PREFACE

In June 2009, university and industry leaders from around the world gathered in Glion-above-Montreux, Switzerland, at the VII Glion Colloquium to consider the role of research universities in an innovation-driven, global society. Launched in 1998 by Professors Luc Weber (University of Geneva) and Werner Hirsch (University of California), the Glion Colloquium brings together university leaders to discuss the future of higher education, frequently joined by leaders from business, foundations and government. Topics have included the rapidly changing nature of research universities, university governance, the interaction between universities and society, collaboration between universities and business, and the globalization of higher education. The papers presented and associated discussions at each colloquium are subsequently compiled in a book available through publishers or downloadable in full-text format on the Glion Colloquium website at http://www.glion.org.

The context for the VII Glion Colloquium is an era in which educated people, the knowledge they produce and the innovation and entrepreneurial skills they possess have become the keys to economic prosperity, public health, national security and social well-being. In particular, leadership in innovation — the transformation of knowledge into products, processes and services — has become critical to economic competitiveness, long-term productivity growth, the generation of wealth and global sustainability. Of course, innovation is more than simply new technology. It also includes economic innovation in integrating and managing business processes, products

and services, and social innovation in formulating effective public policies and actions that broadly benefit society.

Whether in the "old world" of Europe and North America or in rapidly developing economies in Asia, Latin America and the Middle East, the message is clear: innovation has become the key to prosperity and social well-being in a hypercompetitive, global, knowledge-driven economy. The core competency of a business, a region or a nation in the early 21st century has become its capacity to innovate. While characteristics such as population diversity, democratic values, free-market practices and a rational and predictable legal system provide a fertile environment for innovation, history has shown that significant public and private investment is necessary to produce the key ingredients of innovation: new knowledge (research), world-class human capital (education), infrastructure (institutions, facilities, networks) and supportive policies (tax, investment, intellectual property).

Today's intensely competitive global economy requires not only leadership in innovation, but also educated citizens capable of applying technology, talent and capital in new ways, with deep analytical skills and the ability to manage ambiguity. Institutions of higher learning must collaborate with industry and government to create a climate and culture that enable innovation to thrive. Here, part of the challenge is the changing nature of innovation itself. It is far more open; it spans virtually all disciplines; and it is increasingly global. And it arises not only in the laboratory and the classroom, but also in the marketplace, the workplace and the community. It requires the development of new academic disciplines, increasingly interdisciplinary research and instruction across the traditional disciplines, and continual learning opportunities to keep abreast of the fast-changing, dynamic nature of work.

Not only is this a challenge to our universities to provide the new knowledge and broadly educate the graduates necessary for innovation, but it also demands that higher education develop and demonstrate the capacity for continuous innovation and quality improvement at both the institutional and enterprise level. Clearly, sustaining a nation's leadership in innovation will require institutions of higher learning capable of embracing innovation in pedagogy, scholarship and organization as key, both to their quality and capacity to serve the changing needs of our society. In fact, innovation in all its forms (technological, organizational, social, financial) will also be of great importance to the university itself as an institution and higher education as a system to respond effectively to the needs of a rapidly changing world.

The VII Glion Colloquium brought university leaders and colleagues from business and industry together with experts on innovation to consider ways that universities can best contribute to an innovation-driven, global economy. This book contains the proceedings from the colloquium, along with summaries of the discussions occurring in each session.

The first session laid the foundation for the colloquium by introducing the importance of innovation in several guises — technological, economic, political and social. The current economic crisis demonstrates that the dynamic nature of innovation-driven economies raises serious challenges to sustainability of growth as the explosion of new knowledge and innovation not only creates new wealth, but also disrupts existing social structures — communities, companies and governments (Weber). New forms of economic and social organizations and practices are evolving that tap human talent on a global scale, so-called "open innovation", and merge competition and cooperation in shaping institutional relationships (Vest). As knowledge becomes more complex, it not only evolves beyond traditional economic disciplines such as science, technology, finance and management, but also encompasses humanities, the arts and social sciences as it extends benefits beyond individuals to social communities (Hazelkorn).

This broader perspective was illustrated in the second session concerned with the various agents of innovation. Chameau provided examples of how individuals of great intellectual span and creativity were frequently the source of new economic activity such as spinoff companies and even entirely new economic sectors. Organizations have also evolved to reflect both the breadth and depth of the knowledge base required for innovation, from the large corporate R&D laboratories of the 1950s such as Bell Labs to today's organizations tapping the triple helix of industry, government and research universities (Johnson). Van Vught reviewed the diverse roles and approaches of governments and local authorities, whether at the national or regional level, to promote or drive innovation, suggesting the importance of information feedback to reshape a policy learning and adaptation process.

The third session brought together university leaders from both long-established (Winckler, Eichler, Munroe-Blum) and newly emerging institutions (Andersson, Ulaby, Al Hammadi and de la Fuente) to compare and contrast how regional and institutional characteristics shape innovation strategies. Although international efforts, such as the Lisbon Agenda in Europe, can facilitate collaboration and standardization, it was stressed that innovation strategies are best addressed at the national and institutional level. The Canadian experience illustrated the need for nations characterized by high quality educational systems to build the infrastructure, such as national research foundations, necessary to stimulate and sustain innovation and entrepreneurial activities. Singapore, Saudi Arabia and Abu Dhabi provided examples of how rapidly nations capable of focusing sufficient resources were attempting to build world-class universities, not only as sources of innovation, but also as change agents in their own societies. Yet, de la Fuente noted that nations characterized by rapidly growing populations, high social diversity and income inequality such as those in Latin America would, of necessity, take a more bal-

anced approach to the dual challenges of expanding educational opportunity while achieving the high quality research programs necessary to drive innovation.

The emerging role of innovation in achieving economic prosperity, national security and social well-being in stimulating new approaches at both the national and institution level was the topic of the fourth session. Crow described the effort to transform one of the United States' youngest universities, Arizona State, into "a new American university", based upon a highly entrepreneurial approach to social responsiveness, global engagement and use-inspired research. Huber reviewed Germany's effort to focus substantial resources to elevate a limited number of its universities to world-class research status as key to economic innovation. Duderstadt discussed a similar national approach in the United States to create a number of translational research centres to address the nation's energy challenges — so-called "energy innovation hubs" — capable of linking fundamental scientific discovery with the applied research and development necessary for technological innovation and economic impact. Such institutional and national strategies were of particular importance as high-tech industry increasingly shifted to open innovation strategies, developing partnerships with both universities and other companies on a global scale to address particular technology challenges rather than investing primarily in internal R&D ventures (Bénard). Salmi concluded the session with a broad discussion of the challenges of creating world-class universities, including the provocative subject of just how one knows when it has been achieved, beyond simply using league tables, a subject stimulating a particularly vigorous discussion!

The last session addressed the deeper intellectual character of innovation and its relationship to the academic mission of the university. Nam Suh proposed a thermodynamic model of innovation in which the key to regional competitiveness was the balance between the formation of nucleation sites for innovation and the rate of knowledge diffusion. Lenzen returned to the early ideas of Humboldt in creating the 19th century research university, in which scholarship was not only conducted for knowledge's sake but also to benefit humanity, to suggest a broader, more diverse and flexible academic framework capable of stimulating creativity. Deshpande demonstrated how innovative organizations could be created both in technology-intensive environments such as MIT and in entrepreneurial ecosystems such as India. Brown suggested that the power of emerging information and communication technologies, coupled with the new forms of social networking and learning of the young, was driving an epistemological shift that integrated tacit and explicit knowledge, from "learning to do" to "learning to be" to "learning to become".

Frank Rhodes contributed the "alpha and the omega" for the colloquium: he first provided the introductory presentation to review the past decade

spanned by the Glion Colloquia. Then, very much in the spirit of the Glion Declaration drafted in 1998 following the first colloquium, he led the effort to draft a new Glion Declaration addressing the role of the university in meeting the challenge of global sustainability, drawing on discussions at the VII Glion Colloquium. This declaration, endorsed by the colloquium participants, has been included in the final chapter of this book and will be distributed more broadly as a separate document.

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