CHAPTER 23

Summary of the Colloquium

James J. Duderstadt, Mary O' Mahony and Luc E. Weber

SESSION 1: GENERAL DISCUSSION OF INNOVATION

Chair: Georg Winkler
Luc Weber: The Next Decade, a Challenge for Technological and Societal Innovations
Charles Vest: Technological Innovation in the 21st Century
Ellen Hazelkorn: Community Engagement as Social Innovation

The first session began with the observation that it was precisely a century ago, in 1908, that Schumpeter introduced the terms "innovation" and "entrepreneurism" into economics at both the University of Vienna and Harvard, which, together with Lausanne (near Glion), comprised the centres of economic theory at the time. Over the past several months, his theory of creative destruction has been in evidence once again as our world has been shaken by the current global financial and economic crises, in which over $3 trillion of wealth has been destroyed by flawed financial, economic and regulatory policies. It was suggested that what has really happened is that the "real" economy, based on wealth generated by goods and services, rather than financial gymnastics and "quants" — e.g., credit default derivative swaps — has returned with a crash. We have learned once again that while technological innovation can drive economic growth, social innovation is necessary to sustain development in the face of human frailty and misadventures.

The motto of many of today's companies has become "innovate or abdicate", as the explosion of knowledge, coupled with the evolution of a truly global economy driven by rapidly evolving information, communication and transportation technologies, has enabled innovation to flourish wherever bright, motivated and entrepreneurial people can gather. Yet, as the speed of innovation has accelerated, so too has its complexity, becoming both competitive and collaborative, spanning the disciplines and extending far beyond

technology. In fact, today the greatest wealth comes not from technological but rather organizational innovation, as evidenced by new paradigms such as "open innovation" and "global sourcing" in which companies discard old-fashioned, "not-invented-here" constraints to tap ideas and talent wherever it exists, "open source — open content" knowledge that is available to anyone with Internet connectivity, and human capital both distributed and accessible about the globe.

In this rapidly changing environment, all social institutions and communities are challenged to adapt to new challenges with innovative new forms. In particular, universities face the challenge not only to adapt to a world driven by innovation, but in turn, to produce the new knowledge and creative graduates capable of producing that innovation. Yet, concern was expressed about those forces constraining the ability of the university to respond to the challenge of change: governments (and perhaps policies such as the Bologna process) that restrict both autonomy and diversity, students and faculty who fear the "contamination" of academic purity by university engagement with the economy, and the disciplines themselves rigidly moored to their intellectual canon. The issue of autonomy was of particular concern to the leaders of European universities as organizational innovation becomes increasingly important. Yet, while greater university autonomy is certainly necessary if institutions are to achieve the flexibility demanded by an innovation-driven world, this can only happen if institutions are also willing to be held more accountable for their contributions to society and their adherence to fundamental academic values.

In summary, the discussions occurring during this session revealed the following themes: First, technological innovation is not enough to address today's challenges. Social or societal innovation is equally important, with organizational or institutional innovation increasingly emerging as a critical goal. The interaction among these different types of innovation is key, and universities are well-placed to play a role in stimulating that interaction. For that they will need to stress greater interdisciplinarity in academic programs, more leadership roles for younger faculty, and more autonomy to enable innovative approaches to society's needs.

This session also was characterized by an important theme that propagated through the entire colloquium: the role of young people in shaping innovation. While it is evident that the new world of innovation will be determined by the next generation, it is encouraging that today's students seem to understand the growing importance of innovation and their role in creating new knowledge. Even while enrolled in our institutions, our students are contributing to innovation in curricular development driven by their changing modes of learning (e.g., social networking, immersive technology). Hence it is important not only to engage them in learning activities beyond the class-

room, such as research and public service, but to also allow them the time and flexibility to develop their creative skills.

SESSION 2: AGENTS OF INNOVATION

Chair: Frank Rhodes

Jean-Lou Chameau: Curiosity and the Transformative Impact of Fundamental Scientific Research

Wayne Johnson: Industry as a Catalyst of Innovation

Frans van Vught: National Innovation Policies: Governments as Innovation Agents of Higher Education and Research

While many universities have sought to enhance their contributions to technological innovation and entrepreneurial activities through organization such as incubators, technology transfer offices and research parks, in the end their impact almost always depends primarily upon the efforts of individual faculty. A study of successful faculty entrepreneurs such as Carver Mead at Caltech or George Whitesides at MIT reveals the importance of scholarly reputation and institution quality. Furthermore, the most important players in the transfer of the scientific knowledge from campus research activities into the commercial marketplace are usually the students they educate, particularly at the graduate and postdoctoral level. This strong dependence of innovation on the exceptional abilities of a few highly creative people should be kept in mind by those seeking to stimulate entrepreneurial activities. The important factor — and hence investment — was the building of relationships, which takes time and requires substance. Here a question was raised as to whether the close relationships characterizing smaller institutions (e.g., Caltech) gave them advantages, although this was countered by the greater intellectual breadth and diversity characterizing larger universities. There was agreement that in today's world, human talent is not only institutionally but globally distributed and accessible through modern information and communication technologies.

In the United States, it has been estimated that perhaps as much as 50% of economic growth during the latter half of the 20th century was driven by technological innovation, much of which was produced in a small number of world-class research universities (e.g., MIT, Stanford, Caltech), large corporate research laboratories (e.g., Bell Laboratories, IBM Research Laboratories, the Lockheed Skunkworks), and federal laboratories (e.g., Los Alamos, Oak Ridge, Jet Propulsion Lab). Yet, as the monopolies enabling generously supported corporate research laboratories disappeared, world-class research universities proliferated around the globe, and rapidly evolving ICT allowed unrestricted access to talent and ideas anywhere, anytime, the new paradigms of open inno-

vation were embraced that distributed R&D, innovation and entrepreneurial activities on a global scale. New forms of collaboration appeared, in which the triple helix of industry, government and higher education joined together to generate the knowledge and human talent to drive innovation and economic value. Organizations that once demanded secrecy and exclusivity of intellectual property began to share and collaborate to address fundamental technological challenges, even as they continued compete aggressively in the marketplace of products and services. University faculty formed consortia with colleagues both at home and abroad. National governments not only joined in international scientific efforts (e.g., the LHC, ITER, and International Space Station) but began to outsource both scientific research and technology development in areas where others had greater capabilities.

As nations seek to promote innovation as an engine of economic growth, higher education and other research organizations have become crucial objects of national policy. Yet, such policies usually fall into one of two approaches: i) to set themes and priorities for the allocation and concentration of resources, and ii) to emphasize competition among key players such as universities through competitive grants programs or market incentives. It was noted that in large systems, competition appears the best strategy, while in smaller countries a concentration strategy seems better. Yet, the environment for innovation is continuing to evolve (e.g., the shift to open innovation and global sourcing), while the information concerning institutional performance and hence policy effectiveness remains scant. It was suggested that nations should adopt a *policy learning strategy* based upon valid, publicly accessible information on both institutional performance and economic impact as a key supplement to policy strategies such as prioritization and competition.

Here a concern was raised that perhaps regional strategies such as the Lisbon Agenda might prove more effective in the long run than national innovation strategies, which actually could conflict with regional efforts. It was also suggested that the strong emphasis that governments were placing on the role of universities in stimulating the innovation key to economic prosperity might overwhelm the other critical missions of the university.

In summary, the key themes of this discussion session were: The role of students is particularly important in successful university-driven innovation activities. Here the strong involvement of U.S. undergraduates in significant research was particularly beneficial. There was discussion concerning the appropriate role of university leadership in promoting interaction across faculties within the context of an innovation strategy. Successful innovation strategies for industry-university interactions required a careful strategy in the selection of partners to enable the focus sufficient time and resources to design and sustain the interaction. The current trend of government funding to focus on funding individuals needed to be broadened to support the innovation that occurred in

partnerships or larger systems. The nature of government innovation strategies, e.g., competitive vs. concentrated, depends on the scale of the enterprise.

SESSION 3: NATIONAL AND REGIONAL INNOVATION STRATEGIES

Chair: James Duderstadt

Georg Winckler: Innovation Strategies of European Universities in the triangle of Education, Research and Innovation

Ralph Eichler: Team Players to shape our Future; Do Our Students Learn the Right Skills?

Heather Munroe-Blum: The Innovation Society: Canada's Next Chapter

Bertil Andersson: Singapore: Successful in Research; Struggling for Innovation

Fawwaz Ulaby: KAUST, An International, Independent, Graduate Research University

Arif S. Al Hammadi: Transforming an Economy through Research and Innovation

Juan Ramon de la Fuente: Research and Innovation in Latin America

This session focused on the experience of various nations in creating research universities capable of contributing to innovation-driven economies in various regions including Europe, North America, Asia, the Middle East and Latin America. European higher education evolved from the medieval humanist themes of 17th and 18th universities into institutions primarily focused on graduate education and scholarship in 19th century Germany and Austria, a theme that soon propagated across Europe and then throughout the world. While recent efforts to better unify European higher education through the Bologna Process, the European Research Area and the Lisbon Agenda have clearly enhanced collaboration and facilitated the mobility of students and faculty, innovation strategies continue to exist primarily at the national rather than the E.U. level, without the cross-border innovation pressure and demands that one finds in the United States. There is a growing recognition that demands of innovation-driven economies require that the process to achieve European integration in higher education be balanced with efforts to achieve greater autonomy, agility and mission differentiation among European research universities.

Since research and innovation are quite different activities, the former transforming money into knowledge and the latter transforming knowledge back into money, fundamental changes in pedagogy will also likely be necessary. Creativity, innovation and entrepreneurship are most effective acquired through deep student engagement in knowledge-generating projects rather than traditional content-based learning. There is a need to better integrate scientific research in Europe with educational programs, much as it is in North America, rather than keeping it at arms length in separate research institu-

tions, as it tends to be in much of Europe. Yet this will be difficult in some nations where universities tend to be supported at the regional level while research institutes are supported by the national government.

In the United States and Canada, universities have evolved that blend the missions of broad undergraduate studies, research-focused graduate programs and deeper engagement with society through service activities. While the United States benefited from both a philosophy and scale that enabled a sufficient degree of diversity and autonomy of universities with respect to mission, resource base, quality and character to serve a rapidly changing nation, Canada has faced more of a challenge in coupling high quality academic programs to the nation's needs for innovation and entrepreneurial engagement, particularly at the graduate level. The absence, until recently, of strong tax incentives to encourage philanthropic support of higher education similar to those in the United States, has also been a challenge. To this end, a national Canadian Foundation has been created and capitalized to stimulate through large institutional grants major new initiatives aimed at better coupling graduate education and research to market-driven innovation.

In both Asia and the Middle East, there are bold efforts to create world-class research universities. Although Singapore is expanding its universities to serve an increasing population, of particular importance is an effort to work with major international universities (e.g., MIT, Imperial College, Technion, Duke) to build major graduate-research programs in key strategic areas. Although Singapore's investment in such research efforts has now grown to 3% of GDP, there remains a concern about whether creativity and innovation may be hindered by its rigid social structure, e.g., "Can you win a Nobel Prize in a country that does not tolerate graffiti?" It was stressed that deep innovation required a tolerance for failure, a trait currently missing in risk-adverse cultures such as Singapore.

A contrasting approach was Saudi Arabia and Abu Dhabi. There was recognition that these two nations have mounted major efforts to build world-class institutions, working with established universities faculty from around the world to create an innovative culture. Saudi Arabia has launched a major graduate university, King Abdullah's University of Science and Technology, recruiting leading scholars from around the world and building an extraordinary campus on the Red Sea. Abu Dhabi has taken a somewhat different approach with the Khalifa University of Science, Technology and Research, focusing first on high quality undergraduate education in partnership with several international universities. In both cases, the commitment of extraordinary resources and establishment of strong partnerships to build initially several small, highly focused institutions may allow these nations to leapfrog to world-class status quite rapidly. However this global connectivity could create tensions with the strongly rooted local cultures in these nations.

While such small institutions are nimble and capable of significant impact in highly focused intellectual areas, rapidly growing populations of Latin America, characterized by great social diversity and income inequality, demand a very different approach. Even very large institutions such as the National Autonomous University of Mexico (300,000 students) are unable to keep pace with the educational needs of a growing young population, now estimated at over 100 million between the ages of 15 and 25 in Latin America. Innovative approaches in higher education, such as the use of open educational resources and distance learning, will be necessary to meet these needs while allowing sufficient investment in the advanced education and research required by increasingly technologically sophisticated economies. This would require as well greater political continuity and stability of government programs and support.

This session concluded with a broader discussion about the balance between elitism and scale in determining innovation and entrepreneurism. In a sense, the world is both flat (in the sense of Thomas Friedman) and spiky (in the sense of Michael Porter). This discussion raised several important questions. What attracts creative people to regions? World-class universities or world-class educational systems? Are we trying to approach intensely human characteristics such as creativity and entrepreneurism with a systems approach? How do we nurture stubborn individuals? Perhaps in our efforts to define world-class status through simplistic surveys such as league tables, we are losing the diversity in people, institutions and programs that may be key to generating new ideas and wealth. Since institutional diversity is important in stimulating innovation, there was a call for broadening reputational mechanisms such as league tables beyond simply measuring research performance.

Key themes in the session included: the importance to recognize that drivers of innovations come from many different actors, not just universities. The key attraction to company investments in university partnerships are excellent graduates. As the competition for talent and global reputation intensifies, research output has become an even more important index. Finally, as open innovation becomes more common, at the regional level innovation involving a diverse range of partners may be more important than that driven by a specialized centre of excellence.

SESSION 4: INNOVATION STRATEGIES AT THE INSTITUTIONAL LEVEL

Chair: Michel Bénard

Michael Crow: The Research University as Comprehensive Knowledge Enterprise: A Prototype for a New American University

Bernd Huber: The German Excellence Initiative: Changes, Challenges and Chances for German Research Universities

James Duderstadt: New University Paradigms for Technological Innovation
Michel Bénard: Hi-Tech Industry and Universities: A Perspective on Dating for Joint Innovation
Jamil Salmi: The Challenges of Establishing World-Class Research Universities in Developing Countries

The discussion turned to several examples of how institutions — universities, industry, nations — were exploring new approaches to better position educational and research programs to respond to the needs of innovation-driven societies. The lead off discussion concerned the efforts to transform one of the United States' youngest major universities, Arizona State, into a "new American university" paradigm. Taking advantage of its location in Phoenix, one of the most diverse and rapidly growing regions in the nation, the university has not only taken steps to restructure its organization, but even more important, its culture. Included in its objectives were the characteristics of: leveraging its place, transforming society, valuing entrepreneurship, conducting use-inspired research, enabling student success, fusing intellectual discipline, becoming socially embedded and engaging globally.

On a different level and scale, the German Excellence Initiative to achieve focused excellence at world-class levels in a select number of institutions was described. Here, the concerns were the low level of Germany's R&D, currently at only 0.8% of GDP, the need to stimulate a greater commitment to research conducted by German universities, and the desire to introduce competitiveness into the university system in an effort to improve performance. Although Germany has a federal structure similar to the United States and Canada in which universities are primarily dependent upon regional (state, provincial) resources, the federal government has committed a five-year program of $2 B per year to fund grants for graduate education and research to encourage key universities to develop strategies to achieve excellence. Already there are early signs of increasing quality and competitiveness. The German Excellence Initiative was also praised for its effectiveness at relatively low cost, perhaps because it relied upon academics rather than politicians to make the final decisions on centres of research excellence.

Yet, there remain challenges to the program, since it creates tensions within the selected universities among those academic programs and missions benefiting from federal funding and other units. There is also tension at the national level among "haves" and "have-nots" that will likely be exacerbated as excellence funds are removed from some institutions and reallocated to others in the next round. There remain other challenges, such as the large amount of basic research (50%) conducted by independent research institutions (such as Max Planck or Fraunhofer Institutes) compared to that performed in universities, in contrast to the leading role played

by research universities in nations such as the U.S., U.K., Switzerland and Scandinavia.

The discussion then moved to the evolving innovation strategies of industry as companies attempted to cope with the rapid acceleration and globalization of innovation-driven competitiveness. Most high-tech companies have already shifted from concentrating R&D efforts in central corporate laboratories to highly distributed efforts where R&D activities are located in key markets and developing strong relationships with external players including companies (even sometimes competitors) and particularly research universities. However, they face a "Mars vs. Venus" challenge since the research cultures and incentives of universities are quite different from industry. Furthermore, since open innovation strategies frequently involve other players, such as venture capital and investment communities, economic and social innovation can become as important as technological innovation (a theme that was stressed in the first session).

Universities, governments and industry are joining together in efforts to stimulate greater innovation and entrepreneurship in key priority areas such as biomedical research and energy sustainability. Although the flow of knowledge from scientific discovery through development and technological innovation, commercialization and deployment was once thought of as a linear, vertical process, it is now viewed as far more complex, both vertical and horizontal, and involving many interacting disciplines and participants. Traditionally, one thinks of the appropriate activities for each of the key actors in the innovation continuum — namely, government, industry and universities — in terms such as basic research, applied research, development, commercialization and deployment. For example, basic research activities, usually speculative, long term and driven by scientific curiosity, are usually viewed as the proper role of research universities, while use-driven basic research, applied research and development are more commonly roles for government or industrial laboratories. Commercialization and deployment are similarly viewed most appropriate for industry (both established and entrepreneurial).

Yet, there are other types of research important to the innovation continuum. At the earliest stage is *transformative research*, research driven by ideas that stand a reasonable success of radically changing our understanding of an important existing concept or leading to the creation of a new paradigm or field of science. Such research is also characterized by its challenge to the current understanding or its pathway to new frontiers. While it might be assumed that such transformative research would most commonly occur in research universities, ironically the peer pressure of merit review in both grant competition and faculty promotion can discourage such high risk intellectual activities. In fact, transformative research occurs just as frequently in some industrial research laboratories (e.g., Bell Laboratories in the past and Google

Research today) where unusually creative investigators are freed from the burdens of grant seeking or commercial deadlines. At the other end of the innovation continuum is *translational research*, aimed at building the knowledge base necessary to link fundamental scientific discoveries with the technological innovation necessary for the development of new products, processes and services. Recently, the United States has launched a major new research structure for energy research involving new *transformational* research program patterned after the U.S. Department of Defense's Advanced Research Projects Agency (DARPA) known as ARPA-E and funded at an initial level of $400 M/y; funding 46 new Energy Frontier Research Centers on university campuses and national laboratories for small research teams; and creating an initial set of eight "energy innovation hubs" for *translational* research funded at $280 M for the first year.

Yet, all of these efforts are dependent to some degree on the presence of world-class universities and faculty and students of exceptional quality and creativity. Yet, how does one define a world-class university? Apparently every nation wants one. But what is it? How does one create such an institution? By upgrading or merging existing institutions or creating *de novo*? And how does one know when world-class status is achieved? Through popular league tables? Through global competition, à la FC Barcelona? Nations make many common mistakes in attempting to build such institutions, e.g., placing too much focus on building physical campuses, depending too heavily on foreign partners, paying insufficient attention to operational costs and financial sustainability, and perhaps most important, not recognizing that this takes time, regardless of the capacity to commit massive resources.

Additional themes of the discussion included the importance of making major investments in global challenges. Since rankings (league tables) of universities are likely to continue to be used in determining investment strategies, it might be best if universities joined together to better define how they are willing to be measured than simply attempting to reject such rankings altogether.

SESSION 5: PARADIGM SHIFTS

Chair: Charles Vest
Nam Suh: On Innovation Strategies: An Asian Perspective
Dieter Lenzen: BILDUNG and Innovation — a contradictio in adjecto for Today's University Education in a Globalized World.
Gururaj "Desh" Deshpande: Injecting Relevance to Make Innovation More Impactful at Universities
Stuart Feldman: Industry-University Innovation Collaboration
John Seely Brown: Learning in/for a World of Constant Flux: Homo Sapiens, Homo Faber and Homo Ludens Revisited

The session began with the application of a theoretical analysis of innovation to Korea's efforts to build in its Korean Advanced Institute of Science and Technology (KAIST) an Asian counterpart to MIT. It was suggested that the innovation process follows a well-defined continuum of activities, i.e., identifying a need, building a knowledge base through research, creating an idea, demonstrating feasibility, testing commercial viability, finding "angel" investors and then venture capital, hiring talented people, and raising adequate capital. The absence of any step in the process dooms the innovation. Furthermore, the growth of a regional hub of innovation activity involves a balance between the conduct of sufficient activities to nucleate in stable innovation hubs and the rate at which innovative ideas, people and financial resources can move away from a region. A critical feature of successful innovation hubs is the ability to rapidly learn from failure. Examples were provided as to how KAIST was focusing on key themes such as ship building, electric transportation, DRAMS and nuclear power where there was potential for the formation of innovation hubs.

This discussion of a more abstract foundation of innovation was extended to a consideration of the early characteristics of the 19th classical German research university, associated with the Prussian philosopher and minister Wilhelm von Humboldt, who stressed science not only for knowledge's sake but also to serve humanity. Hence, broader forms of pedagogy are necessary beyond the disciplinary canons necessary for creativity and innovation. Thinking outside the box may require other experiences such as greater student involvement in research and/or public service. Yet today, the Bologna process threatens to impose a uniform standard and regulation to all of higher education rather than valuing institutional diversity. While the Bologna process has reduced fragmentation and enabled a general framework that stresses communication and collaboration, some believe it has pushed the goal of a liberal education out of universities because of the disciplinary overload demanded by a three-year baccalaureate program. Perhaps students need more time to explore, experiment and contemplate to develop the capacity for creativity and innovation.

The contrasts and similarities between "eminent innovation" and "universal innovation" were illustrated by contrasting a highly focused innovation program for students and faculty at MIT with the creation of an entrepreneurship ecosystem in India. Both attempted to connect innovation to compelling problems to stimulate the excitement and commitment of young people who in turn are changing the content of teaching and developing their own course materials. New occupations are emerging, particularly in the services economy, for which different graduate schools are needed such as the ability to work both within and across teams and driving social innovation and value.

Yet, the very nature of innovation is changing, in part driven by emerging technologies such as ICT substrates or "clouds", the support of both hardware

and software services through massive cyberinfrastructure installations (e.g., Google, Microsoft, Amazon, Unisys) that not only significantly extend access to state of the art capacity but significantly accelerate the rate of experiment and change. This shifts the "iron" triangle of interaction among universities, industry and governing from "I" shaped (knowing only one area in depth) to "T" shaped (knowing one area in depth along with broad shallow areas) to "pi" shaped (knowing many areas in depth).

In the final presentation, it was suggested that there was a more fundamental epistemological shift occurring from:

- individual → collective
- skills → dispositions and imagination
- explicit → tacit
- stocks → flows
- learning to do → learning to be.

In a rapidly changing world, innovation no longer depends only upon the explicit dimension characterizing conventional content-focused pedagogy focused on "learning to do". Rather, one needs to enable an integration of tacit knowledge with explicit knowledge. Emerging ICT technologies that enable social networking to form learning communities and immersive virtual environments for simulation and play facilitate the "deep tinkering" that provides the tacit knowledge necessary to "learn to be", tools already embraced by the young if not yet the academy. In a sense, learning has become a "culture", in the sense of the Petri dish that is in a state of constant evolution. And just as innovation itself has become more open, accessing ideas and talent on a global basis, the new paradigms of open educational resources (open courseware, library digitization, social networking) have extended both learning and scholarship to a highly interactive global ecosystem of institutions and communities.

A FINAL SESSION: THE GLION DECLARATION — TEN YEARS LATER

This final discussion session began by posing three questions:

1. What are the principal differences in the world of the research university from 1998 to today?
2. What is the audience for a new Declaration similar to that drafted a decade earlier at the first Glion Colloquium?
3. What would be the major themes of such a Declaration?

During the past decade, trends such as increasing populations, environmental impact, global health, poverty and resource depletion have intensified concerns about global sustainability, even as we have transitioned to a knowl-

edge economy increasingly dependent upon educated people and their ideas. The needs for the contributions of universities have intensified. Yet today, there is an increasing tendency to view the university in local economic terms, through utilitarian, reductionist and highly local lenses. We need to look more broadly to identify the themes our institutions should address to serve a global society — or perhaps even better, a civil society. Our institutions need to be challenged to address the grand challenges of the 21st century, with the most urgent among these being global sustainability: sustainable development; resource issues such as energy and food; global poverty and health, policies to sustain stable economic growth; social issues such as urbanization, poverty, health and migration; reducing conflict and terrorism; and the role of government at the nation-state and supra-national level. Our audience should be not only university and government leaders, but also our various constituencies both on campus (faculty, students, staff) and off (industry, NGOs, media, public) and the newly emerging universities throughout the world.

Yet, much of higher education seems deaf to these challenges, as they are to calls for accountability and greater engagement in society. Many nations have succumbed to government efforts to apply uniform policies to all institutions at the expense of diversity, even as the aspirations of most institutions continue be focused on becoming world-class research universities. This combination of eroding autonomy and uniformity is disturbing since more diversity in both the nature of institutions and how they serve society will be needed to address the challenges of the next several decades. Both universities and their patrons seem at times to be deaf to calls for accountability and unresponsive to the need for deeper engagement with society.

There are major challenges facing today's universities, some familiar, such as the issue of the cost, price and value of a college education, the need for a better balance between institutional autonomy and accountability, and the importance of institutional diversity. But there are also new challenges: the implications for both students and institutions of the need for lifelong learning, the globalization of higher education, and the appearance of new learning paradigms enabled by powerful technologies enabling social networking (Facebook, Twitter), immersive environments (Second Life), and "open" learning (OpenCourseware, Google's Book Scan). In fact, it was suggested in discussions that it was time to move beyond the language of a decade ago when one talked of higher education as a "system" and instead view our institutions as just one species in a continually evolving "ecosystem" or "ecology" of learning, from cradle to grave, both in learning institutions and beyond, through life experiences.

During a time when universities tend to be viewed through utilitarian, reductionist and economic lenses, we need to be challenged to look more

broadly at our institutions and their roles. We need especially to examine learning environments in a new way. Learning is no longer confined to school. In fact, to paraphrase a well-known statement: "It takes a village to educate a child." One of the most important themes emerging from the past decade of Glion conferences has been the importance of innovation in the rapidly evolving ecosystem of higher education.