

# CHAPTER 22

## Summary and Conclusion

*James J. Duderstadt and Luc E. Weber*

In June 2013, the leaders of many of the world's leading universities gathered in Glion-above-Montreux to participate in the IX Glion Colloquium to consider the challenges and responsibilities facing their institutions in an era of rapid change. Today, most nations recognize the critical importance of education, research and innovation to their economic prosperity, social well-being and security. They also understand the importance of research universities as key resources in providing these assets. Yet today, these important institutions are being challenged by the powerful forces of demographic change, globalization, environmental risks, hypercompetitive markets, failing governments and disruptive technologies such as information and communications technology, biotechnology and nanotechnology.

The Colloquium was organized into five topical sessions:

- the changing purpose, role and relationship of research universities
- the changing nature of discovery, learning and innovation
- the cost, price, and value of higher education
- the changing nature and character of research universities: developed countries
- the changing nature and character of research universities: developing countries

To provide a framework for the discussion in each session, participants prepared papers that were distributed in advance of the meeting. Although the format of each session allowed the presentation of brief summaries of these papers, most of the session consisted of open discussion of the issues raised both by the topic and the papers.

This summary chapter has been written to pull together several of the key points made by the participants and arising during the discussion phase of the

sessions. These summaries have been provided in an order that conforms to the sessions of the Colloquium.

## **SESSION 1: THE CHANGING PURPOSE, ROLE AND RELATIONSHIPS OF RESEARCH UNIVERSITIES**

*Chairs: Howard Newby and James Duderstadt*

*James Duderstadt: Research Universities and the Future of America: A Study by the National Academies of the United States*

*Heather Munroe-Blum: The Strategic Repositioning of Research Universities to Fulfill their Global Priorities*

*Hunter Rawlings: How to Answer the Utilitarian Assault on Higher Education*

*Chorh-Chuan Tan: The Changing Nature and Character of Research Universities: New Paradigms*

The crucial importance of the research university as a key asset in achieving economic prosperity and security is widely understood, as evidenced by the efforts that nations around the globe are making to create and sustain institutions of world-class quality. Yet, while America's research universities remain the strongest in the world, the nation's commitment to sustaining the research partnership among governments, industry and universities has weakened in recent years, putting this leadership at risk. In response to this concern, in 2010 the United States Congress asked the National Academies (of Science, Engineering and Medicine) to conduct a major study of the future of the nation's research universities and provide recommendations to address the challenges facing these institutions.

The National Academies effort raised several key concerns: The policies and practices of the United States government no longer placed a priority on university research and graduate education. In the face of economic challenges and the priorities of aging populations, the nation's states no longer are either capable or willing to support their public research universities at world-class levels. American business and industry have largely abandoned basic and applied research and today are largely ceding this responsibility to research universities, but with only minimal corporate support. Finally, American research universities themselves have failed to achieve the cost efficiency and productivity enhancement in teaching and research required in an increasingly competitive world. The study provided a series of recommendations to strengthen the partnership among universities, federal and state governments, philanthropy and the business community in order to revitalize university research and speed its translation into innovative products and services. In addition, it recommended actions to streamline and improve the productivity of research operations within universities, and ensure that America's

pipeline of future talent in science, engineering and other research areas remains creative and vital, leveraging the abilities of all of its citizens and attracting the best students and scholars from around the world. This study has ignited a decade-long effort to elevate the priority of American's research universities.

Although Congress requested this study within the framework of contributions to the nation's economic strength and security, this ran the risk of intensifying the pressure on American universities from both government and the public to adopt a purely utilitarian mission, both in the education of their students and in the research they conduct. In fact, many of the most important missions such as educational breadth, basic scholarship and even disciplines such as the social sciences have come under attack by powerful political forces, undermining public trust and confidence.

Research universities in other Western nations are facing similar challenges. Even as they attempt to address urgent global challenges such as world poverty, health and education, they are hindered by the instability of government funding and the erosion of public understanding and support. This growing lack of public trust is a serious challenge, although perhaps it is also because our institutions have become more important to the needs of society. Clearly it suggests that research universities must re-configure their relationships with the government, the private sector and civil society in order to build on their strengths and reaffirm their contributions domestically and internationally.

Here the contrast with the experience of universities in rapidly developing Asian economies is profound. Not only are institutions in knowledge-intensive economies such as Singapore given high priority and strong funding, but they are strongly encouraged to pursue strategies for achieving global leadership through new paradigms that leverage more effectively and explicitly on the synergies between research and education, and between research and the translation of basic research findings into new thinking, products, services, concepts, policies and practices, since these represent very important dimensions of the overall value proposition of research universities and enable them to possibly leapfrog more established institutions. The National University of Singapore provides an excellent example with its innovative development of global educational programs through partnerships that provide both a portal and a bridge to several of the world's leading universities; its fascinating partnership with Yale to build a liberal arts college in Singapore; and its CREATE initiative to build international research "collaboratories" in key areas such as human, energy, environmental and urban systems.

## SESSION 2: THE CHANGING NATURE OF DISCOVERY, LEARNING, AND INNOVATION

*Chair: Heather Mumroe-Blum*

*Lezek Borysiewicz: Research Funding: Trends and Challenges*

*Arnold van Zyl: The Role of Universities in Regional Development*

*James Duderstadt: The Impact of Technology on Discovery and Learning in Research Universities*

*Patrick Aebischer: Can the IT Revolution Lead to a Rebirth of World-Class European Universities?*

The session began with a presentation on the changing nature of research sponsorship in the United Kingdom, a pattern that was also becoming apparent in much of Europe and North America. Sponsors were shifting from providing peer-reviewed research grants to university investigators to grand challenge initiatives with large grants made to interdisciplinary research centres addressing more pragmatic objectives associated with social or economic goals. While this approach addresses the broader character of transdisciplinary research, it also makes even more competitive — and perhaps more routine — traditional research grants and projects. The development of the European Research Area will stimulate still further evolution, particularly with its emphasis on innovation and technology transfer and large-scale research facilities. Hence there will be a growing challenge to funding agencies to keep sufficient funds available for individuals (not large collaborations) where much of the originality in research occurs, while focusing their attention on the amount of funding they are willing to provide rather than dictating the research that will be done with these funds (with a similar caution to industry). For universities, the challenges will include developing academic structures to enable discipline-based units to deliver multi-disciplinary research, combining grand-challenge approaches with investigator-led research, and improving the efficiency of translation of research results into societal benefit.

The third mission of the research university, to transfer knowledge through various forms of community engagement, was an important topic of discussion for this session. In the broadest generic sense, the third mission encompasses the interrelationship between a university and its non-academic partners. Universities need to put the issue of individual human rights and concerns for the environment at the centre of their inquiries. They need to actively engage and enter into alliances with a number of stakeholders. Yet the nature of this engagement must reflect the strong difference in the needs of developed and developing nations. For example, today much of the focus of university engagement in Europe and America addresses economic needs for technology transfer and innovation, although this sometimes raises concern about shift-

ing their centre of gravity away from teaching and fundamental research and may result in the degradation of the university to an extended, externalized research facility for industry (e.g., is Stanford still a university?) In sharp contrast, in Africa there is a need for more immersive engagement of students and faculty in working/caring in a resource-limited environment. In a sense, universities must use their own environments to create optimal modalities for achieving (and demonstrating) their relevance and impact.

Perhaps the most significant changes in learning and discovery (teaching and research) today are being driven by rapidly evolving information and communications technologies. Hence much of the discussion of this session involved new approaches to education, such as massively open online courses (MOOCs), cognitive tutor systems, or Carnegie Mellon's Open Learning Initiative. This is also happening to research (e.g., MOO"R"?) through crowdsourcing, simulation-based research, big data and data mining. In fact, there were several references to frequent claims that today higher education is on the precipice of an era of extraordinary change as such disruptive technologies challenge the traditional paradigms of learning and discovery. To be sure, one of the major reasons for the continued surprises we get from the emergence of new applications — the Internet, social networking, big data, machine learning — arises from the unexpected directions taken by these technologies that evolve at an exponential pace. We have learned time and time again that it makes little sense to simply extrapolate the present into the future to predict or even understand the next "tech turn". These are not only highly disruptive technologies, but they are highly unpredictable. Ten years ago nobody would have imagined Google, Facebook, Twitter, etc., and today nobody really can predict what will be a dominant technology even five years ahead, much less ten!

Because of their recent appearance and rapid growth, MOOCs received a great deal of attention during the discussions. To be sure, through the use of online access, social networking and data analytics, this learning paradigm is capable of providing educational access to extremely larger populations, particularly important in underserved areas. It also establishes visibility and attracts talent (and perhaps eventually even revenues) to those institutions that are leaders in this movement. Yet it was also acknowledged that such online courses were very different from a campus-based education. It was clear that it is a time for experimentation, including rigorous measurement of educational results, before we allow the technology tsunami to sweep over us!

The same might be concluded for the new paradigms for research and scholarship driven by new technologies. Certainly the language of research is changing to embrace concepts such as clouds, data mining and disciplinary convergence. If one subscribes to the view that there is a paradigm shift from hypothesis-driven to data-correlation-driven discovery, then the culture of scientific and engineering discovery and innovation is changing as a result of

access to data, computational technology and social networks. But while these approaches augment the traditional scientific method of observation, conjecture, experiment and theory, they certainly do not replace it.

### **SESSION 3: THE COST, PRICE, AND VALUE OF HIGHER EDUCATION**

*Chair: Nam Pyo Suh*

*Luc Weber: Who Is Responsible for Providing and Paying for Higher Education?*

*Howard Newby: How and Where Are Dominant Funding Models Steering Higher Education and Research?*

*Ronald Daniels: Fault Lines in the Compact: Higher Education and the Public Interest in the United States*

*Linda Katehi: The Challenge of Transition in Public Higher Education*

This session dealt primarily with the financial aspects of higher education. A wide spectrum of issues was discussed in the session. The facts that higher education provides value to both individuals and broader society and can be supported either by the public purse or individual fees, raises issues of economic policy, social policy and, of course, politics. The complexity of these considerations was illustrated by the degree to which minimizing the fees charged to students can actually have a negative impact on equity since it tends to preferentially subsidize higher-income students at the expense of those of modest means. Because of the impact of an educated population on society, a strong case could be made that higher education (including both teaching and research) was a public responsibility, although student fees can also be justified because of the economic impact of education on the earning capacity of graduates.

While this initial discussion was of a general nature, many other issues were country specific. The most discussed was the decreasing government support for higher education at public universities, which led to the discussion of impact of higher tuition, particularly in nations like the United Kingdom where tuition has recently replaced government funding. Another frequently discussed issue was the importance of research funding, which comes mostly from governmental sources. The impact of decreasing investments in higher education by the public sector on the quality of higher education drew much attention, with the University of California as perhaps the most extreme example, since this world-leading institution has lost almost two-thirds of its state support over the past decade. Other issues discussed were the complex relationship between universities and government, the need to embrace ICT to reduce costs and to improve the quality of learning, and the importance of developing effective relationships with industry.

There was a consensus among the presenters that many universities are indeed struggling with inadequate funding for quality education and research. Since many universities depend on government funding for research, this may lead to governmental interference of the research agenda. This trend is greater in countries that have a monolithic structure for funding research. In the U.S., several funding agencies pursue diverse research agendas, which enable its universities to have a wider flexibility in pursuing their research goals. Industrial support of academic research is important, especially in engineering, but the actual level of research funds provided by industry is relatively small.

There was a general sense that the relationship between universities and governments needed to be renegotiated and better aligned with well-established public goals that were sustained by strong public trust and confidence. Yet, notwithstanding the many challenges identified by all participants, the overall tone of the discussions was positive. All the participants appeared to be confident that they could improve their own research universities, even though the current uncertainty at those universities caused by the worldwide economic downturn poses challenges and demands imaginative solutions.

#### **SESSION 4: THE CHANGING NATURE AND CHARACTER OF RESEARCH UNIVERSITIES IN DEVELOPED COUNTRIES**

*Chair: John Niland*

*Alain Beretz: Can the French System Support Competitive Research Universities?*

*Antonio Loprieno: Contemporary Challenges for the Swiss and Continental European System*

*Eva Akesson: A Research University for both Academic Excellence and Responsibility for a Sustainable Future: Does the Swedish Model Work?*

*Sijbolt Norda: Human Capital, the Oft Forgotten Key Challenge for Universities*

This session began with a discussion of experiences from four different European nations: France, Switzerland, Sweden and the Netherlands. France was particularly interesting, since it faced the challenge of creating world-class research universities from a dual system of universities providing mass education and “Grandes Ecoles” providing rigorous technical training for the economic and political elite. The nation has embarked on a series of excellence initiatives to create perhaps five to ten major research universities that are globally competitive and capable of attracting the best researchers and students. This requires a competitive strategy to increase funding, faculty and student mobility, competition and institutional autonomy.

Swiss institutions continued to be well-funded and globally competitive, but they are undergoing a major structural and cultural transformation to better align themselves not only with the Bologna model but also with leading

research universities around the world. Here the shift is from the Bildung/Ausbildung organization of the traditional European “universitas”, with disciplinary concentration occurring at both the college and graduate level, to a broader undergraduate education to prepare students for an intensely focused disciplinary training at the graduate level. Beyond this, the predominant model of the Swiss university has distanced itself from the traditional administratively decentralized, professorially driven and state-controlled institution to reach a higher level of stakeholder diversity, corporate identity and executive efficiency.

Focus on research, personalized instruction, global understanding of the role of the university in society: these seem to be the main features — and the main challenges — of the contemporary Swiss academic landscape. In many respects, this evolution dovetails quite well with the demographic expectations of our knowledge society.

Sweden is also characterized by generous government support of universities and strong research reputations. Yet its practice of government selection of research priorities narrows the academic activities of its universities. Institutions are characterized by high insularity and little mobility on the part of faculty and students. And, perhaps most seriously, the imposition of high tuition and visa restrictions for international students has decimated their enrolment and threatens to cripple the ability of Swedish universities to adequately participate in an increasingly global scholarly community.

Although the Netherlands also continues to sustain universities with a global presence, there are major concerns about the approaching turnover of faculty in Dutch institutions. Serious attention is being given to making academic careers more attractive to young people while encouraging senior faculty to achieve a better balance between the career interests of individual faculty members and university collective interests. Academic leadership will be key in both efforts.

## **SESSION 5: THE CHANGING NATURE AND CHARACTER OF RESEARCH UNIVERSITIES IN RAPIDLY DEVELOPING COUNTRIES**

*Chair: Leszek Borysiewicz*

*Jie Zhang: The Search for Quality at Chinese Universities*

*R. K. Shevgaonkar: Higher Education Models for Large, Developing Economies*

*Carlos Henrique de Brito Cruz: Challenges and Opportunities for Public Research Universities in Brazil*

*Nam P. Suh: Challenges in Establishing a Top Research University*

*John R. Niland: The Asian Tiger University Effect*



A particularly impressive presentation was made concerning China's remarkable achievement in increasing higher education participation of 18- to 22-year-olds from 1% in 1982, to 26% in 2012, with a goal of achieving 40% in 2020. In parallel with this massive effort to increase access to higher education is China's concerted effort to elevate several Chinese universities to truly global leadership in research and graduate education. To achieve a faculty capable of such quality, Shanghai Jiao Tong University has implemented a dual-track model, providing internationally competitive salaries to new faculty with international reputations. However, salary and compensation packages have been progressively increased for all faculty members, while making them more flexible and performance-based.

India faces a comparable challenge in scale, with an estimated need for higher education that is three times the current capacity of existing universities, and a population that is becoming even younger. While the Internet has provided the country with the economic boost from the off-shoring of jobs from America and Europe to India's strong science and engineering graduates of its elite IIT and IIM systems, the nation is still losing the top 10% of its graduates through brain drain. India's key focus areas are involving extensive use of online education for massification, e.g., now providing its entire engineering curriculum in all disciplines through web and video lecture format; adequately funding research at global standards; and developing a strongly entrepreneurial culture to provide innovative solutions to local problems. Since India is at the interface between developed and developing nations, its strategies are relevant to 70% of the population of the world

Yet a third example was provided by Korea's efforts to transform KAIST (the Korean Advanced Institute of Science and Technology) into a world-class institution of the quality of MIT. This has required not only a major investment of resources, but, as well, a significant change in institutional culture that allows, promotes, rewards and respects diverse views. KAIST has dramatically raised the standards for faculty achievement, selecting research topics well-aligned with areas of strength that would attract global attention and working closely with key industrial partners such as Samsung, Hyundai and Daewoo. It has been fortunate in being able to tap the talent pool of outstanding applicants, accepting less than 1% of those who applied to KAIST after a rigorous secondary education.

The final discussion of this session concerned the efforts of other "Asian Tigers" (Singapore, Hong Kong and Taiwan) to build outstanding research universities. The stunning economic growth of these societies over the past several decades has already lifted living standards to developed country levels for many of their citizens. They have also laid strong foundations for developing first-rate university systems, with several of their universities, such as Hong Kong University and the National University of Singapore, already

well-established in the top group of world-class universities. But this is just the start for a wave of new, more agile universities that may well be on the way.

The pace of Asian university development in the past several decades is without precedent, and the trajectory of the Asian tiger sub-species is even more spectacular. These initiatives have certainly benefited from strong investments and government commitment. They have also leveraged their relationship with leading universities in America and Europe, while focusing on areas where they could rapidly move into leadership positions. These efforts have also benefited from strongly aspirational societies (e.g., a Confucian philosophy that greatly values education) and a government approach that was not only collaborative but also highly strategic.

## SESSION 6: A GENERAL DISCUSSION

The Colloquium concluded with a general session both to evaluate the format and substance of the papers and discussions and to identify possible topics and formats for future efforts. The 2013 IX Glion Colloquium was somewhat more homogeneous than earlier colloquia in that almost all participants were either current or former university leaders rather than a mix of participants from higher education, business, government and foundations. The participants believed that this facilitated a somewhat more engaged and focused discussion, both in the formal sessions and during the various associated events (luncheons, dinners, travel events, informal discussions). They also agreed that those papers and presentations that were analytic considerations of particular topics rather than descriptive of particular institutions were the most informative (although using particular institutions to illustrate a more general issue was felt to be highly effective).

The participants believed that the truly global character of the event was one of its strong points. Of particular value were the discussions that revealed the sharp contrasts between developed and developing nations, different regions (Asia vs. Europe vs. America vs. Africa), and different types of institutions.