some strange reason everybody has come to agree that going beyond a single discipline is a noble goal, in Humboldt's terms ever to be striven for and never to be reached completely. However, the practice of German Studies has not yet lived up to this inspiring ideal. True enough, a burgeoning organization, a flourishing journal, and a smorgasbord annual meeting indicate a certain success that has even attracted some attention in Germany. But in intellectual terms the results have been much less impressive, since most German Studies Association (GSA) sessions are still separate, indicating at most a parallel disciplinar-

ity. Occasionally there are multi-disciplinary panels, but rarely do representatives from different fields ever reach a level of creative interaction. After so much effort, one may well ask: Are these initial difficulties soon to be overcome or is this a lasting structural impasse?

In the effort to establish German Studies, the cultural setting of the United States has been both a help and a hindrance. The flexible arrangements of American academe are much more hospitable to experimentation than the more rigid German patterns, as long as such innovation exacts little cost. Disciplinary boundaries are not as firmly entrenched in North America and the lack of central state control facilitates institutional innovation. At the same time, deep structures of "Germany in the American mind" complicate this effort considerably. During the 20th century, Germany has been defined as the significant other, a military threat and an example of human evil that is at once close enough to know better and distant enough to be different. This rhetorical regime favors a historicized concern with Germany that tightly constrains intellectual answers and indirectly also affects institutional priorities.

After a couple of decades of interdisciplinary attempts to create a program of German Studies, there is clearly a need for stocktaking. But most assessments such as discussion in the GSA guidelines committee have been dominated by *Germanisten*, because they are more directly affected and in some institutional as well as intellectual jeopardy. But representatives of the partner disciplines also need to be heard, if German Studies is to become something beyond a recasting of language and literature studies. Merely changing the label without altering the content, such as renaming the German department as the German Studies Department (like at Duke University), looks suspiciously like an *Etikettenschwindel*. Hence I understand my charge as a historian as taking a candid look at the situation of my own field and its attitude toward interdisciplinarity in order to reflect on its potential role in German Studies.

The Situation of German History

For the sake of focusing discussion, it may first be necessary to provide some background information on the sub-discipline of German History. Since Germanists rarely move in historical circles, I want to give a brief status report on the field during the mid-1990s in the U.S. This quick survey will seek to resolve a somewhat contradictory impression: On the one hand German historians have played a major role in shaping the American imagination during the post-war decades by reaffirming the superiority of a democratic and capitalist identity, distinct from totalitarian temptations. But on the other hand, after the Vietnam war public interest has waned considerably and some observers have begun to sense a loss of direction in even more recent years.

In numerical terms, the sub-discipline of German History seems to be doing quite well. There are about 600 individual subscribers to the journal "Central European History" that can be said to form the core of the field. The total number of Ph.D.s is perhaps twice that large, although not all of them are publishing scholars or pursuing academic careers. In contrast to the fields of Polish or Italian history which are driven largely by immigrants' filiopietism and lack firm institutionalization, Central European History is a well-established sub-discipline of Modern European History. The number of its members is considerably smaller than that of literary specialists in the AATG, but it is almost five times larger than that of political scientists in the Conference Group for German Politics. In contrast to *Germanistik*, the field is also not dominated by the German-born, but rather consists largely of American as well as of some Canadian and British scholars.

Institutionally speaking, the distribution of German historians is somewhat uneven. In departments with fewer than ten members this area of specialization is not always represented, since there are likely to be only one or two modern Europeanists. In departments of up to 25 members one can usually count on having one Modern Germanist to teach the World Wars and the Holocaust. In departments that are larger yet and in the leading graduate schools there may be perhaps even two or three German historians with different temporal or thematic specialties (for instance at the University of North Carolina there are Gerhard Weinberg, Terry McIntosh and myself). A few Ph.D.s in German History

are also scattered through administration, granting agencies, the military and the like. It is essential to remember, however, that German historians are always only a small minority in larger historical contexts which dominate their reward structure. All decisions on hiring or firing as well as raises or promotions are determined by non-German colleagues.

From an organizational perspective, the situation is fairly encouraging. The chief association is the Conference Group for Central European History which was founded during the post-war era when even the label German was controversial. The Austrian historians also come under this common roof, although they have their own sub-group for the study of the Hapsburg monarchy. Affiliated with the American Historical Association, the Conference Group is an organization of notables with an Executive Secretary, article as well as book prizes and several standing committees (archives pressure group). In general it seeks to promote historical research and is somewhat traditionalist in outlook. Its well-known journal "Central European History" was established during World War II and revived in the 1960s under a new title. Edited by Doug Unfug at Emory for a long time, "CEH" has recently been taken over by Ken Barkin at U.C. Riverside who has made it somewhat livelier, increased its methodological openness and added book reviews.

In contrast to its institutional security, the intellectual outlook of German History in the U.S. is somewhat less certain. The field was originally founded to explain the American involvement in the World Wars, and benefited greatly from the influx of emigres as well as the military intelligence work of the OSS. Out of war-time propaganda grew a concern about the reasons for German aggression and an interest in the causes of the deviation of such a cultured country from Western democratic norms. More recently, interest in the Third Reich has evolved into the construction of the notion of the "Holocaust" that subsumes Nazi persecution, especially of the Jews, under one comprehensive concept of racism. Typically, Anglo-American scholars have sought to explain "the German problem" (there is no comparable British question or French issue, and perhaps only a Russian enigma). Their work has uncovered valuable sources (captured German documents) and produced a consistent critical interpretation of the German

past, but it also occasionally panders to popular fascination with evil incarnate.

In methodological terms, U.S. German historians have been less innovative than other specialists but more venturesome than their colleagues in Germany. During the 1950s the field was dominated by detailed military analyses, accounts of grand diplomacy and massive studies of domestic politics. During this period German historians were among the leaders of the American historical profession, since some of the best and brightest of the post-war generation were attracted to these questions. During the 1960s German scholars jumped on the bandwagon of new social history somewhat belatedly, because they clung to their political questions, and developed a peculiar social history of politics instead. In the 1980s anthropological impulses of everyday-history also gained some ground, and eventually the older history of ideas also mutated into a new cultural history. With the shift of innovation to British and French history, German historians, except for Holocaust studies, lost their intellectual hegemony. Yet they continued to serve as an important conduit of new impulses toward Germany.

During the mid-1990s, German historians therefore seem to be floundering, somewhat at a loss as to how to regain their previous influence. Because of their instinctive traditionalism, many have failed to engage the post-modernist shift, seeing the linguistic turn as a threat to objectivity rather than as a liberating opportunity for new interpretations. Due to their lack of study of the GDR, most colleagues have also missed the intellectual implications of German unification that is reconstituting a national history precisely at the moment when grand narratives had started to dissolve. Recent conversations with the history editors at the Princeton, Oxford and North Carolina university presses confirm the impression that the battleship Bismarck and the ocean-liner Bremen are continuing to sail their previous courses with only minor corrections. In Kuhnian terms, those who, like Michael Geyer and myself, are frustrated with such immobilism, might question the usefulness of “normal science” in abnormal times.

My own impression about the state of German History in the United States is therefore somewhat mixed. Institutionally speaking, the subfield seems firmly established and even flourishing, if one takes the outpouring of research as an indicator. But in contrast to the post-war

decades, its intellectual importance is clearly diminished, since in the battles about political correctness and multiculturalism, German examples seem to serve only as cautionary tales of intolerance. The current opinion leaders know little about Germany and care even less, since to them the wealth and power of the Federal Republic seems to be part of the problem rather than the solution. While conservative efforts to revive World War II fears (like Newt Gingrich's novel) are ludicrously disingenuous, progressive rhetoric ignores the range of contemporary German experiences with addressing similar problems. Because the traditional appearance of the field seems to offer few answers which they want, current intellectuals are looking elsewhere.

Attitudes Towards Interdisciplinarity

In some ways, German historians in the U.S. are nonetheless better than the reputation that I have sketched above. Especially when contrasted to German historians in Germany, they look like a hot-bed of innovation in methods and methodologies. In contrast to the technological incompetence of many senior Central European colleagues, even most established American scholars have embraced the personal computer and are willing to experiment with e-mail or the World Wide Web. Moreover, in the United States, at least a minority of historians has long been interested in interdisciplinary exploration, a fact which is rarely appreciated by critics. A quick look at some of the general dimensions of these interests will provide the context for some comments about the relationship to the particular disciplines concerned with German culture, politics and society.

Thinking about the German past in a transatlantic perspective automatically involves multiple comparisons. Especially in teaching, almost every statement implies a contrast to American conditions, either as positive yardsticks or as negative examples, since they form the experiential base from which German events are viewed. From afar, Central Europe is constantly compared with Western or Eastern Europe, because in the distance the national differences recede and tend to become part of an overarching European pattern. Also American work that focuses on a particular theme tends to draw upon examples from

other contexts to highlight the similarities or differences of German patterns. By broadening the perspective, such implicit and explicit comparisons make German History in the U.S. less insular than in Germany, even if the price is sometimes a loss of distinctive detail.

The leading area of interdisciplinary exploration during the 1960s and 1970s was historical social science. Growing out of the enthusiasm for new social history, this was an effort to draw on the systematic theoretical questions of sociology in order to illuminate structural changes in society over time. At the same time, the introduction of quantitative methods into historical research was supposed to provide precise measurements of such transformations which could test hypotheses and serve as the basis for building models of historical development. Though not taking the lead, German historians were nevertheless actively involved in the Social Science History Association and helped the establishment of its counterpart, called QUANTUM, on the continent. Because of the heavy demands on computer know-how, statistical reasoning and social science theory, this current attracted only a minority among German specialists and has recently receded somewhat.

The next interdisciplinary frontier during the 1980s was the impact of feminism on the development of a German women's history. Once again, some individual Central European specialists were involved in this movement from early on, but its theoretical orientation was shaped instead by scholars writing on American, British or French subjects. The original military, diplomatic and political focus of German History attracted fewer women than the more diverse subject areas of other specialties. From a suffrage-based Western perspective, the different emphasis of the Central European women's movement on protection within a patriarchal society looked like a retarded development that always came out second-best. Though it has taken a while to overcome these psychological barriers, women's historians on Germany have found their own voice and are producing much innovative work which is also helping to stimulate similar research on the continent.

Perhaps the reception of post-modernism has been even more reluctant. The moral weight of the Holocaust has made German historians leery of frivolously de-centering the past, since all readings of a text cannot be equal, if one wants to be able to refute the claims of the Holocaust deniers. Its intellectual lineage, going back to the Romantics

and to Nietzsche, also renders French theory suspect, and the politics of some of its promoters (de Man) have seemed questionable. Only a minority of younger scholars has been willing to reflect on the implications of the linguistic turn, to re-conceptualize historical writing as a form of representation and to discuss the breakdown of master narratives. Ken Barkin's intemperate attack upon post-modernism in the "German Studies Review" and the critical reaction of H-German net subscribers to the Geyer-Jarausch rebuttal reveal an undercurrent of neo-Rankean obduracy. Nonetheless, some of those who are willing to engage the post-structuralist challenge critically have also helped initiate a discussion on this topic in Germany.

The record of encounters with other disciplines more directly concerned with Germany has also been somewhat ambiguous. For instance, historians consider the findings of political scientists a useful source of information on recent political and social developments. But they generally dismiss theoretical models as behaviorist posturing and resent them as obstacles to interdisciplinary communication. Along with such resistance to theory, there is some mild interest in up-to-date material for courses that go up to the present. Sometimes there is some co-publication in joint volumes, with historians providing somewhat more time perspective on current concerns. And there are also a few systematic historical social science projects, investigating for instance the voting basis or membership of the Nazi party. But generally, there is little communication, since political science often views history as "background" for model building, while historians consider political scientists as contemporary historians who lack the proper documents.

Collegial relations between historians and Germanists are hardly any closer. In graduate training, historians are paying more attention to language competence as a prerequisite for serious work and, thanks to DAAD programs, standards have improved noticeably. In teaching, some of my colleagues also use novels like Thomas Mann's *Buddenbrooks* or Günter Grass' *Blechtrommel* in an illustrative fashion so as to make German developments come to life through narrative portrayals. But in general, they are not competent to launch into a discussion of their literary construction or aesthetic merit. There is also some research on overlapping topics such as the role of the *Schillerstiftung*, the writings of Theodor Fontane, the development of Berlin cabarets and

the like. But Germanists once again consider historians only useful for providing a temporal framework, while historians tend to think literary critics merely helpful in sketching the intellectual atmosphere of a period. Individual exceptions notwithstanding, neither side takes the other's methods or paradigms seriously.

There is even less cooperation with the other disciplines that also occasionally touch upon German topics. Some cultural historians do talk to musicologists or to art historians, while social historians also consult their colleagues in sociology, economics or anthropology. But such contacts are rather spotty, depend upon personal acquaintance, and only rarely mature into long-term collaborative relationships. The key reason is that in the thematic, cross-cultural agendas of these fields, German topics only make a passing appearance and the generally ahistorical orientation of their research militates against disciplinary interaction.

The basic attitude of historians towards interdisciplinarity is therefore friendly in principle, but somewhat disinterested in practice. Impulses from other fields are sometimes accepted as broadening and as diverting, adding additional information and stimulation; but only rarely do they go far enough to affect the methodology or the research agenda. In contrast to the multidimensional crisis of *Germanistik*, most historians also seem complacent about their prospects, grousing in general about the bad job market, but feeling no particular threat to their future. From their perspective, interdisciplinarity is therefore not at all a matter of survival, but rather an addendum, something which may be nice to have without in any way being essential.

Historians and German Studies

Given these institutional constraints, intellectual attitudes and prior experiences, one ought to be cautious about the future role of historians within German Studies. Although there has been more involvement on the local, national and international levels than observers sometimes realize, sizable obstacles in the form of disciplinary boundaries, differences in interests and practical divergences continue to inhibit further progress along this line. Perhaps this is yet another case of the glass

being half full or half empty, depending upon one's expectations. Compared to conditions a generation ago, the changes have been no doubt impressive; but considering the stated goals, the current results still fall considerably short of the interdisciplinary rhetoric.

Among the achievements, a willingness to engage in local cooperation on campus concerns stands out. Historians are usually ready to join their colleagues in exchanging information on funding, travel and research opportunities on the continent. As a partner for members of German or political science departments, they promote a variety of initiatives that increase the visibility of German subjects for students. They cooperate in film series, in sponsoring interesting speakers and in organizing conferences on timely topics. In student advising there is usually some referring to each other's courses which helps reinforce material covered from another perspective. In some fortunate cases, they even collaborate in the establishment of a German Studies Program, although these generally remain housed administratively in German departments. It is unclear how often they take the initiative, but at least they tend to go along, when the benefits for themselves and their students are immediately visible.

On the national level, historians have also been involved in the establishment of the German Studies movement from the very beginning. Unlike most political scientists who had to be dragooned into the enterprise, historians were some of the early founders of the Western Association for German Studies, since they also suffered from geographical and cultural isolation. If I may refer to my personal experience, they also played a critical role in the decision to expand a promising regional initiative into an accepted national organization. At present about two-fifths of the members of the GSA are historians, as are about half of the board members and the past presidents. How could one overlook the fact that the editor of the "German Studies Review" and the Executive Secretary of the association, its very heart and soul, is a historian! Originally some scholars from leading institutions were skeptical, but they eventually began to understand the utility of annual interdisciplinary meetings. Hence in organizational terms, my colleagues have certainly paid their dues.

On the international level, historians have also made a substantial contribution where they had equal access to resources. Due to its liter-

ary priorities, they have not made any inroads on the Society for Intercultural Germanistics, and much of the funding of the German Marshall Fund, controlled by a sub-set of political scientists, has passed them by. But they have responded with some alacrity to the opportunities provided by the DAAD, the Humboldt-Foundation and the Fulbright Program, just to mention a few. Two of the three Centers for Excellence in German Studies are currently headed by prominent historians. They are supporting the German Historical Institute in Washington through an organization of friends, and in the more politically oriented American Institute for Contemporary German Studies they have made more of a showing than literary specialists. There is no need to enumerate all the various programs to make the point that historians respond positively to interdisciplinary challenges where these are backed with appropriate rewards.

Why then are the results of interdisciplinary work on German Studies still rather disappointing? To begin with, the reality of disciplinary boundaries is much underestimated by academic after-dinner rhetoric. From a history of science perspective, the term discipline has a double meaning. On the one hand it is a focusing device that directs energies towards a common goal, making discoveries possible; but on the other hand Foucault correctly points out that it is also a form of repression of competing alternatives, coming close to punishment. In the positive sense, the rigor of discipline forms communication styles and sets research agendas which allows many different individuals to work toward a joint goal. In the negative sense, the power to discipline also creates sanctions against those who trespass beyond its boundaries, expelling them from the community. In academic life both meanings of the concept combine to create a powerful matrix that sets intellectual agendas and institutional boundaries, guiding research efforts both through rewards and recognition as well as through rejection and criticism.

The core interests that set priorities for various disciplines continue to differ fundamentally. What reason have a Goethe specialist, a historian of the Second World War or a scholar interested in European integration to talk to each other? Very few, since beyond a vague “Germanness” of these subjects, the central problems which they address differ fundamentally. Until they branched out into film and popular culture, largely struggled to teach “the terrible language” (Mark Twain)

and transmitted the literary canon, however defined. Political scientists were preoccupied with analyzing the Federal Republic's political, social and economic system, compared with other European governments or advanced industrial societies. Historians tended to focus on explaining the various German catastrophes, ranging from the Reformation all the way to the Holocaust. In pursuing their own agendas, these specialists did occasionally encounter one another in areas of overlap like the history of culture, the politics of the past, or cultural politics and the like. But such meetings were too chancy to overcome mutual prejudices, painting Germanists as stodgy philologists or political scientists as shallow behaviorists and historians as compulsive collectors.

The distinctive methodological approaches of the disciplines are therefore exceedingly difficult to reconcile. In terms of their methods and approaches Germanists have much more in common with other scholars interested in comparative literature or various national cultures than with their colleagues in other German subjects. Political scientists fascinated by Central European problems also share more approaches with their colleagues in the social sciences than with scholars interested in other aspects of Germany. Standing somewhere between the humanities and the social sciences, historians nonetheless gravitate to one another, rather than leading intellectual efforts to bridge the gap. Unfortunately, some cross-cutting initiatives such as Cultural Studies have only compounded the difficulty, because some of their representatives lack rigorous grounding in anything but ideology, stressing positionality over proof. The solution to this dilemma is not a methodological mish-mash, but rather a collaboration that respects the integrity of differing approaches.

My recent experience with editing an interdisciplinary volume, entitled "After Unity: Reconfiguring German Identities," has therefore been somewhat sobering. Intended as a testimony to collaboration, by harnessing a Germanist, political scientist and historian to write a joint essay on a single theme, it has instead become an exemplar of its difficulties. Beyond the normal problems of missed deadlines, three issues have proven particularly vexing:

1) Some contributors have found it difficult to part with their own words, insisting on every iota of their own writing and thereby inhibiting the crafting of a joint text.

2) Several authors also had trouble jumping over their political shadows, propagating conservative or radical analyses of current trends that proved incompatible.

3) And finally, other colleagues deprecated methodologies different from their own and refused to accept the validity of alternate methods. Even within a common text, there are therefore great differences of style, outlook and approach which tend to fracture the essays. These tensions need not be fatal, but much effort is required to turn them into con- rather than destructive directions.

Prospects for German Studies

Disappointment in the intellectual results of German Studies suggests that assessments of their prospects need greater candor in the future. A joint organization, a common journal and shared funding opportunities are not enough to make the inspiring appeals of festive rhetoric a practical reality. To some it might therefore be tempting to abandon the enterprise altogether as an unrealistic pipe-dream. But such a drastic reaction seems excessive, since a practical beginning has been made and the potential benefits of cooperation remain considerable. Another alternative would be to move beyond hortatory appeals and to think more clearly about what may actually be feasible, given the multiple constraints mentioned above. Perhaps one could try to learn from successful examples in designing a more promising strategy: So border-crossing has yielded the best results when a single individual has patiently learned another discipline's methodologies or when a small group of diverse scholars have collaborated on a joint project long enough to appreciate each other's contributions.

Fundamental to the success of interdisciplinarity is the issue of interconnectedness. Scholars interested variously in German History, literature and politics actually have several elements in common, such as the language and culture of their subject, its national political system (when it existed), and its development over time. To the degree that these dimensions interact in the real world, a specialist who concentrates only on one facet runs the risk of failing to understand the subject completely. There should be no need to point out that literature and

culture exist in a politically and socially constructed space which can and does drastically change over time. In a country with as many system's ruptures as Germany and with two dictatorships, the closeness of the respective connection between culture, politics and history also ought to be elementary. One precondition would therefore be to increase the awareness of the intellectual benefits of respecting these connections between the realms apportioned to the different disciplines.

Another strategy might be a re-conceptualization of the subject along cultural lines. If we thought of German Studies not as a closed interdiscipline but as an open-ended conversation about what German might and might not mean, specialists from different areas might enter in more readily. For instance, new interest in the role of memory or representation of conflicting pasts could be one point of departure. Fresh sensitivity to the multiple readings of texts or the organizing force of discourses could be another starting point. Revived attention to cultural forms of power and hegemony could also facilitate some degree of cooperation. Since a single cross-disciplinary methodology is unlikely to emerge, the crystallization of a set of related questions could provide a common agenda that might integrate the efforts of different disciplines. A rethinking along cultural lines would allow Germanists to explain the ambiguity of texts, historians to analyze their temporal constructedness and social scientists to emphasize their power relationships. Such a self-reflective combination of perspectives could provide an exciting meeting since it would concentrate on the changing connotations of Germany over time.

My mixed experiences with interdisciplinary cooperation indicate that another prerequisite for success is greater openness to different intellectual styles. To interact constructively, Germanists, historians and political scientists need uncommon forbearance as well as willingness to compromise. Because disciplines differ in forms of argumentation, reference to authorities and ways of proving a point, their cross-border interaction multiplies the possibilities for misunderstanding. If one partner insists on having all the answers, imposes a single method and dismisses other views, the entire enterprise is doomed to failure. Without a readiness to modify one's style of presentation and to reexamine one's substantive conclusions there is no point in bothering to involve others. Foundations can create material incentives, but only

the individuals involved in joint efforts can make intellectual communication work. Every adolescent knows that throwing off the constraints of discipline is easy – but joining the forces of different disciplines constructively is an excruciatingly difficult challenge.

To conclude on an upbeat note, I do believe that the effort at interdisciplinarity in German Studies is worthwhile. For instance, in working on the same text, regarding the role of the past in the transformations of German identity, Hinrich Seeba and I came up with a novel conception of structural self-definitions that suggests a set of recurrent alternatives, be they apolitical, liberal or chauvinist. Not only are collaborative breakthroughs possible, but an honest exploration of the differences also brings insights which could not be gained through one perspective alone. Though disciplines do help focus research efforts, crossing their borders is an essential corrective to the confining consequences of a single approach. But to avoid the opposite extreme of perspectivist *Beliebigkeit,* the challenge of interdisciplinarity consists of recombining the strengths of rigorous approaches into new interpretations. At a time when the subject at hand has itself mutated once again, any effort to understand the extent of these changes makes such cooperation across the disciplines not a luxury but a necessity.

Intervention on Interdisciplinary Studies

James Rolleston

It is noticeable in American universities that faculty research innovations often express themselves through re-thinking and re-designing programs of graduate study. Thus, I thought I could best play a useful role by briefly presenting the genesis and structure of two interdisciplinary programs with which I've been involved at Duke. Both have been remarkably successful in releasing new faculty energies and the first of them, called the Literature Program, has been crucial in driving the rise in Duke's humanities reputation, something that has significant consequences for both national rankings and administrative attitudes. The idea for the Literature Program was born in 1981 in response to a sense of crisis about doctoral studies in foreign literatures: There were no viable applicants at all that year for French or Spanish graduate study. But a new professorship was available, funded by the National Endowment for the Humanities, a government agency, on a matching basis. A group of us were asked by the Dean of the Graduate School to develop a new concept of Comparative Literature, as it was then known, as a way out of the crisis. The professorship was designated for Comparative Literature.

What we did was sketch a program centered on the newly emerging idea of literary theory, an essentially French phenomenon identified with the then rather fearsome sages Michel Foucault and Jacques Derrida. Students would have a thorough grounding in a traditional national literature, but would also learn to deploy an expertise in the new ways of thinking about literature, the new awareness of its insepa-

rability from social "discourses." None of us was a specialist in theory, so our chief task as a governing committee was to find and attract exactly the right person for the new professorship. To cut a long story short, we persuaded Fredric Jameson to come to Duke; he was and is the best-known American Marxist critic, someone completely in command of the new theoretical language.

He came, of course, with the expectation that several new appointments would be made in the Literature Program, which would retain the flexibility of a "program" even while behaving in many ways like a department. As it happened, times were good financially in the mid-1980s: The Provost decided the humanities offered an economical way to enhance Duke's reputation and some key players in the new theory-field were appointed. Moreover the Program quickly became an attractive recruiting tool: New faculty could be enticed to come to other humanities and social science departments at Duke via the promise of an association with the Program.

I would stress three points about this story: First, the Program definitely required new resources; both faculty and graduate students are fairly expensive and hard money is involved, given the scarcity of external funding for the humanities. Moreover, so fantastically good are the current Ph.D. applicants that we wish we could admit far more than the five allowed on fellowship each year. Second, the Program made its impact because of a paradigm shift in literary studies: The crisis of the so-called New Criticism (the "intrinsic" study of literary works) was surmounted by a leap into theory.

And third, the Program is truly an interdisciplinary enterprise: What theory does is to question every kind of existing discipline by probing its linguistic assumptions, the ways in which its coherence derives not from truth but from self-validating linguistic structures; theory also probes the conditions that make disciplinary statements possible, the so-called social constructedness of all truth-claims. Stanley Fish is associated with the Program and is also a Professor of Law. Law is an obvious example of a field in which new theoretical approaches flourish: The seeming rigor of its "professional" language, together with its reliance on precedent, make it ripe for interdisciplinary analysis. Indeed such is the power of theory, in this new sense, that no disciplines, not even the natural sciences, are exempt from its scrutiny.

A side effect of the success of the Literature Program in the late 1980s was that it made our traditional M.A. in German look hopelessly provincial. So in 1992, following intensive study of other programs and the job market, we launched our new Ph.D. in German Studies. In key respects this is the opposite sort of enterprise. Whereas literary theory is "cosmopolitan," expanding from a new kind of spiritual center, German Studies is "local," setting up new alliances between the German Department and German-involved faculty members in other Departments. So local is it that it cannot offer itself as a model for export: It crucially depends on a critical mass, at a given institution, of German-involved faculty in disciplines like history, philosophy, political science, religion, art and music. Thus, whereas the Literature Program did require the investment of new resources, German Studies, in our pragmatic version (so necessary in the 1990s), in principle does not: It reorients the energies of people already on campus. In practice, of course, we do attempt a kind of modest imperialism, coming up with concepts for faculty positions specifically in German Studies that could appeal to Deans. Thus we conceived of a faculty member in Early Modern German Studies (15th to 17th centuries), who would be based in one of our allied departments and specifically further the Program's self-articulation (this hasn't happened yet, because of financial limitations). Clearly then, German Studies is what we call multi-disciplinary rather than interdisciplinary: It starts by putting the German field itself in question, with its traditional literature-centeredness, then places the age-old question – what is German? – at the center of new networks of relations between literary discourse and its neighbors in history, religion, philosophy, political theory, etc.

The one point of convergence with the Literature Program, otherwise so different institutionally speaking, is the paradigm shift. As our study of the job market told us, the emergence of German Studies is directly related to the rise of cultural studies, a special way of asking the core theoretical questions about language and social construction. German Studies is a version of cultural studies that turns its gaze inward, focusing squarely on the European tradition itself. The paradigm shift moves us away from the analysis of literary works as self-contained and also away from the presentation of the "German story" as self-contained. Luther, Goethe, Romanticism, Freud, the Holocaust:

These are all central European phenomena that need to be reread in many different kinds of relationships and through many different disciplinary lenses. German Studies does not proclaim a new methodology; rather, it asserts the need for new theoretical questions and new combinations of disciplinary reading of German History and culture.

Evolution of Berkeley's Interdisciplinary Program in Microelectronics

David Hodges

Graduate education and research in microelectronics began at Berkeley in 1960. The three electrical engineering faculty members who led the creation of that early activity (Professors Thomas Everhart, Paul Morton, and Donald Pederson) brought diverse technical expertise to the effort. Each had profited from personal experience working in industry. They recognized that this new engineering field had to draw on the best fundamental knowledge of semiconductor physics and materials, mathematics, and statistics. They shared a commitment to giving their students the opportunity for design, fabrication, and evaluation of experimental microelectronic devices. Faculty and students maintained continuous contact with people at the industrial leaders in the early days of microelectronics, including Bell Labs, Fairchild Semiconductor, Texas Instruments, and Westinghouse.

In 1961 a U.S. $300,000 grant from the Air Force Office of Scientific Research enabled the creation of a 300 m^2 facility for fabrication of experimental silicon devices and circuits. Skeptics questioned whether a small university based laboratory could be productive. However, beginning in 1963, research contributions from this program met the standards for publication and presentation in the world's best professional journals and conferences.

In the 1960s and earlier, shared research laboratories at universities were unusual. Major installations such as particle accelerators were shared; otherwise, professors preferred to have complete individual control over the equipment and facilities necessary for their research. Collaboration between professors was viewed with suspicion in promo-

tion reviews and was seen by individuals as a threat to advancement. Faculty leaders at Berkeley wisely acted to break the old pattern, aiming to strengthen the microelectronics program. They opened access to the microfabrication facilities to faculty and students in all fields of engineering and science, subject to strict standards for laboratory training and discipline. Equitable sharing of operating costs was required. Researchers with diverse experimental goals began to share the common facility.[1]

Independent reviewers as well as participants ranked the program as highly successful. Graduates were in great demand in Silicon Valley and around the world, for positions both in academia and in industry. A U.S. $5 million expansion and upgrade of the research facilities was completed in the early 1980s through cooperative efforts and support from faculty, university administration, State of California leaders, and industry. Substantial further improvements have been made from time to time since. Capability of microfabrication of structures employing most semiconductors and a wide variety of other materials has been developed.

True interdisciplinary programs have grown, involving participants from physics, materials science, chemistry, chemical engineering, mechanical engineering, and industrial engineering. Research and education in fields including micro-electromechanical systems (MEMS), cryoelectronic devices and circuits, semiconductor manufacturing processes, and optoelectronics is greatly enhanced through interdisciplinary collaboration. At Berkeley there is now general endorsement of the multiplicative value of collaborative faculty research. Even faculty and students not formally involved in interdisciplinary programs find creative stimulation from interactions with researchers from other disciplines and specialties through encounters in the microfabrication facility.

Faculty involved in microfabrication maintain a policy that new faculty members and their students are welcomed and enjoy equal priority in access to the facilities. At times this means that certain equip-

1 Extensive information about our facility may be found on our World Wide Web site: http://argon.eecs.berkeley.edu:8080/Microlab.html.
Ms.Katalin Voros, Berkeley's Microfabrication Laboratory Manager, provided data and helpful suggestions for this short paper.

ment is in heavy demand. An online reservation system makes it possible for researchers to plan ahead for access to specific resources. Over the longer term, the policy of sharing has proven highly successful. New researchers become supporters, advocates, and initiators in efforts to enlarge the facility, and to obtain new grants, contracts, and gifts to expand the research program and enhance the experimental capabilities. Everyone realizes that by working together they can over the long-term have better capabilities and can accomplish more in research than would be possible in the old individualistic pattern.

The policy of welcoming new faculty investigators has been particularly helpful in the always-competitive arena of recruiting new young faculty members. Berkeley offers candidates equal access to an excellent experimental facility, well-staffed and populated with accessible experts on most aspects of microfabrication. Generally we include a cash award for research initiation of U.S. $100,000 to U.S. $300,000 that can be used to procure specialized equipment not already available in the laboratory. Our new appointees make a fast start in their research. The faculty candidates we seek are usually sought at the same time by other institutions, sometimes with offers that include far more cash and new laboratory space; much work would be needed before research could begin. We usually win.

Our microfabrication facility is not used to fabricate experimental chips that can be obtained via outside services. The MOSIS service, funded by the National Science Foundation and other agencies, provides U.S. university researchers with fabrication services using standard commercial VLSI (very large scale integrated circuits) processes, at little or no cost to individual projects. Focus in Berkeley's microfabrication facilities is on enabling experimental research employing advanced techniques and processes that are not available commercially.

Of course there are very practical advantages to sharing a common experimental facility for microfabrication research. Costly resources, including clean laboratories, technical staff, operating expenses, and fabrication equipment are needed for research involving microfabrication. Today, pooling the resources and energies of a number of faculty members is essential if an academic institution is to be competitive in research and graduate education involving microfabrication. The table below summarizes the physical, financial, and human scope of experi-

mental microfabrication activity at Berkeley for the 1996 – 1997 fiscal year. While it may be possible to conduct competitive microfabrication research today over a narrower technical scope with somewhat smaller human and physical resources, there seems to be a threshold level below which adequate capabilities cannot be sustained. Our experience suggests that all the skills needed to maintain and utilize modern microfabrication processes and equipment cannot be sustained with a technical staff smaller than 5 or 6 people. Faculty and students alone cannot maintain an ongoing capability.

Table: Microfabrication Facility at Berkeley, 1996 – 1997

Faculty investigators	65	
Graduate student researchers	240	
Professional staff	4	
Technical staff	14	
Laboratory and office space	2,000	m^2
Operating expenses	U.S. $1,530,000	
Recharged to faculty grants	U.S. $1,280,000	
University support (as budgeted)	U.S. $250,000	
Value of present equipment	U.S. $8	M
New equipment installations	U.S. $0.5 – 1.0	M/year

Some table entries require clarifying comments. The 65 faculty and 240 student investigators rely on the microfabrication facility for varying fractions of their total research activity, ranging up to 100 percent. Professional staff comprises a non-academic Laboratory Manager, an administrative manager, and two engineers, and is responsible for overall operations and training of new graduate student researchers. Technical staff is responsible for maintenance and installation of equipment and processes. Most microfabrication work is performed directly by graduate students, as an important part of their education.

Operating expenses include 14 staff salaries; faculty salaries and student stipends are not included. Important operating expenses (electric power, building maintenance, etc.) are not included above; these constitute additional university support. The facility is managed care-

fully and regularly operates within an adopted annual budget. Budgeted university support is negotiated in advance. Much of the equipment is obtained as gifts from industry. Specific research grants or contracts sometimes provide acquisition costs for new equipment. Start-up funds for new faculty members, as mentioned earlier, usually include allocations for equipment.

To summarize, microelectronics research including fabrication of experimental devices, circuits, and other microstructures has been carried on successfully at Berkeley since 1961. Microfabrication facilities are shared by faculty and students from many fields of engineering and physical science. About half of the specific research projects are interdisciplinary. Even in projects that are not interdisciplinary, much learning occurs when faculty and students work side by side with peers from different disciplines. By sharing the use and costs of a single facility, investigators have access to a range of experimental skills and equipment that a single faculty member could not support.

External and Internal Governance of Universities

The Management of the Modern University

Steven Muller

The driving force within the modern – or contemporary – university is change. Not gradual, considered, partial change, but rather an urgent, drastic, total transformation. The whirlwind revolution of human knowledge produced by electronic technology continues and inescapably storms through the university, whose sole business is knowledge. As the scope and content of human knowledge is suddenly multiplied by orders of magnitude, and access to and communication of human knowledge becomes instant and universal, the most sophisticated human institution devoted to transmitting and advancing human knowledge must recreate itself or perish. Inevitably, then, the university today is in the midst of the storm of self-reinvention, and therefore desperately difficult to manage.

Of course, the university has recreated itself before. The traditional Western university of faith, committed to the study and transmission of accumulated knowledge, operated for centuries within a prevailing norm of religious orthodoxy. In the 19th century, however, this traditional university of faith transformed itself into the university of reason, committed to rational inquiry and the scientific method, which demanded that the truth of matters should be demonstrable by proof. The pace of change accelerated. By the middle of the 20th century, the university of discovery superseded the university of reason. For the university of discovery, the search for new knowledge and the development of new technology became the central and most attractive mission, and teaching became more and more integrated into – some would say subordinated to – the research enterprise. And then, within a half century – or,

more graphically – in less than two human generations, the virtual explosion of electronic intelligence processing initiated the contemporary transformation of the university into what I have earlier and elsewhere labelled the university of calculation.[1]

The plain fact is that as yet we have no clear idea of what the university is in the process of becoming. The only clear prospect is change, not merely rapid but also radical. Most of what we have taken for granted is becoming questionable and may not survive. While we cannot yet describe tomorrow's university, we can already ask some of the questions whose answers will determine its structure. Because the management of today's university is fated to manage a degree of change amounting to transformation, and will be confronted with all the questions we can ask and more, it makes sense at the outset to examine issues which are already apparent.

Let us begin with one simple assumption: that the personal lecture system of presenting information will not survive in its present form. This may seem too bold an assumption in view of the fact that "the talking head" has survived centuries both of words in print and of literacy. However, the world's best lectures can now not only be taped but appropriately illustrated, so as to offer that marriage of words and pictures which contemporary advertising has revealed to be a truly splendid teaching technique. Who would want to sit on a hard seat in a crowded hall and strain to see and hear a far distant learned professor expound verbally when it is possible to hear the same substance in comfort by oneself (or with friends) at a convenient time, in a convenient place, delivered by the greatest living (or even recently deceased) expert on the subject, and accompanied by support graphics and appropriate music or other sounds – all available in the virtual reality produced by the next generation CD ROMs? Lectures, electronically reinforced and presented, very likely will survive, but the live voice in the crowded hall seems less likely to do so. A magnificent lecture performance by a great and famous scholar, fully edited, illustrated, and orchestrated, is one thing. The same material spoken live from a lectern by a local expert is quite another.

1 *The Advent of the University of Calculation*, in: *Universities in the Twenty-First Century*, ed. Steven Muller, Bergholm Books, Providence, RI, and Oxford, U.K., 1996, pp. 15–23.

If we assume this to be true, other interesting questions pop up. How, for example, will professors teach? If they do not lecture, how will they instruct? And what about the students? Without lectures to attend, what will bring them to the university? The library? Not likely, because just about every word or number available in the library will also be accessible electronically to anyone, anywhere. Laboratories? Yes, of course. Despite the new electronic technology there is as yet no apparent substitute for hands-on laboratory teaching, involving both student and instructor. Virtual reality techniques can assist experimentation, but they are not a likely substitute for hands-on work, and in their most effective and sophisticated form they usually require special quarters and thus are not accessible via personal computers. So, yes, laboratory instruction will continue to require the presence of both professors and students. Could it become true, then, that only the laboratory sciences will require the shared presence of teachers and students in the same space?

If that indeed were true, and if all lectures were electronically presented, then the question arises as to whether the current aggregations of professors at different universities would remain necessary at all. It might make more sense to create centers for each academic discipline. The task of each such center would be to train and maintain a staff of superb experts and to produce a nationwide series of lectures in the discipline – lectures which in aggregate would prepare students for any kind of examinations in the field. If more than one center were needed, this would not be for the sake of redundancy but rather to permit further specialization. Let us take the field of history as an example. In Europe, for instance, there could be one center for European history, but each nation would also have a center of national history, and the history of the rest of the world would be covered by lectures created in Asia, Africa, North and Latin America, etc. What purpose then would be served by separate, comprehensive history departments at any number of separate universities? In fact, would any purpose be served by any such large number of separate universities such as now exist? Would their facilities be transferred and transformed into new centers, each dealing with a single discipline?

We do not yet know just what the information age will expect of higher education. The most likely demand appears to be for human

talent with highly developed specialized skills in a large variety of different fields. Future professionals would presumably have to be credentialed in some way, probably most easily by passing a national, regional, or even international comprehensive examination, or examinations. This assumption leads us to envision sets of national, regional, or even international centers, each devoted to a particular discipline or part of a discipline. Each center would be composed of the best available scholars in that discipline or part-discipline, who would provide the lectures, prepare the examinations, and train their successors. All of these centers would be linked together electronically for the sake of interdisciplinary collaboration. It would be quite possible for the national, regional, or international aggregate of these centers to be called a university – an electronically-linked network of which each center would then form a component.

But what about the laboratory instruction we mentioned earlier? How would it be provided? The large number of students who would need access to training laboratories would require a number of such facilities, all essentially identical. Would these continue to exist at various universities as they do now? Perhaps, but not necessarily. It seems certain, in the age of information technology, that these laboratories will become ever more expensive to equip and operate. How much redundancy would be required, and affordable? Should the industries which would later hire the credentialed specialists be required to make their industrial laboratories available for training? In states or regions where there are non-university research institutes, such as the Max Planck Institutes in the Federal Republic of Germany, should these institutes be required to make their research laboratories available for teaching? To what extent could teaching in laboratories be automated, or performed robotically? What role would the hypothetical disciplinary centers responsible for the lectures and examinations in each discipline play in the operation and supervision of teaching laboratories? The centers for science would each require laboratories for the preparation of lectures, examinations, and future lectures. Would these laboratories also serve as teaching centers? Would it be more convenient, and cost-effective, to have students move among laboratories as much as necessary, rather than to continue to operate clusters of laboratories around stationary students? We cannot answer any of these ques-

tions. They are mentioned only to make the point that the need for laboratory instruction does not *per se* suffice to justify the continued existence of the large number of existing universities.

My personal expectation, whatever it is worth, is that universities will indeed survive in considerable number, but only if they continue to serve a substantial teaching purpose. Lectures no longer will suffice. But universities can continue to teach by providing professors who will serve as tutors for small groups of students preparing for eventual examinations. The reasoning behind this belief is quite simple: Prolonged study beyond school as an essentially solitary pursuit is too alienating for human tolerance. Though it is of course possible for students to form electronically-assembled study groups – as already in existence on Internet – some significant degree of real, as opposed to virtual, human contact among students is likely to prove not only desirable but necessary, despite the knowledge explosion. Most current and past university graduates will acknowledge the extent to which fellow students positively affected their own learning experience. In the same way, former students who credit professors with significant influence on their learning are more likely to do so on the basis of personal encounters rather than mere presence at lectures. It would be as easily possible, of course, to conduct a colloquy with a professor electronically as to form a student study group, but there is still likely to be a point where real human, rather than virtual, interaction remains an essential ingredient in the learning process. The professor as tutor, or seminar leader, is nothing new. What would be new would be that professors would offer their teaching primarily in these roles, including of course laboratory instruction as well. The drastic change involved would restore teaching rather than research as the university's central mission. It would also provide the university with the humanist role of providing a supportive human community environment to supplement the alienation imposed by electronic technology.

Even if these speculations become reality, would they suffice to keep universities alive in anything like their present form? It is impossible to predict. In the United States, long committed to an undergraduate stage of higher education, which usually takes eight semesters, and generally involves student residence in dormitories "on the campus" of a college or university, the elimination of this experience would have significant

social – quite apart from academic – consequences. Four full years of undergraduate study keep close to 50 percent of the age group between 18 and 22 out of the labor market, and also usually remove them from living at home. A whole culture of collegiate life, particularly notorious for an athletic component of circus dimensions, has grown up in this context. Even in totally non-residential European universities some sort of student quarter of a town or city tends to exist, and to exhibit various forms of student life. It is unlikely that students will not seek ways to aggregate, and perhaps universities may continue to exist in part in response to this inclination.

Another as yet unknown factor, however, is what sort of education students in higher education will carry forward with them from school. Present conditions already indicate that all school leavers will have acquired the ability to use the electronic knowledge technology. This presumably also carries with it a matching level of literacy and numeracy. What is not clear is how much of a basic education students will have acquired in school. There is, of course, some possibility for universities to influence the outcome of schooling, by setting conditions for eligibility to study further. In most of the world the working assumption is that schools bear the responsibility for general basic education, and that university work therefore can be devoted entirely to specialized pre-professional study. Only in the United States and other societies which use an undergraduate phase in higher education is it true that a relatively advanced level of basic general education is also an essential ingredient of collegiate education. One may now speculate that if students continue to aggregate at universities for tutorials, seminars, laboratories, and social life, then an easy opportunity would exist to add elements of general education to the mixture. But one could as easily speculate that access to general knowledge via electronic technology is so easy that any aspect not dealt with during schooling remains available to any person, at any time, on a life-long basis without need for any formal instruction.

Such speculations in turn lead to the thought that the familiar concept of a student generation of persons who begin higher education at the end of schooling, and then leave higher education to begin professional work, may rapidly become outdated. Already, technological change and innovation proceed at a pace so rapid that highly advanced

specialized knowledge can no longer be acquired once in youth for lifelong use. Instead, advanced specialized knowledge needs to be upgraded or shifted to new specializations several times during the longer human lifetimes which have already evolved. If universities in future exist to support individual specialized learning via electronic technology, then one might also assume that students might already be employed either prior to or during their university experience. One might further assume that most individuals would have a series of student experiences over the years rather than only a single dose of advanced study after school. It does seem extremely likely that the link between higher education and professional employment will become closer than ever, which raises the question of how explicitly university study will be linked to employment. Is it, for instance, conceivable that employment would precede university study, even to the point of becoming a condition of admission to university work? One may then indeed wonder whether the university degree itself will survive as such, or whether it will be superseded by a credential for proficiency in a discipline, based on the appropriate examination result. Such a credential also could perhaps be periodically renewed, based on new study and a new examination, or supplemented by a second, or third, credential in another discipline. If the purpose of higher education becomes wholly focused on proficiency, then higher education will no longer necessarily produce educated, but qualified persons instead.

In this connection it would also seem possible that a widening and severe social gap would open up between those persons in society who are skilled in the knowledge technology, and those who are not. While access to the knowledge technology may be simple, easy, and cheap, that *per se* no more guarantees universal participation than yesterday's simple, easy, and cheap access to printed knowledge and entertainment guaranteed literacy. And as far as higher education in the information age is concerned, can one reasonably assume that the entire population would participate? Surely not. At this moment, roughly 50 percent of the school-leaving generation in the United States enrolls in some institution of higher education. I believe that this is the highest level of any contemporary societies. Even if one were to assume that this level were to become a global norm – which seems wholly unlikely, what should one assume about the lifestyle of the other 50 percent of the

population? All that can be said here and now is that if indeed there is a great gulf in society separating a knowledge-competent class from a class of those who lack such competence, and if the future university is intimately linked to the knowledge class, then such a situation would be bound to have a significant impact on the university itself. Let me amplify this statement by one example. One way to rationalize the continued existence of universities in many different communities would be to assume that they would provide instructional support or assistance to a large segment of the neighboring population, as needed or wanted, on a part-time basis. But this would be much more difficult to envision if that neighboring population consisted largely of an underclass of persons excluded from a socially-dominant knowledge class.

Enough. All of these thoughts are obviously mere speculation. The purpose of presenting them is not to attempt prediction, but only to make the single point that the university as it exists today cannot avoid change – change both drastic and rapid. We cannot even be certain whether the university as we know it will survive at all, nor, if so, in what form. What we do know is that the university as it exists needs to be managed, toward and through, whatever transformation lies ahead, and that this represents a colossal challenge to university management. Change is invariably difficult for human beings, even when it is welcome. Quick and drastic change is particularly difficult, especially in the workplace, where it will have differentiated – and therefore divisive – impacts on those affected. Management of rapid, major change within any institution therefore is bound to be not merely unpopular, but most likely to become an adversary process between management and almost everyone else involved. Unusual fortitude is required to lead an organization through any major change. Such fortitude is essential even at the beginning, but it becomes even more crucial – and much, much harder to muster – when the process of change has achieved completion of the first stage, or phase. The pressure to make a pause – to take a break – will then become palpable to everyone, including management. Iron will is needed to press on to complete the change process, and to do so in the face of exhaustion and opposition from everyone else. Changing an institution inevitably means conflict to some extent. The management of conflict requires a very

special kind of courage: the ability to function effectively in a hostile environment.

The level of management self-confidence demanded in this situation must also be high enough to include, and rise above, the recognition that the benefits of the changes being imposed are totally uncertain. Clear though it is to everyone that the university cannot simply continue *status quo* operations into the maturing information age, it remains quite unclear which immediate steps will in the long run prove to have been the right or best ones. Everyone's expectations will require university management to proceed with planning, to set out goals, and then to lead the effort to accomplish these goals. What will be missing, however, is any certainty that the plan and the goals are in fact the right ones. The revolution of the technology of knowledge confronts the university with the inescapable need to plunge into unknown territory, in pursuit of no clear future, but rather toward ultimate solutions which remain to be discovered.

Consequently, yet a third dimension of courage is needed by the management of the contemporary university. The admission of error and the shift to a major course correction must be added to the ability to manage change in a hostile environment, and toward uncertain final objectives. The effort to restructure the whole of the university institution in the absence of a clear ultimate goal is bound to involve trial and error. Error, once discovered, must be admitted and corrected as rapidly as possible. The admission of error is one of the most demanding challenges to leadership – i. e., management, because persistence in error leads to failure. All I have been saying here involves well-known aspects of human behavior. What is so striking and different in our own time is the speed at which change now takes place. What once changed only over centuries now is transformed, no longer in decades, but in years or even months. No longer will planning, execution, and result stretch over a career or longer. Indeed the process will not only occur but repeat itself rapidly within years or even months. The same persons who participated at the beginning will all still be participants at the end. Immediate recognition and admission of error and the most rapid possible corrective course is therefore necessary, but no longer softened by the passage of time.

This discussion of the kind of management required to transform the

university began with a focus on courage – to be unpopular, to move into the unknown, and to admit and correct error. What we are also talking about is smart management – smart in the most contemporary modern sense – as in smart terminal. Smart university management requires a team, because no one person will possess all the skills required. That team will need leadership, but whoever leads it needs to be smart enough to recognize his or her total dependence on the whole team. And team members – ultimately even the team leader – must be expendable, in the sense that recognition of error, course corrections, and new directions may require deletions from and additions to the team, and perhaps new leadership as well. Precisely this model of management already exists in industry, which of course requires competent performance above all. The modern university, forced by the knowledge revolution to recreate itself, now requires competence in its management as its highest priority. More traditional characteristics of university management lose priority when the only sound criterion by which university management can be compared and judged is effective performance, i. e., competence.

From my own experience, as a corporate director as well as a university administrator, I would argue that there is less difference between effective performance in the management of industrial corporations and of universities than most people might think, with one exception. In universities management continues to rely much more heavily on persuasion than authority, while the reverse tends to be true in most corporations, except – interestingly enough – some of those in the knowledge industry. The need to inform, to persuade, to discuss, and to entertain dissent remains, and should remain, a hallmark of academic management. A community committed to the acquisition and dissemination of knowledge should not be expected to accept management incapable of persuasion and averse to discussion. Nevertheless, university management must have sufficient authority to reach conclusions and act without destructive delay. It has been said in American higher education that achieving change in university faculties is like moving a graveyard. Such pace of change in the modern university simply is no longer survivable.

Having just now referred to the university as a community, let us remember that it is likely to remain a community during the process of

reinventing itself. The quick and comprehensive changes required will traumatize the university community but not immediately eliminate it. The community knows that it requires management. However, faced with the enormous threats entailed by change *per se*, aware that most of the changes are themselves experimental rather than definitive, managed by a team forced to acknowledge and correct management errors, the university community will find it difficult to trust its management. Nevertheless, only some degree of trust will enable management to function effectively in the situation we are contemplating. The effort of management to persuade and discuss will not succeed in convincing the whole community, but it can engender at least some trust. The biggest – indeed most indispensable – asset available to management is its accessibility. The individuals on the management team are known, and those in charge can be reached and required to respond. Such accessibility and openness on the part of management point the only way to that minimum of community trust required to allow management to function at all. At the same time accessibility and openness also prevent authoritarian management, which would destroy the integrity of the university community. Blind discipline lacks legitimacy in a community committed to knowledge. However limited, only trust earned on the basis of shared knowledge and interests confers legitimacy on university management. On that limited trust rests the fragile but indispensable authority available to university management.

This fact alone would argue for the need of each university to function with a high degree of autonomy. Accessibility and accountability are at least possible when the management in charge is part of the community. Both accessibility and accountability are lost when those in charge are outside the community altogether, and resident management is perceived as only executing instructions from somewhere else. When dealing with the need for rapid and comprehensive change, the willingness of management to address the problems, and of the community to endure the inevitable trauma, is dependent on a shared sense that all the effort and sacrifice involved will result in an improved, surviving community – and that the contribution of each person is required, recognized, and rewarded. There may be some degree of comfort in the knowledge of any one university community that the change it is compelled to undergo is part of a comprehensive total process affecting

the whole system of higher education. However, even such a comprehensive overall plan for change would allow for some degree of differentiated adoption by each particular university within a comprehensive system.

In fact, the evolution of the new university model required by the knowledge revolution is unlikely to result successfully from only a single comprehensive effort by a whole national or regional university system.

My opinion here is based on the fact noted earlier, that the speed of change is fast beyond precedent, as well as on the assumption that the final result of the transformation required remains obscure and is more likely to be the product of much trial and error than of a pre-designed total scheme. With respect to the speed of change, the prospect is that a finished solution for an entire university system would take longer to develop than the educational needs of currently enrolled students could tolerate. Worse, no matter at what length and with what care the grand scheme is designed, it will likely fail to be definitive. It also will have taken so long as to be outdated by the time it is finally ready for adoption. American experience in higher education, which features an extremely high degree of institutional autonomy particularly among the so-called independent colleges and universities, indicates that successful trials by one institution are almost immediately adopted by most other institutions. Errors, on the other hand, are unlikely to be repeated elsewhere, and their negative results can often be limited to only a single institution. A serious flaw in a grand comprehensive scheme can potentially injure all concerned, and is at the same time difficult to correct. The equivalent flaw in only a single institution has much less widely damaging potential. American experience also shows that the survival instincts of autonomous institutions are strong enough to lead to rapid correction of errors.

Quick adjustments in response to trial and error do, however, require that management is in control of the university budget. The income side of the budget may always be beyond management control to some degree, but that makes control of expenditures even more essential. The allocation of resources within the university is the single most powerful and useful tool in management's hands. In the end, the designation and shifting of funds within the institution is the only effective way in

which management authority can be exercised. What this also requires, of course, is reliable management competence to administer university finances and resources. Incompetence in fiscal management makes mockery of financial authority and destroys confidence in and respect for management. Easy and obvious as this is to say, it must also be acknowledged that budgetary competence has not been one of the traditional strengths of the university institution and can therefore not be taken for granted. Lack of budgetary authority, or incompetence in budget management, however – either one – will inevitably result in management incompetence and impotence.

With this thought we arrive at the crucial question: Is it possible to create management capable of coping with the challenge of the university's unavoidable and nearly total transformation? We have spoken of management which must deal with a professorate in professional agony, must move toward goals that are not clearly fixed or visible, must therefore proceed by trial and error and acknowledge and reverse error without delay, must be persuasive and open to discussion, must remain dependent for its authority on the trust of the community it manages, and must demonstrate reliable competence, particularly in fiscal administration. Is management with all these indispensable virtues possible? Are there ways to achieve or assist what is so desperately needed?

The one suggestion I can offer is that university management should have the assistance of a strong and able board of directors. Such a board would function very much like the board of directors of a publicly-held commercial corporation, principally selecting, supervising, and advising management. This suggestion is obviously derived from my personal experience as the president of a private, or independent, American university. Thus, it could at the very outset be deemed to be ill-suited outside the United States. I respectfully suggest that the suggestion could be adopted to universal use. The primary virtue of such a board is that it provides an alternative to direct supervision of the university by government. Direct, detailed supervision of and accountability to government inevitably inhibits the university's necessary managerial authority and flexibility, and also risks undue political intervention in university operations. It is worth pointing out that the public universities in the United States, i. e., those substantially funded by state appropriations, also have boards of directors. These can and do

function as effectively as those in the independent universities, unless they are politically appointed or elected, in which case they function more as simply a part of state government. A board of directors consisting of distinguished persons from business, industry, and the professions serves to provide public accountability of the university. Such a board represents the public interest in much the way the corporate boards of public enterprises represent the interests of the stockholders. As distinct from corporate boards of directors in business and industry, who receive compensation for their services, however, university directors serve in their spare time while continuing their individual careers. They must care enough about the university to volunteer their service, but they are not university employees, nor employees of government. They cannot and do not manage the university, but their approval is required both for the selection of the university's top managers and for all major university policies and decisions. The university board of directors in the United States is regarded as the guarantor of the integrity of the university's fiscal and administrative operations, and as the appropriate representative of the public interest with regard to all of the university's programs, including research and teaching.

All this is nothing new. My point here, however, is that an effective university board of directors can assist and strengthen university management in several ways – ways which are potentially of crucial significance during the crisis of drastic and urgent change. The very existence of a board of directors already achieves the reality that university management is neither selected by nor directly accountable to the faculty, or professorate. It goes without saying that any university management which is wholly unacceptable to, or would take actions wholly unacceptable to, the faculty could never function. But there is also a clear and crucial distinction between a management selected by and directly accountable to the faculty and one selected by and accountable to a board of directors. If I may be permitted a personal comment, I found that one of the great privileges of my own university presidency was to see the institution as a whole, with at least partial knowledge of each and all of its component parts. But this privilege was also a great burden, because only the president and a few top managers enjoyed this perspective, while everyone else was informed about his or her own component of the university but usually largely

ignorant of all the rest. Aside from the management team, the only other group which consistently saw the university as a whole was the board of directors. So my argument now is that in times when change unavoidably threatens faculty interests, and therefore focuses professors on threats to their own most immediate concerns, there is scant chance to rally the faculty to raise its sights to the whole of the university. The sense and significance of the whole can however be shared with the board of directors, who may thus represent the only – and indispensable – partner and supporter of management during the crisis induced by change. University directors cannot help but hear all of the voices within the university. An essential reality check is accomplished if they share fully in management's view of the whole. If they do, progress is possible. If they do not, progress will be arrested – as it probably should be. An effective board of directors thus can strengthen management when the university needs it most, and when support from the professorate is at its most fragile. It is all too human for short-term sacrifices faced by the faculty to obscure and frustrate long-term gains.

There are two lesser ways in which a university board of directors can also assist management at critical moments. One is to provide public spokesmanship when it is most needed. The board of directors, consisting of non-employee volunteers from other walks of life, has more public credibility than university management itself. At moments when government and the public at large question the university's course – and this is almost bound to happen during an intense period of change which may have caused professors and students to be up in arms – the firm support of the university board of directors, speaking in the public interest, can make a significant impact. The endorsement of university management's course by a board of persons each of whom is successful in concerns outside the university can carry a lot of weight.

By the same token, the university directors would usually include many persons with management experience. That experience – which renders their public support of university management so credible – also enables them at times to give knowledgeable and crucial advice to university management. In particular, the change process confronting the university is after all not solely experienced there but encompasses the whole society. Business, industry, the professions, indeed all of us, are caught up in this ceaseless and drastic change. University directors

who are themselves engaged in managing change as part of their own careers can be of extraordinary assistance to university managers – not by micro-managing within the university themselves, but by sharing experience and ideas. I cannot even begin to count the number of management mistakes avoided or corrected by wisdom or caution expressed by university directors during my presidency.

And now we end as we began. The management of the modern university is faced with change of unprecedented scope and urgency. The existence of the university as it is now and as we know it is in doubt. University managers will have to deal with difficulties beyond all past experience. They are condemned, as the ancient Chinese curse goes, to live in interesting times. Challenges of this magnitude are frightening, but they can also be exhilarating. When so little is clear, failures may not be avoidable, but they may also be survivable. Those of us who are spending our lives in the knowledge industry can only welcome the knowledge revolution. Higher education will survive. The task of determining its new shape has begun.

University Governance as Conflictual Management

Detlef Müller-Böling

Opening Remarks: Conflictual Management "In-Between"

I would like to open my presentation with two introductory remarks. Firstly, and a very general remark: In this section of the conference program we are discussing the interrelationship between internal university governance on the one hand, and external forces, changes, developments on the other. As is the case with every binary opposition – and the opposition internal/external is a classical one – what is decisive is not so much the terms that are standing in opposition to one another; rather, it is the boundary that seemingly separates the two, yet at the same time also ties them together, thereby undoing the clear-cut opposition in the very unfolding of the logic of the in-between. Hence, we cannot talk about either internal or external forces and reaction without thematizing the line in-between, the demarcation line, as it were, which actually is the space where real conflict appears.

This leads me to my second introductory remark: University governance will have to take into account this logic of the in-between. To some extent, university governance in the future also will be management on the borderlines, on the boundaries, and on the margins. By the same token, it will be management of conflict as well as conflictual management. For it will take a stance in-between – in-between, for instance, what we are used to identifying either as the inside of the university or as its outside; or what university members perceive as the inside of their academic community or administrative unit and as its external other. In a sense, this stance in-between is the only position for

the management of a university in the absence of a unifying idea, of a generally accepted ideal of what the university actually is supposed to be. Whereas the Humboldtian university was able to function on the basis of unifying notions such as the "Spirit of the Nation," which provided it with an identity as well as a medium in which the singularity of disciplines could ultimately be sublated, the modern university has by and large lost such unifying and generally accepted ideas.

I will have to come back to this point later on in my talk. Suffice it to say for the moment that university governance these days will have to account for this position in-between, which is also a space of transition – the space of transition of a university in transition.

Having said as much, I now move, as it were, "inside" the main body of my presentation, which I will begin by pointing out three essential features of the institution that we call the university.[1]

Characteristics of the University and Their Perversion

First of all, the university is a professional organization. Many of the issues in a university (e. g. research, teaching) can only be decided upon by academic experts. Based on the notion of academic freedom, the university as an institution as well as its individual members claim a high degree of autonomy and self-regulation. This affects a university's external relations as well as its internal governance structures.

Secondly, the university is marked by organizational fragmentation. Teaching and research take place in almost autonomous organizational cells, which by and large follow the traditional notions of disciplines. The university in this sense is an organization containing within it a great number of individual and highly specialized entities. It appears as a "loosely coupled system," as an assemblage of autonomous units.

This leads me to the third characteristic, namely the decentralization of decision making, the dispersion of the power for decision making over autonomous entities within a lose institutional framework. With regard to its organizational structure and the pace in which decisions

1 See also Frans A. van Vught, *De nieuwe academische collegialiteit, Rectoraats overdracht,* Universiteit Twente, 13. Januar 1997.

are made, the university resembles a supra-national body such as the European Community rather than some of the latter's centralized nation states.

If one accepts these aspects as characteristic of the university – and I think they indeed capture something of what may be called, for lack of a better word, the university's "essence" – one may be tempted to characterize university governance as a "mission impossible." For not only is it very difficult to actually govern an institution that in its basic characteristics tends to resist formal and stringent governance; there is also evidence that the university is permanently threatened by the perversion of the three characteristics I just mentioned.

Professionalization: Hyper-Specialization

There is, for instance, the general tendency of professionalization turning into hyper-specialization, that is, the fragmentation of disciplines into a myriad of isolated sub-disciplines. In order to legitimize their existence, such sub-disciplines claim a specific scientific territory as their own. They put up "no trespassing" signs in order to keep any possible intruder from disturbing the inner circle of their self-centered scientific world. Communication no longer takes place within an institutional framework; rather, specialists communicate with other specialists around the world. They identify primarily with their discipline rather than with the institution they belong to. And yet, although the tendency toward hyper-specialization to a certain extent is in accordance with the logic of research and science and their move toward unknown territory, there is also the danger of science becoming incapable of tackling the holistic, interdisciplinary problems of mankind. In addition, hyper-specialized research no longer is able to legitimize and communicate to the tax payers its growing need for public funding. Hyper-specialization thus may severely damage the university's social reputation and acceptance. But it also affects teaching and the organization of our study programs, leading to the well-known deficits like uncoordinated courses and examination dates, overlaps in curriculum and content, to name but a few.

Specialization: Academic Individualism

Coupled with the tendency toward hyper-specialization is the second moment of perversion I would like to mention, namely growing academic individualism which undermines and subverts both the university's corporate autonomy as well as its institutional identity. The institution's organizational fragmentation thus turns into the isolation of single departments or even individual faculty members, who all claim the right to pursue their own interests and who are generally allergic to any kind of interference from above or outside. What gets lost in such a situation, then, is the sense of academic collegiality.

Decentralization: Conservative Organization

In such a situation, the university becomes incapable of adapting to a changing societal context and to responding to the challenges of institutional self-recreation and modernization. The university turns into a profoundly conservative organization. The decentralized system of decision making, which I have mentioned as the university's third characteristic, breaks down. The university and its members lose sight of the challenges they will have to face in the future. Instead, they become self-centered and self-obsessed. Strategic planning on the institutional level turns into strategic behavior of individual university members, into tactical moves of sporadic collective alliances mainly designed to resist the growing need for modernization and change – for "drastic and rapid" change, as Steven Muller recently put it.[2]

Types of Resistance toward University Management and Governance

I will come back to this point later on in my talk. For the moment, I would like to give you a few examples from daily academic life of what I have called the perversion of the university's characteristic fea-

2 Stephen Muller, *The Management of the Modern University*, this volume.

tures. They also show some common forms of internal resistance toward university management and governance.

Ignoring Leadership and Governance

Everybody familiar with the university – and I venture to say, the university in almost any country – knows how inventive academics can be when it comes to circumventing or postponing decisions and initiatives or to boycotting university governance altogether. One of the most common forms of resistance is simply to ignore leadership and governance altogether. For instance, it is impossible to account for the number of memos and instructions sent by a university president to department chairs or to individual faculty members that allegedly have been "lost in the mail." In German universities, this is a very common excuse and a comfortable way of undermining internal communication and administration; and it is favored by the common lack of effective internal communication networks.

Questioning Governance on Scientific Grounds

Another form of resistance is more appropriate to academic professionals yet not less effective with regard to undermining leadership and university governance. It consists in questioning governance on scientific grounds. To give you an example from my own experience as a university president: During my presidency, I attempted to reshape the internal procedure for the allocation of funds on the basis of a new mathematical formula. When it became clear that the department of mathematics would have to accept a considerable cut-back in funding, the faculty members took great pains to demonstrate that the formula we used was mathematically incorrect. Fortunately enough, the other department chairs were unwilling to follow their colleagues from the math department on foreign scientific territory and thus rejected their reasoning. Although the department's initiative ultimately remained unsuccessful, it still was able to cause considerable disturbance within the university.

Putting Decisions on Hold

Still another commonly deployed strategy is that of putting decisions on hold by relocating the problem that needs to be solved on adjacent territory. Here is an example from my current work as the director of the Center for Higher Education Development: Together with a humanities department of a large university we designed a common project intended to reshape and optimize departmental organization. However, when the proposal was submitted to the rector for approval, we were confronted with the question why we were cooperating with the humanities department instead of the department of law, although the law department never had shown any interest in engaging in such a project. This had the effect that, at least temporarily, we could not get down to work. The reason for this was not simply the lack of good will on the rector's part; it also had to do with deficiencies in the ways decision makers are involved in internal information and communication processes.

Building of Strategic Political Alliances

One last form of resistance that I would like to mention here is the building of strategic political alliances within the university's various councils. This form is particularly "appropriate" to the German university, which unlike universities in other countries essentially is characterized by collegiate decision making.[3] This accounts for the power the various councils on the central and peripheral levels hold within the institutional process of decision making. Now, the shift in German universities toward participatory democracy, which took place in the 1970s, led to a very fragile balance of power between the various constituencies in the university councils. As a result, professors find themselves forced to build strategic alliances with their colleagues merely in order to defend their narrow majority against the other constituencies.

3 See the comparative study by Harry de Boer, Leo Goedegebuure, Frans van Vught, *Governance and Management of Higher Education Institutions. A Comparative Analysis*, lecture presented at the Thirteenth General Conference of IMHE Member Institutions, "Setting New Priorities for Higher Education Management," Sept. 2–4, 1996.

The mediation of conflicting opinions and individual interests as well as the search for the smallest possible consensus thus become vital issues to the professors. Everybody familiar with universities and the idiosyncrasies of their members knows that this is a hard and very aggravating undertaking.

In this regard, one is reminded of that very cogent characterization of academics once given by Nietzsche, who wrote: "Whoever associates with scholars knows that one occasionally wounds them to the marrow with some harmless word; (...) one can drive them beside themselves merely because one has been too coarse to realize with whom one was really dealing – with sufferers who refuse to admit to themselves what they are, with drugged and heedless men who fear only one thing: regaining consciousness."[4] However, if there is one thing the university and its members are forced to acknowledge, it is precisely this need to regain consciousness – reforms.

University Governance between Scylla and Charybdis: Conflictual Management

And yet, as soon as one regains consciousness, one realizes the unresolvable dilemma and a fundamental conflict in which university governance is caught. It is constantly forced to oscillate, as it were, between Scylla and Charybdis – between, for instance, the temptation to either simply ignore the pressing need for change, or to hectically and rather intuitively react to any fad that might appear on the academic, social, or political scene. None of these attitudes is adequate with regard to the real and dramatic changes ahead. Just think of the enormous challenges the university faces in the age of telecommunication and tele-teaching. It is simply impossible to predict how the virtualization of the classroom will affect both the traditional forms of research

4 Friedrich Nietzsche, *The Genealogy of Morals*, III, 23 *("Man verwundet sie – jeder erfährt es, der mit Gelehrten umgeht – mitunter durch ein harmloses Wort bis auf die Knochen, man erbittert seine gelehrten Freunde gegen sich, im Augenblick, wo man sie zu ehren meint, man bringt sie außer Rand und Band, bloß weil man zu grob war, um zu erraten, mit wem man es eigentlich zu tun hat, mit Leidenden, die es sich selbst nicht eingestehen wollen, was sie sind, mit Betäubten und Besinnungslosen, die nur eins fürchten: zum Bewußtsein zu kommen ...". Zur Genealogie der Moral III, 23).*

and teaching as well as the university's institutional self-understanding. Furthermore, there is the need to adapt the university and the study programs it offers to the changing societal context. For instance, will it become necessary to respond to the growing demand for life-long learning. Higher education as yet has been rather reluctant to acknowledge the need to expand its traditional course offerings and to adapt them to a very heterogeneous clientele. And finally, the university also needs to recognize the changes in society's attitude toward research and the results it produces, society – and German society in particular – becoming increasingly suspicious of the possible effects of technological advances or new findings, particularly in the biomedical field.

Although we might recognize and accept these challenges as a threat to the university's self-understanding and its institutional integrity, we at the same time are forced to admit that as yet we "have no clear idea of what the university is in the process of becoming" (Muller). The only thing we know for sure is that the traditional representations of the university no longer are persuasive. This is the fundamental dilemma in which we are caught. For the university of the future can no longer be governed according to the ideal of an independent "republic of scholars;" nor can it be treated, as is sometimes the case in Germany, as a subordinate government agency without any real institutional autonomy. And neither is the idea of the university, as a mere service organization appropriate to its scientific aspirations and academic mission, nor is the 1970s model of the German university, as an institution organized according to the principles of participatory democracy, a viable concept to master the changes ahead. All these concepts are still alive in the public debate about the university. But none of them is adequate with regard to providing the organizational principles and the governance structures our universities actually need.

In a way, the situation is similar when we turn to the internal organizational structure our universities need in the future. Here again, Scylla and Charybdis loom on the horizon. For neither the temptation to strengthen university leadership by means of centralized and hierarchical structures of decision making nor the respect for the university's traditional characteristics ultimately offer viable solutions to the university's internal management problems. Whereas the former promises effectiveness and efficiency, it at the same time tends to disregard some

of the essential features of academic culture, i. e., creativity, individuality, and unrestrained scientific curiosity. And whereas the latter tries to respect the university's fundamental characteristics, namely professionality, organizational fragmentation, and the decentralization of decision making, it constantly finds itself on the verge of fostering organizational anarchy, academic individualism, and institutional disintegration.

Hence, there is no lasting solution to the fundamental conflict of university governance. In the absence of an all-encompassing and unifying idea of the university, it becomes impossible to reach a state of harmony in which the fundamental conflict that inhabits the university and its governance is suspended. It is in this sense, then, that university governance will have to turn into conflictual management, that is, into the management of the university's inherent conflict and tension in the absence of any viable and lasting solution.

Principles of Conflictual Management

Now, what are the principles that university governance as conflictual management will have to follow?

First of all, university governance will have to transgress borderlines; it will have to take into account the zones of conflict, the demarcation lines between central and peripheral academic units as well as between the university and its surrounding social and political context. The guiding principle for university governance as conflictual management thus can be formulated as follows: decentralized responsibility with a centralized concept and organized coordination. Decentralized responsibility means that the individual academic units (chair, department) must be in charge of performance and results. However, these have to be integrated into the superior concepts in each case (i. e., individual professors into the department, the various departments into the university). The determination of goals and the evaluation of results then must take place within an organized, coordinated effort.

It is clear that this principle applies to a genuinely autonomous university. However, autonomy in this sense no longer can be understood as the academics' right to unlimited intellectual freedom without

collective responsibility. On the contrary, the question of autonomy henceforth has to be seen as touching upon the internal relationship in a university on the one hand, and on the relationship between state and university on the other. Again, in both cases university governance turns into management on the borderlines, maintaining and affirming lines of separation while at the same time constantly transgressing them. University governance has to restore a balance between individual and corporate autonomy, and between its internal structure and society's legitimate interests and demands. With regard to the concept of autonomy this means that the freedom of research and teaching, which is often misunderstood as the freedom of the individual, should be interpreted more emphatically as the freedom of the university or the department *vis-à-vis* the state to define its own profile. The freedom of research and teaching thus clearly needs to be focused on common objectives.

Management and Coordination Tools

If one is willing to accept these principles – and I believe that they lay the groundwork for an effective restructuring of university governance – one also has to look for the appropriate management tools for university governance.

Organization theory knows a variety of management and coordination tools which are, however, of unequal value to university governance. Internal conflicts and conflicting interests can be coordinated:

- by means of a management by directives;
- by formal rules and regulations;
- via the standardization of tasks, roles, and functions;
- through internal markets;
- within a commonly shared institutional culture and corporate identity;
- by means of processes of self-regulation;
- by means of a management by objectives.

Directives, Rules, and Standardization

The first three forms of coordination, i. e., management by directives, by formal rules and regulations, and/or by means of standardized roles and functions, are only of limited value to university governance. They presuppose strict hierarchical structures of decision making or strong external control and thus ignore the university's institutional and organizational particularities. I addition, they tend to avoid, or rather suppress conflict in that they emphasize irremovable and clear-cut lines of separation.

Internal Markets

The case is somewhat different with internal markets. They may represent an effective means of internal coordination, yet only to the extent that commonly accepted performance indicators are at hand in order to measure the performance of individual departments against each other. This, however, is not (yet) the case.

Organizational Culture

By contrast, an organizational culture based on commonly shared values to some extent seems to be an appropriate means of coordination and internal organization.

Self-Regulation

It also appears as the basis for academic self-regulation, which functions at its best in socially and culturally homogeneous groups. And yet, the critical issue with self-regulation on the basis of an organizational culture is that academic units are generally unable – or unwilling – to implement and accept effective means of self-control. Again, there is the tendency in this model to avoid conflict, to maintain the idea of internal harmony without any disturbances that come from "outside."

Although self-regulation on the basis of a commonly shared organizational culture has a long-standing tradition in our universities, it appears questionable whether it is still appropriate as the sole basis for effective university governance. In addition, it is less than clear whether in the current situation of mass-education universities can still rely on this – essentially non-conflictual – means of internal coordination. For neither the students nor their teachers still can be expected to share a common set of values and to pursue identical interests. This was still the case only some decades ago when access to higher education was restricted to about 5 percent of the population. With the enormous growth of the higher education sector over the last 30 years, however, academic life has become as diverse as the rest of the society, and the traditional ethos that supported the idea of the university in earlier times has by and large evaporated.

This, however, should not be a reason for mourning and for regrets. To be sure, nostalgia for the good old days is very widespread in academic circles. And yet, the issue is not whether we should reverse the process in order to return to the ideal of an esoteric "republic of scholars." For the decision to open our universities to broader segments of the population was both necessary and correct and thus is an irreversible fact with which we have to deal. Hence, the real and indeed very difficult issue is whether and how it is possible to recreate something like an academic culture under the circumstances of the modern university with its fundamentally agonistic nature.

In this regard, it may be useful to reconsider, for instance, the prohibition of in-house promotions of scholars at the end of their academic training. Under the current practice in German universities, graduate and postgraduate training spreads over a period of about ten years, which is long enough for an academic to identify with the university in which he or she is trained. However, after the completion of their training, academics are forced to leave the institution because in-house tenure tracks are generally not available. There are good reasons for this practice to exist. And yet, there is little doubt that it also may keep specific organizational cultures from emerging within our universities.

Having said as much about ethics, academic self-regulation, and the creation of an organizational culture, I would now like to turn to the other management tools I have mentioned. I am convinced that, in order to be effective, university government will have to turn into a management by objectives that deals with the fundamental conflict of university governance and thus turns into conflictual management in the above mentioned sense. Only on the basis of negotiations about the mission and the goals of a university as well as its individual academic units is it possible to arrive at forms of academic self-government and self-regulation that move beyond a sheer selfish pursuit of individual interests to the detriment of the larger academic community. On this basis, then, is it also possible to promote and strengthen the sense of belonging to an institution without suppressing conflict and without negating the productive game of internal and external differences.

One of the prerequisites for a successful management by objectives in this sense is that individual goals – i. e. goals that individual university members pursue – become integrated into corporate goals, that is, goals shared by a larger community within the university or by the university as a whole. In order for this management tool to function effectively, it is essential that goals are developed and agreed upon within a bottom-up process of communication and negotiation. The search for goals thus starts on the department level and leads to agreements between the department chair on the one hand and the department members on the other. In a next step, goals of individual departments are coordinated and integrated into agreements with the dean who in turn negotiates with the president or other decision makers on the central level. In order to assure as much transparency as possible, negotiations at the lower levels of the institution have to take place in the presence of the person in charge of university governance on the upper level. In this way, it is possible not only to better communicate the reasons and motivations that stand behind a given set of actions and decisions; the process of goal negotiation also strengthens the responsibility decision makers have to assume *vis-à-vis* their own unit as well as *vis-à-vis* the central university government.

Twofold Legitimation of Decision Makers

All this, however, cannot be achieved without provoking conflict and without an effective management of conflict. Hence, one of the prerequisites for this process to work is that we modify the selection processes for university administrators on every institutional level. It is a mistake to believe that collegiate bodies or academic councils always select the person that is best qualified and energetic enough to do the job. On the contrary, collegiate bodies often tend to vote for those of their members by whom they expect to be bothered the least. And if by accident they call into office a "strong" chair or a "strong" dean, they can be certain that they won't have to endure this person for more than a year or two. This situation, I believe, is neither satisfying nor is it appropriate to the governance of a university or an individual academic unit. Hence, what we have to get to is a greater independence of the central and peripheral administrators from the institution or the unit they are supposed to lead. Administrators are in need of a "twofold legitimation" of their position and of the power that comes with it. Only then are they able to persist in a situation of conflict, and only then are they strong enough to sustain a conflictual management in the sense it is understood here.

Ultimately, this means that key administrators should not be elected by their colleagues alone. Rather, they should be appointed in cooperation with and with the approval of the person in charge of the administration of the upper level unit. A department chair, for instance, thus will be elected by the members of his department. This is in line with current practice. However, he will come into office only when appointed by the dean, just as the dean will be able to assume his functions only when his election is supplemented by an appointment made by the university's president or rector. With regard to the latter, I suggest that they are appointed by a "board of regents," which represents society at large and is concerned with the university's strategic planning. In this way, we can assure that decision makers on every institutional level receive the political backing they need in order to survive, or rather manage the conflicts that arise on organizational borderlines.

Concluding Remarks: “Beyond Good and Evil”

Conflictual management, thus, needs to affirm organizational lines of separation while at the same time transgressing them. It needs to affirm conflict within the university and between the university and the broader social and political context in which it moves. I am convinced that if we succeed in implementing such an organizational structure, our universities will be able to manage both the changes and conflicts they will have to face in the future. Hence, we have to respond to the growing need for moving beyond existing lines of separation – lines that separate the university from the rest of society, and lines that may lead to the disintegration of the university’s organizational unity. Ultimately, university governance as conflictual management is a form of transgression – in the Nietzschean sense of constantly trying to move “Beyond Good and Evil,” beyond a fundamental conflict and an unresolvable tension, however, without ever leaving them behind.

Between Desire for the Status Quo and the Pressure to Conform: The German Universities and Their Search for Quality Standards

Klaus Anderbrügge

Task

On the threshold of the new millennium, the German universities find themselves still committed to the classical ideal of the *universitas litterarum*, although this certainly does not apply to them all and there is some confusion about it. They attempt to fulfill their legally outlined tasks in the areas of research and teaching, both understood as one common unit, throughout the whole spectrum of arts and sciences. They cling to a basically fictitious ideal of a community of teachers and students, constituted in the basic legal structure of an autonomous corporate body with an academic nucleus. Without relinquishing the right to search for truths, free from all thought of how useful their work might be, at the same time they fulfill the task of preparing students for professions which require an academic training with its application of scholarly knowledge and methods.

But this task taxes its powers to the limit: Just at a time when the number of students at German universities is higher than at any other time in their history – nearly 2 million – the resources given by the state are dwindling. At the same time, instead of being places of solitude and freedom, they are seen more and more as large service enterprises and are enlisted in the attainment of social, economic and political aims. They are expected to guarantee the transfer of scientific theory into industrial practice as a decisive regional development factor and thereby make technological innovation possible. Their basically international orientation is expected to help overcome provincial confinement, and their artistic creativity to bring culture to the people.

Practical relevance and an orientation to market requirements, an active utilization policy (for example, patents and licenses) and a professional management which controls all these activities well are demanded of them – in short, the highest possible adaptability to constantly changing requirements. And the universities are hurrying to fulfill all these requirements equally.

Torn between a desire for the *status quo* and the pressure toconform, they are suddenly faced with unfamiliar competition. There is a lack of reliable orientation in their search for a model which will be of use in the future, for a vision which will at least be valid for the coming decade. The familiar signposts point backwards, and for good reasons the universities only hesitatingly dare to follow the fashionable promises of the market. Where there was an attempt to formulate a model, the result is easily in danger either of remaining too abstract or of being overtaken by topicality. Is there a practicable middle course? In view of the constantly changing state stipulations – today teaching, tomorrow research, and then again university management – is it at all worth them consistently heading in their own direction which they could perhaps agree upon internally only with endless difficulty? A concrete goal begins to emerge; security of standards. There are different ways to reach this goal, but it is questionable whether the available means allow this goal to be reached.

Finance

In Germany, the basic financing of the universities comes from the budget of each respective *Land*. Every university has its own budget in the respective plan of the ministry responsible for academic and research matters in each *Land*. This budget covers the basic needs in personnel, administration, maintenance of buildings, investments and other expenditure for teaching and research. The redevelopment and building of universities (including the clinics) and their equipment with large scientific apparatus is financed by the *Land* and the federal government together within the framework of itemized federal projects anchored in the Constitution of the Federal Republic of Germany. At present there is no alternative to this public system of finance.

Finance from other sources still plays a very minor role compared to basic state funding. At present it usually covers only less than 15 percent of expenditure. What is more, the greater part of this financing which is not directly from the academic budget of the *Land* usually comes from public budgets. Up to now, in Germany fund-raising has not been seen as one of the main or even usual tasks of a university vice-chancellor or departmental dean. The tax law rewards private financial contributions to research and the sciences only on a small scale. Financially relevant relations between universities and their *alumni* are not usual. Tuition fees are being considered more and more, but as yet they have not been introduced extensively. It is only recently in some *Länder* that the universities have begun to benefit from all income from their own academic activity: transfer of knowledge and technology, service industries, renting of rooms, organization of conferences, etc. But they are not well prepared for the consequences of the tax laws involved. University functions which are directed toward an interested public are enjoying more and more support from sponsors in industry in the areas of culture, sport and further education.

The distribution of funds for research and teaching from the *Land* to the universities and then the distribution within the university are mainly determined by a key which differs from *Land* to *Land* and university to university. This key takes into account parameters involving needs as well as results: for example the size of the academic staff and the numbers of students in the lower semesters on the one hand; and on the other hand the number of graduates and doctorates, the expenditure of funds from other sources; and all of these factors with differing percentages and weighting for the arts, sciences and engineering. This success-oriented distribution of funds has already led to a considerable change in the behavior of universities, particularly as far as the lucrative recruiting of finance from other sources.

The management of these funds still takes place on a financial basis (*Kameralistik*). Commercial bookkeeping is practiced only in the university clinics and some test locations in Lower Saxony. However, there is a general tendency towards a global, mainly autonomous management of finance accompanied at times – despite the retention of traditional finance – by the introduction of business management calculations, budgeting and controlling.

More important than the problem of imminent under-financing of the German universities caused by the tight state budget, and particularly when one considers how the education secretaries like to stress the autonomy of the universities, seems to be at the moment the problem of their false financing from (politically determined) program cash reserves, which are controlled solely by the relevant ministries. The fact that the universities are absolutely dependent on these funds in the realization of their tasks in teaching and research contrasts strangely with the obscure method of distribution. Without taking achievement scales into account, without calling upon experts, and even without any apparent quality control, the ministerial staff decide on the basis of extremely subjective criteria and personal preference for specific themes and/or people, by cheering so to speak, about teaching and research resources, in a way which would be impossible in comparable dimensions with respect to normal distribution of funds.

Whereas special funds are willingly made available for the increase in the quality of teaching by means of multimedia systems or the promotion of environmental or women's studies, the universities are referred to the normal budgetary funds for the financing of even the most important appointments to chairs, which are decisive for the future structure of whole departments for the next quarter of a century.

Fortunately, alongside the state basic and special financing of the German universities from the budgets of the *Länder* there is also a research aid system which is almost free of political implications and is also financed by the state and the *Länder* together. This offers unique prerequisites for pure university research and, thanks to its rigorous assessment system, allows selected beneficiaries to research in their chosen fields without having to worry about practical application and economic usability.

Responsibility for Quality

None of those responsible for German universities would doubt that these noble institutions are badly in need of reform. Critics doubt whether they are capable of this on their own and quote the seeming lack of success of such attempts in the past. It is said that the autonomy

granted has led to an inability to reform and that the universities cannot change on their own. And because society is supposedly not in a position to instigate the necessary changes, state intervention is unavoidable. It is said that only a basic reorganization by outsiders of university management together with a temporary revocation of autonomy could lead to the independent management of the university as a corporation.

However, autonomy does presuppose that those who are responsible for the running of universities really do have at their command the necessary instruments of reform for the increase in efficiency of management. In fact, it can be seen that the legal promise of autonomy does not yet guarantee autonomous action, at least not before a general basis has been established. When the universities in the largest *Land* were granted a limited financial autonomy, some of them immediately used the new leeway to undergo the painful process of an evaluation of their effectiveness in teaching, training, research, and management and administration. And what only optimists dared utter at the beginning of the 1990s has now almost become general belief, namely that internal budgets should no longer be distributed so strictly according to the defined budgetary items and agreed claims, but primarily according to measurable achievement criteria.

The next step of the reform process is the consistent organization of management and all university personnel toward the recovery and the security of quality in research and teaching. The universities are not only thinking about new methods and structures, they are also putting them into practice; and this is happening with more creativity and courage to change than many had thought possible. In the process, the essential values of the German university tradition, which ultimately led to their high status, have not been thoughtlessly sacrificed for quick success, but the universities have attempted to retain them under the conditions of the mass university.

In particular, as far as teaching is concerned, this means the securing of standards for the long overdue introduction of a system, based on Anglo-American standards, of graded and at the same time internationally comparable final examinations. This should be done without completely renouncing the elements which are so typical for the German system, like the free choice of lectures and courses, the right to determine one's own areas of interest within the course of studies, the elabo-

ration and expression of academic opinion, in other words the independent practice of academic discourse. In suitable subjects courses will be devised within the framework of a common curriculum with foreign partner universities and will contain elements which have to be studied there. This will lead to mutually recognized degrees and, therefore, to more international appeal. In the past this ultimately led to the lengthening of an already long period of study in Germany. However, in future, it is intended that studies can be completed in a clearly definable period of time thanks to the thorough limitation of the necessary material to be covered.

Nevertheless, the German universities do not have to be made aware of this orientation to internationally recognized standards in the area of research. Despite the strain in teaching due to the high numbers of students, university research in Germany has been able to gain or even regain international status in many subjects. University research can compete nationally with the publicly funded research programs in the extremely efficient non-university research establishments, even in the light of restricted resources. The universities have been able to counter the danger of losing research and its best people to these very attractive establishments by arguing that the universities train the new generation of academics – a task which they take very seriously – and are therefore always in a position to renew their forces. The dangers of poor and false financing already mentioned should not be denied, and with it the dependence of research on the political goals implemented in state aid programs. The universities have long ago taken up the challenges which have resulted from the dynamism of global scientific developments and from the new emphasis of state research policies. The willingness to analyze critically strengths and weaknesses has grown. New forms of personnel exchange and interdisciplinary research have been exploited in order to improve the hitherto inadequate network of planned projects and their results. Where they have been granted leeway, the universities have determined their own research emphasis and founded interdisciplinary research centers – often assessed critically by the research aid system, which proves to be effective in the maintaining of standards.

Just as important as it is difficult is the development of quality standards in management and administration which play a key role in the

coming reform process. The adoption of responsibility in this sector requires authority in two senses, namely as autonomous decision making powers granted by the state and as individual creative ability. It demands the highest qualifications and clear objectives of those responsible.

In most German *Länder* the university is directed by a cooperative board, at the head of which is usually a vice-chancellor (called *Rektor*) as the highest representative of that university. The vice-chancellor is usually elected for a limited period of time from the body of professors. Alternatively, a president can also hold the chief executive position of a university. In both cases, the applicants must be able to prove themselves qualified for this office through a long and responsible professional career, especially in academic, financial, administrative or legal circles. It is rather doubtful that a business manager can be found in the body of university professors. What is more, the legally fixed salary for the holder of such an office offers no incentive whatsoever for a successful business manager to change to university management. Nevertheless, experience has shown that most universities are in a position to nominate a professor for this highest office, who by virtue of his or her own personality is able to give the university new impulses and a distinctive profile.

Decisive for the success of a management of the university based on clear quality demands is a strategy which faces the challenges of the future and which enables the vice-chancellor to follow his or her own structural ideals, even in the face of the state and society, instead of merely reacting to ministerial directives as before. An effective university management demands a functioning division of labor on all levels. The key positions in the cooperative board and in the university administration, which must master a quantitatively and qualitatively growing work load with less and less staff, must be held by competent people. The existing qualification profile, which still is usually biased towards legal experts, should have a wider range of expertise, for example knowledge of economics, information science, and technology. The systematic further education of the office holder will become a decisive factor in increased efficiency, not only on the administrative level but also on the managerial level. The goal of this process is the adequate adaptation of competence in the sense of creative ability to respond to changing tasks and their importance.

As far as goals are concerned, we have to counteract tendencies which go directly against the demands of quality. On the one hand, even universities which are open to challenges of competition should not allow themselves to be commercialized. Orientation toward the market and the consumer are not reasonable criteria for the differentiated, socially responsible perception of the legally defined task of the university to maintain and develop scholarship. Every reduction of the necessary reform process to models which might have proved successful in redevelopment in private industry, but whose suitability has not even been tried out in university management would lead, thanks to the dictates of lack of finances, to the closure of whole academic departments which could not be managed in the light of profit maxims. Even excellent academic achievements have no immediate market value at the moment.

But there is danger from another direction in store for the university management which adheres to the highest academic standards. After overcoming the hypertrophy of the "group university" with its rather complicated but relatively rational system of decision making which takes into account the differentiated cooperative powers of the four member groups (professors, students, lecturers, and secretarial and other non-academic staff), representatives of new groupings are gaining entry into the decision making levels of the universities with the help of political structures. Alongside those who represent the interests of dependent employees of the universities on the staff council (as opposed to professors and the new generation of academics), there are now representatives for women, the disabled, foreigners, ecological problems and transport issues, amongst other things. In other words, for special groups and issues which have allegedly and perhaps really not been given enough attention in the decision making process of the universities until now. They have all been given the right to voice an opinion without having to be made personally responsible for the delays or even the watering down of the content of the decisions which often occur as a result. This development is hard to reconcile with the principles of democracy; it has not only resulted in increased dependency of those responsible, but also tends to influence the process of the security of quality and sets particular interests above those of the common good. It may sound strange, but one occasionally feels the

need to point out that the university is not there primarily for its employees.

On the other hand, one can only welcome the basic ideas of a radical functional reform, such as those which are emerging politically at the moment in connection with the planned amendment of the general outline of the law providing guidelines for universities. The administrative offices of the university, such as vice-chancellorship, president or dean, are to be given comprehensive decision making powers for all matters at the university and faculty level within the framework of their responsibility. But at the same time they have to be completely accountable to the democratically authorized representative organs, such as senate and faculty boards. Decision making power and responsibility would no longer be separate, provided the provisions for special interest groups were kept within reasonable limits. The necessary basis for effective university management would be created in connection with the guarantee of dependable basic financing from the state together with the substantial strengthening of institutional or corporative autonomy with regard to the state, which the universities demand. In Germany this institutional or corporate autonomy is still underdeveloped in comparison to the individual autonomy of the academic, in other words his practical academic freedom. Then it would be in the hands of the German universities themselves to prove that they are able to secure or develop and carry through quality standards for research, teaching and training. Such a gigantic process of change must not be limited to the central administrative organs, but must include all decision making levels of the university and set the incentive which is so vital for success. The universities have enough concrete ideas for this. These ideas include aspects from the central participation in the costs of evaluation of the departments, through the provision of starting incentives to attract finances from other sources, to the finalization of agreements which provide the departments with security in their planning of internal changes.

It remains to be seen whether the critics are right when they say either that they do not think the universities have the power to reform or that the state spoon-feeding will never stop this time. But one thing should be quite clear: There can be no true reform of the German university system without the autonomous cooperation of the universities.

Innovations in Research Despite Budget Cuts

Jürgen Heß

A Comparison of Strategies

From times of innovation and financial well-being to times of creative, structural and financial crisis, the historical development of higher education in every country has been marked by periodic change. Admittedly, not all of these terms are necessarily in opposition to one another. There are, in fact, indications that animosity need not necessarily rule between innovation and financial necessity. With regard to this changing relationship, the question to be asked here is: What has been the experience of universities in the United States and Germany? Many observers contend that American universities have developed better strategies for maintaining a high quality of research with limited resources. In this respect, a careful comparison is required. In the following paper, the situation in Germany will be sketched and a strategy for safeguarding innovation in research will be developed in the form of several theses. With this goal in mind, the ultimate question to be asked here is whether this strategy from the perspective of American universities will gain support and encouragement or criticism and scepticism.

The Situation of German Universities

The German university comes under fire in three respects. First, it appears to be confronted with a crisis of "self-organization." This problem in turn precipitates a second and third; namely, a financial emergency and a crisis of credibility respectively. Severe deficits in managerial structure are held responsible for this problem of self-organization. The financial crisis is outwardly expressed in the ever widening schism between the needs of the university and the resources available. The focal point of the crisis in credibility is then evident in both the governmental and societal distrust of the university's potential to address the increased time required for study, higher drop-out rates, and the publicly discussed misuse of academic freedoms.

All three areas of concern are multidimensional in scope. For this reason, although the following considerations concerning distribution and budgeting have their roots in financial management, they can never be viewed separately from the three crises named above.

The question to be asked here is how the federal government and universities might frame their requirements for intelligent and efficient management of their scientific resources. However, the following self-critical analysis should not overshadow the fact that in large measure the state has contributed to this difficult situation through its political mismanagement of education.

Findings

As I see it, despite all of its attempts to increase efficiency, aside from a few truly laudable models, the university system has demonstrated an extraordinary resistance to change. This governs several factors of relevance in both the design and the allocation of inter-university funds. These include the penchant for maintaining material holdings, the principle of collegiality, the precedent set by the estimates of the previous year. With the exception of several tame and relatively limited programs, however, the linking of performance and success to both the budget and the distribution of funds is generally considered unsatisfactory.

The allocations provided in order to retain a chair currently filled increase substantially with each and every round of negotiations so that the person occupying the chair then retires at the highest niveau. I am not, however, aware of developments in the reverse when there is a case of minimal scientific activity involved.

Importantly, the patterns found at the relatively low level of departmental chairs, may, in fact, be carried over to the entire university. With tremendous zeal (and in better times regular success) the universities fight both for new areas or directions of research and expanded facilities. The creativity of the departments in justifying new fields of research is really quite astonishing. However, to the contrary, I have hardly ever read even a single line about projects being concluded and institutions being dissolved. Naturally, there is never a lack of allusions to unprofitable, exhausted, or simply superseded branches of knowledge. The isometric powers that the German university has at its disposal all too often inhibit resolution making.

Finally, among the majority of university professors, a deep-seated distrust of and scepticism towards performance evaluation and its financial consequences still prevails. At the center of this sentiment are concerns regarding the endangerment of the constitutionally guaranteed rights of intellectual freedom. However, at the bottom of it all, lies a strong aversion to being subjected to public review either by oneself or by one's colleagues. This being the case, one must ask how the allocation of funds can be based upon achievement, when no measure or standard of performance is available.

The previously mentioned issues are indicative of a code of thought and conduct that has been passed down which must be changed at all levels. This change in thought patterns is not, however, a question of financial technique. It involves, instead, a new "financial acculturation." To assess the potential risks and benefits of establishing such a new culture, an examination of the American experience would be especially beneficial.

I will attempt here to bring together several main points concerning such a financial culture in the form of several theses. I must, however, ask for the readers' indulgence for the necessary simplistic generalizations as well as the somewhat fragmentary character of the theses.

Thesis 1: The Principles of Selection and Time Constraints

In each and every case, new requests for scientific resources must be made within a certain period of time. The principle of maintaining the level of resources in perpetuity must be replaced with a dynamic principle of competition.

Brief Reasoning behind the Thesis

Scholarship and above all research relies upon an innovative setting and the reaching of goals within a certain time period. Scholarly projects must be concluded within a certain period of time. This period of time must also conform to the resources available. The allocation of resources must be made based on a process of competition in which projects are ranked according to their worthiness. Following such lists of prioritized projects, as many projects as possible are then to be approved until the funds available are exhausted.

Thesis 2: The Structure of Institutional Provisioning

The provisions of institutions and chairs are to be grouped based in part upon the provisions themselves, the expense of the equipment, and a distribution of resources based upon performance (see Thesis 1). The basic provisions provided are not to exceed 40 percent of the entire university allocation of space and resources for research and instruction. The resources in high demand are to be allocated in accordance with capacity calculations.

Brief Reasoning

Only when basic supplies are very narrowly allocated can there be enough room to manage the large demand for resources and their performance based distribution. The basic provisions should ensure only the elementary work capacity of the institution. However, provisions should be made such that resources are transferable to qualified project requisitions.

Thesis 3: The Commission for Evaluation

All project requests (particularly those requisitions made for research or new instructional programs) are to be evaluated by a commission that is equally composed of inter-departmental and extra-departmental personnel. In addition to basic quality criteria (e. g. methodology, and potential for success, etc.), the reviewing body should take into consideration the entire area of research so that parallel projects are avoided whenever possible. In addition, the successful completion of projects already undertaken by the petitioner should be taken into account as well.

Brief Reasoning

The advantage of such a competitive procedure over general methods of evaluation is that the judgements need not be made in terms of "good" or "bad." Instead, reviewers can simply produce a prioritized list of projects. In this way, reviewers can avoid the unpleasantness of making negative evaluations and petitioners of resources need not fear the stigma of having a project judged unworthy. Of course, this does not change the fact that petitioners will admittedly have to accept when other projects are placed higher on priority lists.

Thesis 4: The Requirements for Renewal of Resources

Upon principle, only those projects which are new within one discipline can be admitted onto the list. The addition of these projects will be made financially contingent upon and commensurate with the successful completion of other, earlier projects. Requests for continued support will only be approved, if the Commission for Evaluation confirms the existence of a new degree or level of innovation.

Brief Reasoning

The consistent carrying out of these considerations is the only way possible to address the tendency of retaining provisions provided in perpetuity. An approach which employs a system of checks and balances where the granting of project provisions is made commensurate with the completion of projects proposed will have the effect of inhibiting both open and covert research requisitions when no new level of innovation is in evidence.

Thesis 5: A Competitive Portion of the Federal Budget

Federal structural planning is legitimate, if it is significantly influenced by the internal-administrative organizations of scholarship. In order to achieve a balanced scholarly topography, the state should implement the following guidelines when establishing new disciplines and/or creating new nuclei of research. German universities can apply for the allocation of equipment and resources within their sphere of research. After approval, the resources allocated must be accounted for by the university in question.

Brief Reasoning

Each university must develop clearly definable profiles distinct from other universities. An atomization of research activities is no longer financially feasible. The logistical question of where new areas of research are to be housed can be best clarified in a competitive process which is subject to scholarly review. The additional resources earned must, however, for reasons of safeguarding the budgetary plans of the university, be fixed. Moreover, the previously mentioned principle of "No new approval without corresponding completion of an earlier focus of research" is also at least worthy of consideration here.

Thesis 6: The Budgetary System and the Method of Calculation

Neither the much prophesized introduction of the global market nor the introduction of a sales-like system of bookkeeping are essential for achieving the previously named goals.

Brief Reasoning

With this corollary thesis, I would like to simply counter the frequently heard opinion that the introduction of the global market and/or the sales system of accounting would ensure the efficient deployment of resources. This point refers to my earlier contention that a substantive change in thought and not a simple change in budgetary technique is required here. Admittedly new budgetary methods might be necessary, but only under a very different set of circumstances; namely, if the German scholarly system developed into a market. However, this discussion lies outside the scope of this particular paper.

A Comparison of Systems

The theses suggested here touch upon two principles. First is the elimination of the perpetual retention of provisions through a pressure for innovation. The second is the principle of quality selection through competition. It is exactly this last point which can be examined especially in reference to the experience of American universities. The questions are therefore, whether or not the theses presented here are particularly applied at least in the American universities; and if so, with what degree of success. We are certainly united on the point that the most important advantage of comparing systems lies in the adoption of those identified positive experiences, and the avoidance of those mistakes which have already become recognizable.

Governance in the University of California: The Transformation of Politics into Administration[1]

Martin Trow

Introduction

The University of California (U.C.), on its nine campuses and its many properties and institutional connections all over the world, has an operating budget of over U.S. $11 billion (1996–1997),[2] over 160,000 students and almost that many employees. Within the State of California this University is one of three segments of public higher education, the other two being the California State University (C.S.U.) on some 22 campuses with some 330,000 students, and the community colleges on some 100 sites around the state with over a million students taking its courses. By law the University of California has a monopoly in the public sector on the awarding of the doctoral degree and a near monopoly on research; it also admits the most academically able of the graduates of California high schools. It is important that students in the other two public sectors are earning credits which would allow them to transfer at some point in their careers to the University, and many in fact do. Alongside the public sector are a large number of private uni-

1 Paper prepared for a German-American conference "The University in Transition," March 17–21, 1997, Berkeley, California. This paper might equally as well have been subtitled "The minimization of conflict."

2 If the budgets of the three big national laboratories administered by the University are excluded, the operating budget of the University is then about U.S. $8.5 billion. Of this, only about U.S. $2 billion come from the state of California. So the University is not precisely a state university, but a state-aided university. But those phrases do not properly define the relationship of the University of California to the state's government.

versities and colleges, the best known being Stanford University and Cal Tech.

Any summary of the governance structures and processes of such an institution would take a long book, unfortunately one still to be written. To discuss how this system is governed, how myriad decisions are made about and within it, large and small, is not the work of an essay. So rather than work descriptively through the main elements in the governance of the University, I will try instead to explore what I see as the overriding aims and purposes behind the University's forms of governance and administration. I believe that we can understand a good deal if we see these as embodied in two broadly shared principles in the University, shared by regents, presidents, chancellors and academics, principles of action shaping how the University relates to the outside world and how it governs itself. These two principles are first, the maximization of the University's autonomy – its capacity to direct its own affairs; and second, the pursuit of preeminence – or how to become or remain the best university in the country in every possible department, service and activity. This latter is the principle that Neil Smelser has called "competitive excellence" – a kind of excellence that is measured in comparisons with other leading research universities in this country and abroad.[3] In common language we want to be number one, and we want to be able to govern ourselves. These are not merely abstract principles or ideals; they are the criteria by which much of what is done in the University is directed and assessed.

These two values or principles are mutually reinforcing. University autonomy allows the university to remain largely meritocratic in its academic appointments and promotions, and, within limits, in student admissions and non-academic staff appointments as well. And the vigorous pursuit of competitive excellence gives the University the worldwide reputation that is the major bulwark and support for its institutional autonomy.

These criteria together lead the University in a variety of ways to resist both political pressures from outside, and also the introduction of

3 Neil J. Smelser, *Growth, Structural Change, and Conflict in California Public Higher Education, 1950–1970*, in: Neil J. Smelser and Gabriel Almond, eds., *Public Higher Education in California*, University of California Press, Berkeley 1974, pp. 9–143.

partisan political forces into the governance of the University. The first kind of resistance, against external political pressures, is the obvious defense of the University's autonomy; in the U.S., a populist and politicized society, that is a continuing struggle, especially for public universities in California. The resistance to partisan political activity within the University is thought by most participants to be necessary to preserve it as a meritocracy guided by the principle of competitive excellence, and that only a severely meritocratic institution can maintain its academic quality and leadership.

Partisan politics – the politics of party and interest – is pursued with great passion in the United States, as we all know. And a central question throughout our history has been to what extent it is either desirable or possible to insulate any public institution from the influence of party politics. One device used by many European nations has been to create a civil service which in its own spheres of competence is to some degree independent of the political currents of the day. And the autonomy of universities in some European countries, with Germany as the model, is in part procured by treating academic scholars and scientists as members of the civil service, and thus protected from direct political influence in their intellectual work.

The United States did not go in that direction. But that has left the question of how American universities, and particularly public universities dependent on public funds, could be insulated from the direct play of party politics and political influence. Not all American universities have succeeded in that effort, or have been uniformly successful throughout their histories. This University has been remarkably (though not totally) successful in resisting political influence, which may partly account for its extraordinary success as an institution. Of course the University has seen plenty of conflict with political overtones, and been exposed to a good deal of external political pressure over the years. But it is fair to say that despite these pressures, the University has preserved a very large measure of autonomy, certainly by comparison with other American public universities. These sweeping judgments would need a great deal of amplification to be persuasive. But rather than discuss these political disputes and pressures, I want to suggest that the central goal and function of our governance machinery is to resist those pressures, and to remove their causes as far as possible.

I am talking about what governance in U.C. tries to do and, indeed, what it exists to do, and not the more complicated question of how successful it is or has been.

The Resistance to Politicization

The foundation of resistance by the University to political influence was first laid down in the Constitution of the State in 1879, which declares that the University is a "public trust" and that its organization and government should be "entirely independent of all political or sectarian influence, and kept free therefrom in the appointment of the Regents and in the administration of its affairs ..."[4] This clause in the State Constitution does not deflect all efforts by governors and legislators to influence the character and direction of the University, but it is a powerful if largely symbolic force asserting the autonomy of the University against the play of domestic politics.[5] Moreover, other elements in this clause in the Constitution established the principle that the state's contribution to the support of the University come as a block grant, in ways that make it difficult for politicians of whatever stripe to intervene into the private life of the University – into its internal arrangements – through the vehicle of University's budget. The state does not support this or that chair or department or school or campus; it provides the money to the University as a whole, which then decides on its internal allocation. I need hardly say that legislators and governors are not shy about indicating their preferences respecting various aspects of the University's operations, and not infrequently try to link their support for the University's budget to the University's attention to or even compliance with their wishes. Senior University administrators spend a fair amount of time in discussions with various officials of the state government, both in the executive and legislative branches, and the University is sensitive to their concerns, as a public university ought to be. But in principle, a principle that is strongly defended, it

4 Verne A. Stadtman, *The University of California 1868–1968*, McGraw Hill, New York 1970, p. 82.

5 Symbolic, because University lawyers are reluctant to actually test the constitutional protection in the courts for fear that it would not sustain the weight of institutional autonomy placed on it.

remains finally the decision of the University what activities it pursues, and how it spends its funds.[6]

The University's capacity to defend itself against partisan political interference in no way rests solely on the protection built into the California Constitution of 1879. Moreover, this resistance to political interference from outside has extended to a distaste for political activity inside the University as well, and a preference for administration over governance. Let's look briefly at some of the other ways the University tries to minimize the role of politics in the University.

U.C. is Not a Democracy

One way of reducing the play of politics within the University is not to have many occasions for voting. And there are very few occasions for voting in the University's governance structure. Whatever else the University of California may be, it is not a democracy. And that is perhaps strange, located as it is in the most populist state of a broadly populist country, a state in which significant laws and revenue sources are commonly initiated and passed by the whole electorate, laws which override those made by the representative houses of the Legislature. But starting with the Regents, 18 out of the total of 25 are appointed directly by the governor then in office when a place is vacant, and those are the regents who actually do the business of the Board; there are seven *ex officio* members, four of whom are elected state officers who with some exceptions rarely attend meetings of the Board; two are elected by the U.C. Alumni Association for one year terms.[7] The seventh *ex officio* member is the President of the University. The appointed members of the Board of Regents serve for 12 years, ensuring that they will serve beyond the term of the governor who appointed them.

6 The Legislature often attaches "budget language" to a budget it passes, indicating its interests in the way the budget is used by the University, and pointing to particular activities or conditions it wants to see the University honoring. The University is sensitive to these indications of the Legislature's wishes, and can anticipate having to explain how they were followed, or why they were not. But the University will not conform to such "instructions" if they seem to violate its sense of its own autonomy.

7 The Regents themselves elect a Student Regent for a one year term.

A Regent can be reappointed, but cannot be dismissed except for criminal behavior; in fact no one ever has been dismissed. All this is designed to make them independent of the governor who appointed them, at least over time.

The Board of Regents appoints the President of the University, with the advice of the Academic Senate; the Board also appoints all chancellors on the advice of the President and a Senate committee. Chancellors appoint all the senior academic and non-academic administrators: they appoint the provosts and deans, and the latter appoint department chairmen, though usually on the advice and with the participation of the department in question, and sometimes of a committee of academics from other departments. Of course a good deal of consultation goes on in connection with these appointments, but basically academic administrators are appointed by their superior officers, and can be and indeed occasionally are dismissed by their senior officers. The contrast here with European practice is very marked indeed, and largely accounts for the far greater power wielded by these academic officers as compared with their counterparts overseas. Incidentally, all these officers except for department chairmen serve without limit of term, another aspect of their office which strengthens their hands.

The Academic Senate and the Academic Community

If we are to find democracy anywhere in the University, it should be in the Academic Senate. But here, too we see an aversion for democratic political processes in favor of appointive procedures and consensual decision making. The model is a guild rather than a bureaucracy, but guilds are no more formally democratic than bureaucracies.

But first a word about the academic community. In U.C. the Academic Senate consists of the whole body of academic personnel, from the newest assistant professor to and including emeriti professors. All have an equal standing in the Senate, all have all its rights and privileges. Indeed, it is important to stress what American academics, and not just at U.C., take for granted, that almost every assistant professor who gains tenure will, in the fullness of time, become a full professor. Merit and market together will affect how fast he or she makes that transition, but

promotion is chiefly a matter of salary anyway. There is no *Mittelbau*, no body of academics who are not professors and not likely to become professors. So there is no significant conflict of interest between professorial ranks – and so no need for a separate representation of that class of academic personnel in the governance structure, or for the representative bodies in which, after appropriate campaigns and elections, such defined and distinct categories of academic personnel would be represented.

Moreover, like other leading American research universities, U.C. does not have an academic trade union. That is to say, the academics do not bargain collectively with any authorities about pay, working conditions, fringe benefits, or anything else. Thus, there is no organization at the heart of the university whose interest it is to cultivate and organize discontent, and to find allies for its positions in the larger political parties of the society. The Academic Senate, which I have already said consists of all the regular academics in the University, from assistant professor up, and some other senior academically linked administrators as well, manages its business through a variety of committees. But these committees are for the most part not elected. With some few exceptions, on each campus they are appointed by one committee that is elected – a Committee on Committees.[8] To become a member of that committee one cannot actively run for election – indeed to be seen to want to be elected is almost certainly to fail to be elected. One is nominated by a group of friends and admirers, and other members of the Senate vote for candidates on their judgement of the character of the nominee or of his/her nominators. But any connection with external political links is kept at some distance through the absence of campaigning. One result is that members who are elected or appointed to any Senate committee have no obligations to any faction or group of constituents, and can speak in their own voices and as prompted by their own judgement and conscience. The absence of these external commitments eases the emergence of the compromise and consensus that are the basis of almost all actions by Senate bodies. One might go so far as to suggest that the exclusion of factional and party organiza-

8 Each campus arranges its own Senate rules. Currently, most campuses, but not Berkeley, also elect their Divisional Chair as well as their Committee on Committees.

tion within the governance structure of the University is precisely to allow for decisions to be made as the outcome of (sometime prolonged) discussion and the search for consensus, both in Senate bodies and in their relations with administrative officers.

The Academic Senate in this University has rather more formal power and authority than is common in its counterparts in other American research universities. Roughly, and very briefly, Senate bodies have primary responsibility for the academic programs on the several campuses, for the appointment and promotion of academic staff, and more ambiguously, for the criteria for the admissions of students – though this latter has been at the heart of a real controversy within the University over the past two years. Beyond that, it is consulted and advises on everything else – but its weight in those consultations varies with the issue in question. Outside the realm of teaching, research, student admissions and assessment, and academic appointments and promotions, the role of the Senate is to react to initiatives by administrative officers: to reject them when they seem at odds with academic values or procedures, to improve and refine them, and ultimately to legitimate administrative decisions and actions for the whole body of academics who can then believe that their interests and values are being protected. All this is known in the University as "shared governance." Above all the Academic Senate works through consultation and advice, and in its quest for consensus, often very slowly. Wise administrators take that into account, and are patient. Problems arise when decisions have to be made quickly, or administrators claim that they do. But when the Senate is working well with administrative officers, whether on a campus or in the President's Office, the actions and decisions taken gain a measure of legitimacy and the willing acquiescence of the academic community that is required for anything in a university to be done well. The existence and work of the Academic Senate creates a climate on our campuses of what might be called "responsible inattention" to the many and remote activities of the University beyond the scholarly and scientific horizons of the academic staff. For the ordinary academic, the existence of the Senate and its committees lets them get on with their real work of teaching and research in all their manifold guises.

On Treaties and Bureaucratic Agreements between the University and State Government

The aversion to internal political dispute is linked to the University's resistance to external political pressures. Internally, as I have noted, we have no trade union, no politicized contest for office. But in addition, the University goes to some lengths to reduce the ordinary issues of dispute and controversy. For example, one issue that is commonly a source of controversy, in this country as well as abroad, between the academic community and the administrative officers, civil servants or politicians who determine such things, is the level of academic pay – either for all academics, or for different ranks. But at least since Word War II, U.C. has not experienced a significant controversy between the academic community and internal or external authorities over the issue of compensation. No one in the University comments on this peculiar fact because it is so taken for granted. How is this possible? Well, briefly it is because we do not negotiate our own broad salary schedules, but let other American universities do it for us. And that is through an agreement with the state legislature, and the appropriate civil servants in state government, that our salaries, rank by rank, will be roughly comparable to and competitive with the salaries of eight other named (and leading) American research universities, four public and four private. Their salaries are published, and are the guidelines for ours, the principle being that U.C. must be paid about as well as these other institutions if we are to be competitive with them for leading scholars and scientists. And while our salaries vary a bit from those averages depending on the condition of California's economy, public authorities still accept in principle that we must be at or a little above the average of these other institutions, and if we fall behind in bad times we must catch up when times are better.[9] Of course individual academics negotiate their own salaries in a somewhat different way,

9 "The governor's budget for U.C. also calls for ... employee pay increases equivalent to an average 2 percent salary increase ... and additional funding equivalent to a 3 percent parity increase for faculty. That funding would bring faculty salaries to within 1.6 percent of the average pay at U.C.'s eight comparison institutions. This is a priority of Regents, who hope to close the faculty salary gap by 1998–99." "U.C. begins discussion of long-term fee policy.", U.C. Focus, vol. 11, No. 3, February/March 1997, p. 7.

but that is within the broad guidelines that emerge from this treaty with the state that takes categorical salaries out of contention.

This example illustrates the link between external and internal politics in U.C. The University enters into this treaty over how to set academic salaries with the state almost as an equal; the decision over academic salaries does not lie with politicians or civil servants, but has been absorbed into a formula and taken largely out of the political arena. As a consequence, there is one less big political issue within the University for political groups or factions to organize around. This transformation of politics into administration is precisely what Lenin, who lived by the principle of the primacy of politics and conflict, warned against; but then that may be the best recommendation for what we do.

Indeed, it has been the habit and strategy of the University of California, almost from its beginning, to take its operations out of the political arena in every way possible, often by developing stable understandings and agreements with state officials regarding the formulas governing the funding of the University. These agreements cover such matters as the *per capita* state support for students and faculty, the extent and nature of state support for the maintenance of university buildings and facilities, as well as the agreement for setting academic salaries and increases. These agreements outlive governors and other elected officials, and provide an important insulation against the hostility or political gestures of governors, (and we have had some in recent decades of both parties), a basis of stability that gives the University the ability to plan its future with some confidence. The officials in the President's Office who look after these agreements will protest that they are not as stable as I suggest; that they are constantly under review and discussion, and need to be carefully tended by senior administrators and by the president of the University himself. Yes, of course, and that is an important part of the work of the Office of the President; but those formulas and treaties are by and large still in place after the financial strains of the early 1990s and substantially reduce the direct influence of political considerations in the funding and operation of the University.

I said a moment ago that when our senior administrative officers negotiate an agreement with the state over some aspect of university

life, and state funding for it, we meet with them almost as equals. The University has a considerable capacity to defend itself politically, though not primarily through the instruments of partisan politics. The University of California has 800,000 living alumni, including the current Governor of the State, some 30 percent of the state's legislators and a quarter of California's congressional delegation in Washington, along with many leaders of business and industry. President Richard Atkinson has noted that among the many business leaders and entrepreneurs who are U.C. graduates are the chief executive officers of Intel Corp. and Sun Microsystems.[10] Moreover, the University makes very considerable efforts to bind its students and alumni to the University with ties of loyalty and affection, sentiments that are potential sources of support both material and political. But this kind of support does not rest on sentiment and loyalties alone. The University's long-standing commitment to public service of every kind has the effect of creating new friends and strengthening ties to groups and segments of the community who have never been to the University. Broad support in the society at large is always potential political support; and it helps to protect the University against the direct intervention of political interests into the life of the University. To a considerable degree it is the University's latent political power that insulates it from direct political interventions. And that latent political power, arising directly from the University's long-standing commitment to public service, is a major element in its ability to maintain its institutional autonomy.

Another treaty between the state and the University, perhaps the most important of all, is the Master Plan, fathered by Clark Kerr and embodied in state law in 1960. The Master Plan also serves to reduce the role of politics in the life of the University, in this case by defining in an authoritative way the relations between the University and the other segments of public higher education. Of course there are controversies between the University of California and the California State University, not least over the allocation of limited state funds available for higher education. But the Master Plan does in fact limit the nature and extent of such controversies: For example, it rules out the possibility of what is elsewhere called "institutional drift" – the tendency of

10 Annual Financial Report, University of California 1995–96, p. 5.

non-university institutions to seek to gain full university status, complete with research resources and the right to award the doctoral degree. In many countries universities are continually struggling with what they see as the threat of the elevation of non-university institutions into the university sphere, with the consequent dilution of research resources and, as they fear, also the dilution of university academic standards. The Master Plan prevents that by assigning the three segments distinct spheres of work,[11] and by making clear that no C.S.U. campus will be promoted to the status of a U.C. campus, however hard it might lobby in the state capital. That takes a big issue out of the political arena. Still, the California State Universities do offer Masters degrees, and many of their graduates continue their education as graduate students in U.C. And they have the name and standing of universities – though not research universities. European academics and civil servants can hardly imagine a university without a strong commitment to research, which makes this particular compromise there more difficult.

The University employs formulas to reduce controversy both internally and in its relations with the state. In 1996, in what he called "University of California's Budget Initiative," the President surrendered his power to allocate the state's block grant among the nine campuses, a power which of course entailed chronic controversy among the campuses and with the Office of the President (OP) over that allocation. Instead, in agreement with the chancellors, the OP agreed to allocate the grant on a formula based on student enrollments on each campus. This reduces the OP to something like a conduit of state funding directly to the campuses. The OP thus loses a measure of influence over campus policy and practice, but effectively takes the allocation of the annual state allocation out of controversy.

And further, just now the University is exploring the possibility of writing yet another treaty with the state that would commit the state to "provide ... U.C. with at least their current proportional share of the state's general fund budget, currently about 4 percent."[12] The formula would start with that level of current funding, but also commit the state

11 In addition to the three public segments – U.C., C.S.U., and the community colleges – the Master Plan also recognizes and provides a place for California's many private colleges and universities.

12 "U.C. begins discussion of long-term fee policy," op. cit., p. 1.

to adjust future state support to both the growth in enrollments and also to growth in the California *per capita* personal income.[13] It also ties student fee increases to California's *per capita* income growth. Such an agreement would reduce the political influence of students on the legislature, allow fees to grow slowly and predictably, while stabilizing the portion of the University's income that comes from state sources. If the state government agrees, as currently seems likely, this would take yet another set of controversial issues out of the political arena.

There are of course downsides to the minimization of conflict within the University, and the substitution of administration for governance. The principle behind this policy is to drive as many educational decisions as possible down from state government, and from the Regents and the Office of the President to the campuses, then to their schools and colleges and departments and on to the individual faculty members who are presumably most competent to make academic decisions. The policy necessarily weakens the Office of the President and strengthens the chancellors; much of the power devolved to the campuses remains with the chancellors, who are not so anxious to devolve authority as is the President. The chancellors are also currently greatly strengthened by the rapid increase in private giving, almost all of it to the campuses rather than to the University as a whole, putting very large amounts of discretionary money in their hands.[14] All this is at the expense of the concept of "One University on nine campuses," of the power of the President to innovate and lead, and, incidentally, also of the power and influence of the Academic Senate, both system-wide and on the campuses.

But the right balance of power between the center (the Office of the President) and the campuses is itself a controversial issue. My point

13 The potential agreement is embodied in AB (Assembly Bill) 1415 (Bustamante), *The Higher Education Partnership Act of 1999*, published by the University of California, July 8, 1997. My thanks to Associate Vice-President Lawrence Hershman, Director of the Budget for U.C., for a helpful conversation on these issues, though he is not responsible for my interpretations of its effects on governance.

14 For example, Berkeley received over U.S. $182 million in 1996/97 from 66,000 contributors. "Direct state support now accounts for 38 percent of the campus' budget, compared with 52 percent in 1985." (*Campus Gets More Gifts in 1996–97*, The Daily Californian, August 8, 1997.) Of course many of those gifts are earmarked for particular uses by the donor, but that still leaves large sums at the discretion of the chancellor.

here is that most of the formulas described above, many ironically developed on the initiative of the President, have weakened the role of University governance and decision making in relation to administration, and have shifted the center of gravity of the University to the campuses. The University today, for good or ill, is more a confederation of largely autonomous campuses than the federal university that it was even five years ago. But the Office of the President still has important functions to perform. One of these is to buffer the campuses from the direct pressures of political forces as reflected in state government.

A Buffered University

The University, and all its campuses, deal with the State of California through the Office of the President, and not through the chancellors. That means that the campuses, where the actual teaching and research goes on, are buffered by the Office of the President, full of administrators who have a lot of experience dealing with the state government, both executive and legislative branches, and thwarting its interventions. Much time is spent by senior administrators dealing with elements of state government over issues of whose very existence the University's scholars and scientists are mercifully kept in ignorance. Not only does the Office of the President buffer the campuses from direct involvement with state government, but the President and his staff, and all the chancellors are buffered in turn against intrusion by state government by the Board of Regents, who hold ultimate legal authority over all aspects of University life, and effectively control all its assets. It is absolutely crucial for the autonomy of the University that the Regents are inside the University, rather than an arm of government.

The Regents have considerable freedom to avoid public discussion of controversial issues, and to delay taking action on issues that are politically sensitive. Often, though not always, time drains the passion out of an issue, and allows it to be avoided altogether, or to be resolved quietly and administratively, rather than noisily and politically. A current example is the issue of providing University benefits to same-sex partners:

"An unlikely coalition that includes Regent Ward Connerly is pressuring the University of California to offer benefits to same-sex partners. But U.C. administrators – still recovering from the bitter affirmative action controversy – have been working hard to keep the issue out of the public cross-fire. 'We've known it's a looming issue and we won't escape it, but we have all the big issues we can deal with right now,' said one regent, who requested anonymity."[15]

Markets as a Substitute for Politics

There are still other forces and circumstances which reduce the direct impact of politics on the University. One of these is the role of competition in various kinds of academic markets. I have mentioned that the overriding value of the University, around which consensus always crystallizes, is that of competitive excellence – the common wish to be, and to be seen to be, the best university in the country.[16] The reputation of the University as a whole is an aggregate of the reputations of its nine campuses and of their academic departments and professional schools. Moreover, the University has been remarkably successful in persuading governors and legislators of the importance of this ideal, and even of the costs of achieving it. With this shared value always implicit in the University's decisions and actions, many of them become less controversial. To take an example close to home: In the late 1960s a number of the leading research universities with whom Berkeley compares itself had established or were considering the establishment of a graduate school of public policy. Perhaps the best known of these was and is the John F. Kennedy School at Harvard. A distinguished political scientist at Berkeley successfully proposed the creation of such a School here. It has its own unique character, but it was created with less controversy than if the University as a whole were not committed to being in the vanguard of intellectual developments, both in the scholarly and scientific disciplines and in the education of professionals.

15 Pamela Burdman, *U.C. Pressed on Partner Benefits*, SF Chronicle, 5 April, 1997, p. 1.
16 This is a central concept in the essay by Neil J. Smelser, op. cit.

Or to take a much larger example: In the early and middle 1980s there were signs that the quality of work coming out of some of Berkeley's departments of biology was falling behind those of its major competitors. This unwelcome discovery occasioned a quick and substantial reaction: working together, University leadership (the then Chancellor and Vice-Chancellor of the Berkeley campus) and the leading biologists on campus developed radical plans for revamping the biological sciences on campus, involving both fundamental restructuring of the departments of biology and the building of major new buildings for conducting advanced biological research and engineering.[17] This activity almost completely bypassed the Academic Senate in favor of specialist committees of biologists selected by top administrators and the leading scientists on campus – and there was little or no protest from the Academic Senate. In the service of competitive excellence, of the simple passion to be Number One, the crucial decisions were too important to be left to the amateurs who happened to be leading the local Senate at the moment. And the Senate recognized and accepted that, as well as the leading administrators.[18]

Toward the end of his tenure in office, Chancellor Tien opened a meeting with German colleagues with a dramatic story about the recent recruitment of a highly prized biologist from another university. The cost of the new laboratories required to recruit the man ran to some U.S. $4 or 5 million, money provided by a call from the Chancellor to a particularly generous donor. The story reflects the joint power of the market, the Chancellor and trust as alternatives to politics in university governance. The minimization of politics on and in the University has as its major goal the preservation of a Chancellor's power to take this kind of dramatic action. It is no accident that the Chancellor chose to illustrate what he can do with his freedom and the discretionary money he raises by pointing to the recruitment of one of those outstanding scholars and scientists who in the aggregate determine the quality of work done here, and thus the University's rank and reputation among

17 Part of this story is told in Martin Trow, *Leadership and Organization: The Case of Biology at Berkeley,* in: Rune Premfors, ed., *Higher Education Organization: Conditions for Policy Implementation,* Almqvist and Wiksell, Stockholm 1984, pp. 148–178.

18 The current Dean of the Biological Sciences has made reference to this reform as necessary "in order for us to maintain a high visibility [in biology] in the country."

the universities of the world. Harvard and Princeton may not trumpet their success in quite this way, but their presidents and provosts do exactly the same thing, which is why we call the principle that guides this behavior "competitive" excellence, or perhaps, the competitive pursuit of excellence.

Trust is another alternative to politics as a determinant of action. The recruitment of this scientist required an act of trust on the part of the donor, to whom there will be no real accountability for her gift beyond her knowledge of how it was spent, and perhaps a statement or demonstration of the University's gratitude for it. We might also observe in this story the measure of trust displayed by the Academic Senate, which would have been consulted on whether the scientist met Berkeley's standards for appointment, but probably not on the financial negotiations and commitments that brought him here. The Senate could acquiesce in that appointment, I believe, largely because it was so clearly driven by the shared commitment to competitive excellence, and the shared pride in the University's national standing that is so powerful a force in this University. We might reflect a moment on the concentration of power and authority in the hands of a Chancellor in this University so long as he can be seen as furthering the institution's reputation and academic standing among its peers. And that in turn is a function of the institution's autonomy. The University of California is in part a public institution, but in very large part a private corporate body. And much of what we call governance is designed to keep it that way.

On the Size of Administration, the Variety of Support Groups, and University Autonomy

I have been speaking of the minimization of organized political controversy both within the University and in its relations with its environment, and especially with state government. But if that is the case, what are all these administrators doing? The numbers are huge by European standards: roughly a thousand employees in the Office of the President alone, and many more on each campus. There are several answers. One is that the governmental ministries (including the Treasury) that else-

where are concerned with science and higher education are here largely inside our own structures, and the civil servants and managers who elsewhere would be public employees are here employees of the University.

The other reason is best suggested if I simply point to the groups and organizations in the larger society which have a genuine interest in the University, and are part of its support system – who give it money or political support or both. And in reviewing these groups and organizations, keep in mind that the University employs people to attend to its relations with all of them. The list would include state and city governments, diverse and uncoordinated departments and agencies of the federal government, the University's large and important Alumni Association, the trade unions which represent substantial numbers of U.C.'s support staff, foundations and other friends who contribute substantial funds to the University every year, many academic organizations, including those which grant the University its formal accreditation, business firms with whom we have important and growing connections, to name only a few. Nor should we forget the many individuals and groups who take us to court over real or imagined grievances, and for defense against whom the University employs a large staff of lawyers. The diversity of our interests, the many links between the University and the rest of civil society as well as governments, and above all the diversity of our sources of financial support are pillars of the University's autonomy, but also explain the size and diversity of the University's administrative staff.[19]

"Failures" of U.C. Governance

There have been at least four occasions since World War II when one felt the presence of external politics inside the University strongly. The first was in the late 1940s and early 1950s during a period of intense popular anti-Communism, when the President and Regents together imposed a special oath on the faculty requiring them to attest that they were not Communists. The faculty resisted, a number of leading schol-

19 Though there are legitimate questions about whether it has to be quite as big as it is.

ars and scientists resigned rather than sign the oath, and other non-signers were dismissed.[20] The special oath was later withdrawn. In 1967 President Clark Kerr was dismissed by the Regents under pressure from then Governor Ronald Reagan, reflecting his hostility toward Kerr arising out the events associated with the Free Speech Movement.[21] In the third event, during the 1980s and early 1990s a significant proportion of the faculty urged the Regents, unsuccessfully, to end the University's administration of two national laboratories, at Livermore and Los Alamos, which were then active in designing nuclear and other weapons. The fourth event, in July 1995, involved the decision by the Regents to end the practice of giving preference in admissions and academic appointments to members of particular racial and ethnic groups.[22]

All four cases involved strongly held political sentiments arising out of issues in the larger society which forced their way into the University. In the first case, the faculty faced pressures from the Regents and senior administrators, and from outside forces, but were divided in their responses. In the second, Kerr's dismissal evoked a strong positive response from the faculty in his support. In the other two cases the faculty was split nearly down the middle. It is fair to say that in all four cases the governance process that I have described failed to insulate the University from the direct effects of external political sentiments and pressures. As for their lasting damage, the key question is what effect these events had on the level of trust within the University, between Regents and President, and between administrators and the Academic Senate, a climate of trust without which these informal arrangements and consultations at the heart of "shared governance" could not work. My own judgment is that the Oath Controversy gave rise to deep resentments within the University toward the then President and Regents, which dissipated only over time as that President and most of the Regents involved left the University. But the net result may well have

20 David P. Gardner, *The California Oath Controversy*, University of California Press, Berkely 1967.

21 Verne A. Stadtman, op. cit., pp. 487–493. The story will be told in detail in Clark Kerr's forthcoming history of his own service to the University of California.

22 One perspective on these events can be found in: Martin Trow, *A Divided U.C. Faculty Seeks a Path to Consensus on Affirmative Action*, Public Affairs Report, Institute of Governmental Studies, U.C. Berkeley, Vol. 37, No. 2, March 1996, pp. 9–13.

been the strengthening of U.C.'s autonomy, and also of academic freedom in the face of external political pressure. The firing of Kerr was clearly an arbitrary intervention from outside driven by the Governor's personal hostility toward the President, was broadly unpopular within the University, and had little effect on the governance of the University subsequently. Indeed, like the Oath Controversy the reaction was so strong it may well have made a politically motivated dismissal of a U.C. president less likely thereafter. The movement by a group of engineers and scientists to force the surrender of the University's ties to the national labs was dealt with through the regular procedures of University governance, and in my view had little effect on the climate in the University, especially after the end of the Cold War and the substantial shift of the work in both labs toward civilian projects.[23] Finally, the controversy over "affirmative action" in the University is still ongoing. It may have deeper consequences for the climate of trust within the University than any of the others. All parties are currently making efforts to repair the damage to the governance processes that resulted from the events surrounding the Regents actions of July 1995, but it will be some years before we can assess the full effects of the controversy on the University.

Conclusion

I have tried to suggest that the central function of governance in this University is to resist partisan pressures from outside the University, allowing it to respond only to those which it chooses, and so far as possible excluding partisan politics from its internal life. Those efforts in turn are aimed at the preservation of the autonomy of the University, of its capacity to make its own decisions, govern its own life, both intellectually and materially. Governance and administration in U.C. together aim to keep crucial academic decisions inside the University so far as possible; and once there, have them made on their merits, in the service of the value of competitive excellence through the processes

23 This controversy should perhaps not be labeled a failure of governance, but is included as an example of the intervention of national political issues directly into the life of the University.

of what we call “shared governance.” We do not always succeed, either in the first aim or the second. It is even less certain what the future may hold for these jealously defended principles. But it is still fair to say that those are the aims and principles by which the University is governed, in every sense of that word, and by which it will continue to be governed in the immediate future.

Different Ways of Decision Making in Higher Education and Higher Education Policy in Germany and the United States

Hans Weiler

The title of this brief statement encompasses two rather different and reasonably distinct domains of decision making: the institutional domain of decisions made within institutions of higher education (known in the U.S. discourse as questions of institutional "governance"), and the systemic domain of policy decisions that affect the system of higher education as a whole. With regard to both domains, there are significant and instructive differences between German and U.S. higher education. Within the limits of this short paper, however, I will concentrate on the institutional domain, leaving an examination of the policy domain in the two countries to another occasion, but indicating some lines of comparative inquiry that I would find particularly promising.

The Institutional Domain

In this section, I have tried to capture some of my observations on the differences between the two countries in the form of a number of theses, related to several key issues in higher education governance. These are, by necessity, an abbreviated and at times somewhat exaggerated account of reality, but they do point out some of the key differences between the two institutional cultures.

Models of Governance

Thesis 1
While institutional decision making in the U.S. (even in state institutions) is more closely patterned after a corporate model of interaction between managerial and supervisory roles (with a deliberative and advisory role of faculty representation), the German situation seeks rather to emulate a "separation of powers" model of either the parliamentary or the presidential variety, where the "legislative" component (*Senat, Konzil*) leans heavily towards group representation (faculty, staff, students). The functioning of the U.S. model is heavily influenced by the presence of a powerful class of professional university administrators, while the German model operates under the equally heavy influence of the behavioral and legal traditions of the German civil service.

Thesis 2
Decision making in U.S. institutions tends to be more result based *(ex post)*, while it tends to be more rule based *(ex ante)* in German institutions.

Thesis 3
Even leaving sources of financing aside, the modes of governance in the two systems of higher education differ significantly in that the German system is governed strictly as a public (or rather "statist") institution, while the U.S. system represents a much wider range of governance arrangements, on the whole tending more towards "private" forms of organization even in its "public" institutions ("a competitive system without the profit motive," Gerhard Casper).

The Democracy-Effectiveness Quandary, or: The Precarious Legitimacy of Governance

Thesis 4
In addition to a general preoccupation with legitimating institutional decisions, the quandary of legitimating decisions either by democratic procedures or by positive results exists in the institutions of both coun-

tries. In reality, legitimating decisions by procedural norms plays a much more dominant role in German institutions, while obtaining desired results looms larger in the legitimacy calculus of U.S. institutions.

The Accountability-Authority Quandary, or: The Dual Meaning of "Responsibility"

Thesis 5
One of the striking differences between German and U.S. higher education lies in the much greater discrepancy or incongruity between accountability and authority on the German side; institutional leadership in the U.S. is characterized by a considerably greater congruity between what one is accountable for and what one has the authority to determine. (An interesting linguistic observation in this regard concerns the fact that in English, "responsibility" encompasses both accountability and authority, whereas in German one needs two terms, *Verantwortung* and *Zuständigkeit*.)

The Equity-Efficiency Quandary, or: Decisions on Selection, Rewards and Punishments

Thesis 6
Looking at German and U.S. higher education, there is considerable evidence that the equity-efficiency quandary is a false issue, and that the erroneous assumption that it is a real issue is more widespread in Germany than in the U.S. Decisions in U.S. institutions of higher education on selection, promotion, rewards and punishment, while flawed in many respects, demonstrate that an efficient promotion of quality can be achieved without violating reasonable standards of social equity (unless, of course, those standards are deemed to require uniformity of treatment regardless of quality).

The Knowledge Base of Decision Making

Thesis 7
The overall quality of the knowledge base for making decisions in higher education is significantly better in the U.S. than in Germany. This is due to a more advanced body of research on higher education, a more professional and more adequately trained type of middle-level university administrators, and a more systematically developed and maintained body of institutional information. A case in point is the rather considerable capacity in U.S. higher education for medium-term institutional planning (including the planning of budget adjustment and restructuring processes). Developments in the same direction in Germany are hindered by a heavy dependence of university administration on legal expertise, the absence of formal training in university administration, the dearth of research on higher education, and a considerable sensitivity over the use and misuse of institutional information.

Centralization and Decentralization in Governance

Thesis 8
At the institutional level, one of the large unresolved issues in university governance in Germany is the relationship between the central decision making authority of the *Rektor* or *Präsident* and the deans as heads of schools or faculties, or between the principles of institutional cohesion or centralization and of sub-unit autonomy or decentralization. Current reform proposals to strengthen both central and decentral leadership functions are likely to aggravate the problem further. Whatever its strengths and weaknesses in other respects, the U.S. system of university governance seems to have established reasonably clear ground rules: Deans are typically appointed by the president with the consent of the school's faculty members, thus maximizing cohesion without sacrificing the legitimacy of the incumbent.

Allocating Resources: The Crucible of Decision Making

Thesis 9

The principal differences between German and U.S. higher education regarding decisions to allocate resources have to do with the relative importance of distributive vs. competitive models of resource allocation. Incentives for improving institutional performance on a competitive and comparative basis play a much larger role in U.S. institutions (cf. the construct of "matching funds"), while there is more concern for the equitable and calculable distribution of resources in German higher education. Consequently, there is a wider arsenal of instruments available to the U.S. decision maker for measuring institutional and individual performance as a basis for the allocation of resources, while the German system has developed greater skills in formally moderating conflicts over resources, designing distributive formulas, and forming resource-related coalitions. It also appears that, perhaps as a result of having to cope with the problem earlier, U.S. institutions have accumulated, and experimented with, a wider array of institutional responses to resource retrenchment than German institutions, although the latter seem to be catching up fast.

Decisions and Deciders: People in Governance

Thesis 10

Although it is difficult to generalize over large populations, there seem to be significant differences not only among, but also between U.S. and German institutions of higher education in terms of the kind of personnel that is recruited (or recruits itself) into positions of institutional leadership. The difference in middle-level administrative personnel has already been noted; at the level of senior personnel, the typical U.S. recruitment process of academics for institutional leadership through the ranks of decanal and provostial to presidential responsibility has really no equivalent in Germany, and would conflict with the notion (present still at least in the realm of normative rhetoric) of the *"primus inter pares"* quality of a university *Rektor*. Very gradually, however, the differences seem to be decreasing, as more German academics (some-

times without admitting it) are making a career of university leadership for a substantial portion of their professional biographies. Incidentally, and somewhat paradoxically, senior U.S. university administrators, although subject to recall and/or dismissal, usually last longer in office than their German counterparts with secure periods of tenure. Incidentally as well, there is a substantially larger and more varied labor market for past deans and presidents of U.S. universities (foundations, corporate boards, non-profit institutions) than is the case in Germany.

The Systemic/Policy Domain

If, in spite of many differences, there is still some basis for comparability between German and U.S. institutions of higher education in the institutional domain of decision making, the systemic or policy domain presents serious problems of comparability. Strictly speaking, there hardly exists a "system" of higher education in the U.S. in anywhere near the sense in which it exists in Germany. The rather strong elements of systemic cohesion that play such an important role in the German situation – the Rectors' Conference (HRK), the Federal Ministry of Education and Research, the *Wissenschaftsrat*, the Permanent Conference of (State) Ministers of Education (KMK) – are virtually absent in the U.S., where the web of such system-wide institutional arrangements as do exist is much more fragmented (AAU, National Association of State Universities and Land Grant Colleges), and where informal means of policy coordination through foundations, councils and commissions seem to play a more important role. These rather fundamental differences notwithstanding, it would be intriguing to look at how the two "systems" deal with some of the critical issues facing higher education in the two countries. The following lines of comparative inquiry would seem to be particularly promising:

a) Different models of federalism in higher education policy
   - the relative role of state governments and state based governing bodies;
   - the catalysts of a national discourse on higher education;
   - equivalents/branches of national institutions at the state level;
   - the partisan politics of higher education policy.

b) Differentiation in higher education
   – different origins and similar effects of differentiated systems;
   – difference in kind vs. difference in quality/selectivity;
   – transition problems within differentiated systems.

c) The management of university financing
   – private vs. public funding;
   – the two tuition controversies;
   – indirect research cost as a source of university financing;
   – organizational and psychological conditions for philanthropy;
   – the politics and management of retrenchment.

d) Governance issues in research
   – university vs. extra-university research;
   – the tension between sustaining university "profiles" and the opportunities for external funding;
   – the blessings and hazards of peer review: maintaining standards vs. facilitating innovation.

e) The institutionalization of quality
   – mechanisms of institutional recognition and evaluation;
   – agents and criteria of accreditation;
   – quality based resource allocation.

f) The "para-systems" of governance in higher education
   – the importance of "external" actors; foundations, associations, commissions, lobbies;
   – media and higher education.

g) The knowledge base of higher education policy
   – the (modest) state of research on the functioning of higher education systems;
   – comparing and validating indicators across institutions and fields (let alone countries!);
   – planning and serendipity: What actions bring what results in higher education?

Conclusion and Perspectives for the Future of the Research University

The American University Always in Transition: From a Glorious Past to a Dreadful Future, 1900 – 2000

Clark Kerr

When I was appointed Chancellor of the University of California at Berkeley in 1952, I had never attended the many public events on campus at which chancellors customarily give speeches. So I asked my predecessor, University of California President Robert Gordon Sproul, "What does one say on occasions of this sort?" Sproul replied, "Well, there are only four possible topics: First of all, you can look back in triumph; that's easy. Second, you can look forward with fear; that's easy too. Third, you can first of all look back in triumph and then look ahead with fear." And then he stopped. I said, "What's the fourth one?" He said, "The fourth one is a theoretical possibility but I can never make it work, and that is to look back in triumph and then look forward with hope." With this in mind we are now looking at the 21st century with apprehension. At the same time we look back on the great century of the American university, the 19th century, and at the achievements of the 20th century with a sense of accomplishment and pride.

A curiosity of American university history is that the *ex ante* perspectives have always been so full of fear and the *ex post* so full of triumph. In the United States in the last century, we have moved from having hardly anything that one could call a university to having perhaps a hundred full-fledged universities today. It has been a great century. We end up looking back with a sense of triumph.

Henry Rosovsky, a long time Dean of Arts and Science at Harvard University, said a few years ago that if one were to look around the world and pick out the 30 greatest universities, at least 20 of them would be in the United States. I have not heard anyone, anywhere, con-

tradict that possibility. It has been a great century, but it did not start out looking that way. Back in 1900, American higher education was facing the future with great trepidation, with great fear. It was the age of fast advancing capitalism, the period of the trusts and monopolies, and of the robber barons. The fear was that American higher education, particularly our universities, would be taken over by the capitalists, controlled by the "Captains of Industry." There were many indicators that that might happen, and I will mention just two of them.

One was the famous case at the University of Wisconsin in the 1890s involving Richard T. Ely, one of the founders of the American Economic Association, who was charged with favoring the rise of the trade union movement. He was actually given a public trial by the Regents of the University of Wisconsin. However, when the trial was over they reinstated him to his position as professor. But it was a very important case and reinforced the fear that professors with questionable points of view were going to be eliminated from American higher education.

The other famous case was at Stanford involving Edward A. Ross, a sociologist, who was actually dismissed by Mrs. Leland Stanford whose husband had started Stanford University. Ross had taken a position supporting the so-called Workingmen's Party in California, which was fighting the importation of Chinese labor to build the railroads. The Workingmen's Party also challenged the federal land grants which were given to the railroads. Mrs. Stanford took Ross's position as a personal attack upon her former husband because his railroad had used Chinese labor, and he had made his fortune by selling railroad land grants. She insisted to David Starr Jordan, the first president of Stanford, that Ross be fired. And Jordan, under threat that she would withdraw her support to the university unless he did so, fired Ross.

So when we started this century we feared that the Robber Barons were going to come to rule our universities. But it did not turn out that way. James Bryce, in *The American Commonwealth* (1912), declared that the American universities were the only part of American society "which have almost entirely escaped from capitalist control in society." In any event, we began this century with fear and trembling, and in many areas there was fear all the way through the century. Now, at the turn of another new century, we again face the future with fear and trembling.

One element shaping the present evaluation of the American university comes from viewpoints such as those expressed in Hugh Graham's and Nancy Diamond's book, *On the Rise of the American Universities* (Johns Hopkins Press, 1997). In the last chapter, dealing with the future, the authors begin by noting all the corrosive forces currently at work on the American university – it is quite a long list. Their chief response is only to say that the higher education system has always had a lot of resiliency and we can expect it to have some in the future. Then the book ends with the rather ominous phrase, "How well that system accommodates the changes accompanying the nation into the 21st century, only time will tell." (p. 222)

Let me mention quickly some of what Graham and Diamond call the "corrosive forces at the turn of the 21st century." They note current public criticisms of universities including charges of:

– frivolous courses and useless research
– grade inflation
– student abuse of alcohol and drugs
– student cheating
– corruption in intercollegiate athletics
– scientific fraud
– bloated administrations
– padded research accounts
– soaring default rates in student loans
– faculty conflict of interest in commercial ventures
– the intrusion of "political correctness," causing some campuses to reduce freedom of speech
– curricular attacks on Western Civilization
– interdisciplinary programs that study African Americans, women, Chicanos, Native Americans, gays and lesbians
– an expanding list of proscribed "isms" that you can't talk about such as racism, sexism, ageism, lookism, and ableism (pp. 214–215).

They opine that all these corrosive forces are tearing us to pieces. They go on to list several somewhat more substantial items such as the flight from teaching which has been affecting us here at Berkeley as across the country. The teaching loads of faculty members have dropped by one half in the course of the last 40 or 50 years. The decline of federal research and development (R&D) support in real terms to faculty

members is listed as another more long-term corrosive force acting upon our universities.

Graham and Diamond go on to talk about the possible collapse of the teaching hospitals of our medical schools under the new federal health policies. They call attention to the political earmarking of funds: Instead of going through the procedure of peer review to get R&D funds, a university may go to the congressperson representing the area and get him or her to attach to some law an amendment giving support to a special university project. They point out that the amount of money going to political earmarking rose from U.S. $10.7 million in 1980 to U.S. $708 million in 1992. They talk about the increasing intrusion of the courts and state governments into the internal affairs of the university, as with admissions at the University of California or at the University of Texas. And they talk about the demise of liberal education as the research model permeates higher education.

The only thing Graham and Diamond see which might offset this long list of corrosive forces is the traditional resiliency of American higher education. But it sounds like a rather frivolous dismissal of all these corrosive forces if the one thing we can count on is resiliency once again. In light of this background, I raise the curious fact that always, as we look ahead, we fear what is going to happen, and then as we look back we always say how great it was. How can we explain this tendency?

I have two explanations, neither of which is entirely adequate. One is the rhetoric that stems from the situations of the people giving the speeches. You say, “Look back in triumph,” particularly if you have been in office for a couple of years. You really say, “Look back at how much I have done.” And, if you want to accomplish something in the future, you may say, “The situation is very bad. You must accept my recommendations or it will get even worse.” So the puzzle can be explained by noting that the rhetoric is useful to the people who are doing the speaking.

The second and more disturbing explanation is that the people making comments about the future pay too much attention to short term turbulence, to the static in the air, and too little to long-term trends. They are concerned about what Mrs. Leland Stanford may have done while not paying attention to the long-run trends in the United States.

This came to my attention particularly in the 1980s, when what I consider to have been the best forward look in American higher education was provided by Howard Bowen, then head of the Claremont Colleges system in California. In 1980, we feared a great demographic depression in higher education in the United States which, it turned out, never happened. The prediction of a depression was based on the fact that the size of the college-going age cohort was decreasing by 25 percent. In addition, a book called *The Over Educated American* had just appeared, written by Richard Freeman, a Harvard professor in economics. This book showed that the rate of return on a college education, compared to the return on a high school education, had gone down from 60 percent to 40 percent. There were people then who took the reduction of the age cohort, plus the decline in the rate of return to a higher education, to estimate that enrollment in American higher education would decrease by as much as 40 percent. This would have wiped out many of our colleges entirely and caused significant difficulties everywhere.

Howard Bowen, however, came out with what I thought, at the time, was a really crazy prediction about the future, but it turned out to be absolutely correct. He made not what he called a "prediction" (he did not believe in predictions as I do not), but what he called a "possibility." He suggested that rather than a decline of 25 percent or 40 percent, enrollment might actually increase. The Carnegie Commission on Higher Education [Clark Kerr was its Director] at that time was making its own enrollment estimates. We estimated an enrollment decline of from 5 percent to 15 percent. We considered it quite extreme under the circumstances when Bowen suggested that enrollments might actually increase.

How did he do it? He ignored the turbulence of the time, all the things we were worrying about. He based his "possibility" on one claim, what he called "the growth of a nation of educated people." A higher percentage all the time of our young people were going to college. It was 4 percent of the age group in 1900; by the 1960s it was around 40 percent; it is now 50 to 60 percent. Bowen looked at this century-long trend to see the future much more clearly than did those of us who were confused by short-term events. This is an illustration of how people, particularly those producing the rhetoric of how bad things are going to be, tend to be disturbed by the local turbulence, the urgent

problems that are on their desk, while not looking beyond today to recognize basic trends and the direction they are going.

What lessons do I think we have learned about looking ahead? One is that transitions in higher education come very slowly. Once upon a time I tried to answer this question: How many institutions have continued to exist in the western world over the past 450 years, with the same names, doing the same things, often in the same places? I took 1520, the time of the foundation of the Lutheran Church, as my point of reference. We came up with 85 such enduring institutions, which I think now is a somewhat low figure – I think we undercounted the number of Swiss cantons that had been established by 1520. In any event, we identified 85 institutions still in existence, and 70 of those were universities. Feudalism disappeared, the world changed enormously as corporations were expanded, businesses and trading companies grew. Princes came and went along with kings and queens, but the universities kept going. I think that it is a good principle when looking at the future always to keep this in mind. We change, just like the rest of the world, but universities tend to change more slowly and to hang onto the past more stubbornly than any other institution known to mankind. I think I only slightly exaggerate when I remark that of all the institutions around us today that survive to the year 3000, our universities may look more nearly as they do today than any other institution.

The second lesson is that the future of universities is not predictable in any detail whatsoever. Their situations are too complicated, and there are too many types of universities and too many different situations. If you look at the past century and all the unforeseen things that have come along to change situations, such as wars, depressions, and the explosion of knowledge, few were predictable. The last issue of *Daedalus* (winter 1996), the Journal of the American Association of Arts and Sciences, features American academic culture. It points out the enormous changes that took place between 1950 and 1980 in the mentalities of faculties. In 1950, American academic culture was concentrated around a white male European center. By 1980 mentalities had changed and by that time the culture was not all white, but included people of many colors. It was not male only but also female, and it was no longer European-centered but multicultural. There was also a tremendous change in the mentality of faculty members in the prior centu-

ry when they moved from an emphasis upon faith and the Bible to one based on science and reason. And, of course, the introduction of the Humboldt university ideal had a great impact on the United States. So I say, forget about predictions. What is worthwhile is taking a look at possibilities and probabilities.

Third, try to take a look at the long run of what may happen. I would suggest that the general concern about the current turbulence should be put aside. Throw away that long list of immediate issues and examine sustained trends. I would like to suggest that for the United States, some of the long-run trends might possibly be the following:

One, that the United States will continue to move, as Howard Bowen said in 1980, toward becoming a nation of educated people. In the long way off by the year 3000, going to college may become as customary as is going to high school today. That would have an enormous impact on our society. Studies show that people with higher education take better care of their health, save more money and invest it more efficiently, are more efficient consumers, and participate more in their communities and in political life. They also add to their skills which leads to increasing productivity in the workplace. One has to concede, of course, that not all of these benefits accrue because people went to college. It is also because they were selected to go to college and were believed to have greater ability and greater motivation than others. In a recent U.S. econometric study the suggestion was made that only one half of these added attributes of college-going people, given the fact that they had greater ability and motivation to begin with, was caused by education. As we get closer to 100 percent college attendance, that selective aspect will be lost. But even if we get only half the present return on higher education in the future, it will still make a very big difference in the country. So I would suggest looking at what happens as we move toward becoming a nation of educated people.

Two, I would suggest that with respect to national priorities, we may come, just to survive, to reinstate our priority for science. Research and development are very important to economic growth, to our ability to compete around the world, and also important to maintaining military capability. It will be very difficult, however, to reproduce the earlier rise in productivity stemming from advances in knowledge. We cannot possibly go back to the level of the 1960s when productivity was in-

creasing at 3 percent a year, which means doubling the standard of living in 25 years. It is also unlikely that we can go back to the 2 percent annual productivity increases that we had in the 1970s. I think we will be doing quite well if we maintain the 1 percent rate which we have had since about 1980, which would mean we could double our living standards every 75 years. My great fear is that, if we are not able to preserve productivity growth at that rate as the result of science and technology and good management, there are other developments in society, particularly the increasingly adverse distribution of income toward the wealthy and away from the poor, that will cause very severe social unrest in the United States in the future.

Now let me add two more comments: One is that in looking ahead I think it would be much better if we try to be more specific than if we talk about "The University in Transition." Which university are we talking about? Under what conditions and what part of it? I believe the future of graduate education and research may be quite different from that of undergraduate education. I can see major changes taking place in undergraduate education. I can see within the next century the almost complete disappearance of professors lecturing, replaced by computers and instructional technology. But I do not see much change at the graduate and research levels. And there are enormously different possibilities between the humanities and the biological sciences, or between medicine and engineering. Begin by disaggregating and do not try to look at the whole.

I would add one other observation about trends as we look into the future. There may be another major change coming in the mentality of the professoriate such as there was during the time of the introduction of the Humboldt university model, or the debate over the Bible versus science during the 19th century, or the change in the 20th century from the male-centered point of view. It is this: The impact of the elevation of a "post-modernity" point of view and the devaluation of the Enlightenment.

I return to the issue of *Daedalus* that I referred to earlier. The authors of the articles include representatives from two humanities fields (literature and philosophy) and two social sciences (economics and political science) presenting their understanding of their own academic cultures. What is happening in the humanities is very different from what is

happening in the social sciences. There are many references to what is called "post-modernity," which can be traced back to many sources, one of which is the Frankfurt School in Germany. The "post-modernity" school points out all the disadvantages of modern society which is based upon reason and upon empirical approaches. Ideas developed in the great Enlightenment of the 18th century have had tremendous advantages in prolonging life, increasing literacy, and providing material comforts, but they have come with many costs. These include the growth of what is considered to be mass culture, increasing inequality of standards of living among nations and within nations, environmental degredation, and many other things that have gone wrong.

Yet the hope that modern society holds for the solution of problems, the great engine driving modern society, is the research university. That is where to find those people who create science and technology and modern medicine. Thus, when you begin to attack modernity, you are led to attack the research university which is at its very center. It disturbs me very much that we may turn out over the next century to have been our own grave diggers, as the postmodern attacks on the research university arise, to a large extent, from elements within the humanities located in those very universities. It may be better to call this new mentality not "post-modernity" but "anti-modernity," because post-modernity does not say anything about the advantages of modernity. Without modern science and technology, the whole world would collapse.

I conclude then by saying that if I were trying to look at the 21st century, I would forget all the common annoyances, all the turbulence, and all the things which we complain about and have been talking about at this conference. I would just say, "What are the big things?" And I would say that the big things for the United States are (1) becoming a nation of educated people, and (2) a return to a high priority for science. It is ominous that a recent study shows that in the United States the productivity of research and development funds has dropped over the past 20 years by one half in terms of the patents that they create. That is an ominous figure, but there are also some good things emerging. There are chances for productivity to be increased in the areas of biotechnology, of new materials, particularly ceramics, in new ways of creating and distributing power.

If I had one great concern about the future, it would be that instead of turning the "post-modernity" criticism into a positive force for improvement, we will find ourselves in the university becoming what Lionel Trilling once called the "adversary culture," moving away from being the support of American society to becoming the center of criticism of it.

I began by saying that Robert Gordon Sproul once said that he could never make it work to view the past with pride and the future with hope. I want to suggest that there is a possibility that, as we enter the 21st century, we can look back on the past century not only with pride, but also that it is even possible to hope.

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