

The MIT-Greater China Strategy:

Report to the President and Provost of the Massachusetts Institute of Technology

August, 2010

Prepared by the MIT Greater China Strategy Working Group
with the Office of Global Initiatives



MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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A MESSAGE FROM THE CHAIR

Dear President Hockfield and Provost Reif:

During the last two years the MIT Greater China Strategy Working Group (GCSWG) met more than twenty times to explore China-related activities at MIT and at our peer institutions, brainstorm new ideas, discuss the capabilities of Chinese peer institutions, and develop the recommendations presented in this document¹. In the pages that follow, the MIT Greater China Working Group outlines a proposed twenty-year strategy for the Institute's China-related engagements — without losing sight of MIT's ability to continue to make a bold, short-term impact in the region.

In addition to our conversations as a group, we also shared our strategy with Chinese leaders on campus and in China, with leading alumni and friends, and with potential partners in industry. In all, members of our group made more than fifteen person-trips to China, Hong Kong and Taiwan to explore the future of the MIT-China relationship.

This process generated considerable excitement around the world and cultivated important relationships with individuals, foundations and industry. For instance, one measure of this success is raising nearly \$10M to seed the MIT Greater China Strategy. This momentum allowed the Working Group to launch the highly successful MIT-China Forum, establish the Quanta Professorship in Chinese Studies, and introduce the MIT-China Innovation Fund to spark new, global research collaborations.

With the submission of the recommendations that follow, the MIT GCSWG completes its appointed task. But we hope that you will join us in sustaining the momentum behind one of MIT's most significant global partnerships. To capture the possibilities ahead, MIT will need to appoint faculty leadership to galvanize campus stakeholders and execute the strategic recommendations. Therefore, with the submission of this report, we respectfully request your vision and support to sustain this fruitful and important partnership for years to come.

On behalf of the MIT GCSWG, I hereby present our recommendations for a strategy to enhance MIT's presence in China.

Respectfully,

Victor Zue

¹ For a complete list of Working Group members, see Appendix V.

EXECUTIVE SUMMARY

China is very important to MIT's future. The phenomenal growth in this region of the world – economically, technologically, and politically – means that our graduates are increasingly asked to work with people in China, or even to work in China. China also offers some of the most challenging problems, whose solutions may be different from those in the Western world. Furthermore, the Institute continues to attract the best talent from China today. Chinese students currently comprise the largest foreign student body at MIT, both for graduates and undergraduates, and the estimated number of Chinese research staff is equally significant. In short, China offers some of the most interesting problems, ones that require the best minds and the most creative solutions. We must prepare our students and faculty for the increasingly connected world in which China plays an ever more prominent role.

MIT has a long history of engaging China that dates back more than 130 years. Since then, many of our faculty, students, alumni and alumnae have worked on various China-related projects in Cambridge and abroad. These projects share a set of common characteristics. First, they embrace MIT's hallmark of combining mind and hand – “Mens et Manus” – in the understanding and resolution of the great, practical challenges of our time. Second, many of the projects tend to be broad and multi-disciplinary, spanning the boundaries of the natural sciences, the social sciences, engineering, and the humanities, reflecting our belief that these challenges involve the interaction of science, technology, public policy, commerce, societal preferences, and individual human behavior. Third, these projects typically include a component of students and researchers working on the ground, in China, since to be truly “of this world,” we have to be fully engaged in China-related activities.

It is important to note that Hong Kong and Taiwan feature prominently in the Greater China Strategy, as well. Home to two of the largest bodies of MIT alumni outside of the United States, Hong Kong and Taiwan have provided MIT

with individuals who have been involved at the highest levels of the Institute leadership, industry partners that have collaborated in path-breaking research and education, and catalytic financial support to develop and sustain MIT's on-campus Chinese presence.

The Greater China Strategy Working Group, having explored various China-related activities at MIT and our peer institutions, makes the following set of recommendations:

Recommendations:

1. MIT should take steps to **increase awareness of China on campus**, and to increase China's awareness of MIT.
2. MIT should **prepare students for increasingly global careers** – ones that may involve working with peers in China.
3. MIT should **promote collaborations** between our faculty, researcher staff, students and their Chinese counterparts.
4. MIT should consider **establishing a few special relationships with Chinese academic institutions**.
5. MIT should **consider establishing an MIT-China Innovation Hub** that links research, education and innovation.
6. MIT should **develop executive education-style training programs** for governmental officials, educators and researchers in science, technology, and innovation, as well as business practitioners.
7. MIT should **establish a resource development effort** to support the implementation of its China Strategy.

THE RISE OF CHINA

The People's Republic of China has become a formidable power. The rise of this nation, a nation born not from within but outside the established post-World War II international order, signals the end of a Western-oriented era and the onset of an Asian-centered one. This shift will be one of the great dramas of the twenty-first century, a drama that began, at least symbolically, with China's grand ascendance onto the world stage as the host of the 2008 summer Olympics. Some argue that because this rise necessitates the end of a unipolar U.S. era, it will lead to tension and distrust between China and the West. However, this power shift is much less about the end of American influence and more about "the rise of the rest." In other words, America's leadership was instrumental in helping to set up an open, integrated, and rules-based international system that creates prosperity and opportunities. We should expect to live in a world where people will want to emulate and join us.

Indeed, China's state power is ultimately based on continued industrialization and sustained economic growth — processes that helped the U.S. on its own path to global wealth and power — and China's leadership is well aware that no nation can modernize in isolation. As China becomes much more of a stakeholder in such issues as trade, diplomacy, scientific development, manufacturing, and education, the Chinese have been seeking partners who can integrate the People's Republic into key global systems.

China is shedding its developing nation status, and there is a once-in-a-century opportunity for MIT to serve as one of China's valuable partners in scientific, economic, and educational development in the ten to twenty year horizon. These opportunities are both enormous and unprecedented. For instance:

- China spends over \$136 billion on research and development alone, making it the second highest investor in R&D in the world. During the last decade, China's R&D intensity has doubled.
- The number of scientific researchers in China has increased by 77% in just ten years. The scale of its research force, about 926,000 researchers, makes it a significant talent hub.
- China is beginning to adopt national policy frameworks that encourage global research collaborations, which could mean focusing less on inward investment and more on innovation systems.

While the above clearly illustrate China's impressive commitment to scientific development, a sizeable intellectual talent hub, and an environment ripe for discovery, China also offers unique research opportunities for MIT students and faculty who wish to problem-solve and "engineer at scale." China is vast, complex, and diverse. It boasts unique educational and legal systems, 14 major dialects, and over 8,000 distinct counties on the mainland alone. Whether in infrastructure, energy and the environment, transportation and logistics, neuroscience, economics, or medicine and the life sciences, China is where some of the most interesting problems will be, and where some of the best answers will come from. China is arguably the most important international partner in MIT's future. From the standpoint of education, the phenomenal growth in this region of the world – economically, technologically, and politically – means that our graduates are increasingly asked to work with people in China, or even to work in China. In addition to attracting the best students from China, from the standpoint of research, China has to be part of the solution for many key global problems such as energy, resource sustainability, and public health. Increasingly, new-to-the-world innovations, from ultra-high voltage transmission in the power grid, high-strength, lightweight aluminum in skyscrapers to pebble bed (high temperature) nuclear reactors and a myriad of examples in cell phones, are being

deployed for the first time in China. China also offers some of the most challenging problems, whose solutions may be different from those in the Western world. For MIT to remain a leader in global problem solving, we need to engage deeply with China.

Getting our China strategy right is a matter of urgency. MIT is perceived to be lagging our peers, despite the breadth of substantive activities being pursued across the Institute.² This perception is partly due to the fact that some of our innovative efforts in China tend to be relatively small in scale and fragmented, which makes it hard to capture the attention of donors, the media, and potential stakeholders within China. In contrast, our peers are conducting high-profile, attention-grabbing activities that we are not – establishing research centers in China, or creating China-based training programs for government officials, university administrators, and business executives. We believe MIT now needs a large-scale unifying project, a key initiative that can at once put us on the map, serve as a magnet for China-focused donors, organize our existing China-related activities, and serve as a platform for building future activities.

² See Appendices I, II, and III for a list of selected stakeholders in our China-related activities, faculty with research interest in China, and MIT's China-related activities, respectively.

A SHARED HISTORY OF INNOVATION

MIT and China are old friends. Our connections date back to the Qing dynasty, when scholars were sent to the U.S. “to learn modern scientific methods for the benefit of the Chinese government.” These students, “The Chinese 100,” were part of a greater education movement adopted by the Chinese government. Many of these scholars came to MIT in 1876 from as far away as Guangzhou, Xiamen, Macau, and Shanghai. They studied mathematics, mining, chemistry, and mechanical engineering, and launched a partnership that continues more than a century later.

First Steps Forward

Just a few short years after the members of the Chinese 100 returned home to serve their government, two Chinese students, Tsok Kai Tse and Ching Yu Wen, became the first Chinese graduates of MIT. Their chosen course of study was mining engineering, an education that proved useful throughout the illustrious careers that they enjoyed in both the private and public sectors. Shortly thereafter, MIT alumni groups appeared in Hong Kong and on the mainland, and at their invitation, MIT scholars visited China. In 1910, the Institute sent a small group of mining engineers to help make China’s mining industry safer and more efficient. Then, in 1920, MIT trained one of China’s chief railroad engineers, Kwong King Young, who helped lead the development of three major railroads in China. In 1931, John Ripley Freedman led the first field project between China and MIT, which was to improve navigation and flood management on the Hwai and Yellow Rivers — a major feat of engineering that helped save numerous human lives.

Mid-Century: An Equal Exchange

MIT has benefitted tremendously from the imagination and ingenuity of Chinese scientists and scholars. By mid-century, their talents directly benefitted MIT. In 1931, Professor Norbert Wiener left Cambridge to spend a year at Tsinghua University in Beijing to help the mathematics department modernize its curriculum. With him was Yuk Wing Lee, a newly minted MIT doctorate from China. During their time abroad, the two completed groundbreaking research in electric networks, the foundation for modern cybernetics. Lee's accomplishments ultimately led him back to the Institute as a visiting professor, and then as a full professor in 1960, where he received several awards for his advances in statistical communications theory.

Lee was joined by his contemporaries Qian Xuesen and Xie Xide. Qian Xuesen is described as the “father of rocket science” in China. Like Lee, Qian came to the Institute as a graduate student in the 1940s, completing his master's degree in 1946. His doctorate soon followed, and Qian's “brilliant mind,” earned him a place in MIT history as the Institute's youngest full professor. Qian became a co-founder of the NASA Jet Propulsion Laboratory, which ultimately led him to the California Institute of Technology before returning home to China, where he established the Chinese space program. The eminent Xie Xide, meanwhile, began her career as a leading researcher in semiconductor physics when she received her Ph.D. from MIT in 1951. Xie would later return to China to become the first woman to head a major Chinese university, author several influential publications and textbooks, and found the Center for American Studies at Fudan University, where she continued to foster global academic collaborations between MIT and China.

In 1956, famed political scientist and China expert Lucian Pye became an MIT faculty member, where he advised John F. Kennedy and Henry Jackson on East Asia policy issues. Pye, like so many on the MIT campus, was inspired by the momentum behind the MIT-China relationship. Pye observed that this momentum permeated not only the Engineering School and the School of

Science, but also the departments of Economics and Political Science, a shift evidenced by visits from the Chinese Academies of Sciences and the Chinese Academy of Social Sciences in the 1960s. Shortly thereafter, U.S. President Richard Nixon made his historic state visit to China, where he and Chinese Premier Zhou Enlai urged the American and Chinese to cooperate on key global challenges. They issued a call to MIT alumnus Ren Zhigong to lead eight "groundbreaking" delegations of Chinese and American scientists to China in 1972. By 1983, MIT and China were collaborating on the World Coal Report. In 1985 they turned their attention to urban planning issues, which culminated in the establishment of the Beijing Urban Design Studio, a joint program between the schools of Architecture and Planning at MIT and at Tsinghua University. Nearly 400 students and faculty have participated, making it one of the most enduring scholarly programs between the U.S. and China today.

In 1990, twenty leading companies from a range of industries in Taiwan established the Epoch Foundation, which aimed to bring Sloan's management savvy to major Taiwanese industries. Epoch has since promoted growth by focusing research on Taiwan's industrial and economic issues, regional economic cooperation, and the region's economic outlook. Together, industry partners and individuals have given MIT nearly US \$90M since the launch of the foundation.

The Industrial Performance Center received a major grant from a consortium of industrial, trade and government organizations in Hong Kong in 1996 to conduct a one-year study of the role of industry in the future development of the Hong Kong economy. The project, entitled *Made By Hong Kong*, provided an understanding of how a society with a strong manufacturing past can develop new strengths and new activities; how industries operating in the larger China region can utilize the advantages presented by the proximity of a large market, low-cost labor, and access to emergent strengths in advanced technology; and how economic capabilities, employment, and social well-being can be maintained even as many of society's production facilities move outside domestic territory. In 1997 the *Made By Hong Kong* book was a best-seller in Hong Kong.

MIT and China Today

Over the past two decades, there have been an increasing number of China-related activities carried out at MIT and in China. These encompass education and research across all five schools, with participation of faculty, researcher staff, and students. Appendix I includes a selected number of such activities.

MIT's China-related programs have been varied, but precisely because they have emerged from a common institutional culture and uniquely MIT spirit of entrepreneurship, they share certain common characteristics. First, they reflect the view that MIT, throughout its existence, has been dedicated to solving the great problems facing humankind. MIT is committed to producing leading academic research. Yet, regardless of whether that research is theoretical or applied, we believe that research must be “of this world,” somehow connected to the understanding and resolutions of the great practical challenges of our time. This belief is unique to the MIT approach, and the Greater China Strategy Working Group believes that future engagements ought to bring this value to the forefront of a centralized approach.

Second, we believe that the great challenges of our era must involve the interaction of science, technology, public policy, commerce, societal preferences, and individual human behavior. The best research, therefore, must almost by definition be broad and multi-disciplinary, spanning the boundaries of the natural sciences, the social sciences, engineering, and the humanities. Third, we believe that the great challenges of our era are global in nature. They often involve activity taking place in a variety of different national locales, settings with their own unique cultures and societal institutions. Moreover, we are now witnessing new-to-the-world innovations being rolled out for the first time in places like China rather than the U.S., Japan, or Western Europe. If we are going to be involved in the resolution of global problems — whether sustainable cities, climate change, resource depletion, disease control, or any other — we have to be able to understand and engage partners in China. Furthermore, to the extent that we remain involved in the roll-out of new technological innovations, we are more

likely than not going to have to do at least some of our work in China, with Chinese counterparts, and in the context of Chinese social institutions. In short, as we have known for at least 15 years, and as our record of engagement suggests, to be truly “of this world,” we have to be engaged in China-related activities.

Those activities to date reflect more than just an MIT-wide collective sense of mission. They reflect a common educational philosophy. We believe that our research and educational endeavors are inseparable and together they form the foundation of the culture of innovation that has become synonymous with MIT. We are committed to continually reshaping our classroom curricula to reflect the most recent research findings. We are also committed to exposing students, undergraduate and post-graduate, to the activity and process of research. Just as our research is based on the relationship of “mind and hand,” so too is our teaching. Students should not, and indeed cannot, just be passive learners. They must be actively engaged in the issues they are studying. Finally, as noted above, we are committed to the idea that understanding and working in global settings – particularly China – is crucial not only to our research, but also to our teaching. If we are going to train not only the best scientists and engineers of tomorrow, but also the best global leaders, we have to expose our students to an international education. That exposure cannot only happen in the classroom. Rather, it must happen in the global setting itself, and it must happen through active, experiential learning rather than through passive study in the classroom.

PROPOSED GUIDING PRINCIPLES

China is different from all the global partners with which MIT has established collaboration over the years such as Portugal, Singapore, and Abu Dhabi. This is largely due to China's sheer size and its rapid rate of development. As stated earlier, China is important to the future of MIT from the standpoints of talent development and global problem solving. Engaging with China will achieve greater impact than with any other country, although such impact may not be felt immediately. *Therefore, we must develop a sustainable China engagement strategy and invest in the relationship for long-term impact.*

Today, China remains less developed than the U.S., although China is gaining rapidly on many fronts. By all measures, top universities in China are still quite behind world-class universities such as MIT. However, the Chinese government is making unprecedented investments in education, especially in science and technology. Given this investment, coupled with China's vast talent pool, it is only a matter of time before some of the top Chinese universities become globally competitive. *MIT should engage with China's leading institutions now and treat them as equal partners, demonstrating our willingness to help and to learn, and making multilateral decisions that benefit both sides. An important element of success will be to position MIT as engaging with China in support of China and not simply as another player in the Chinese market.*

China today approaches institutions such as MIT as a peer and seeks to engage in equal partnerships that will help Chinese universities and research centers improve and grow. China's confidence may be relatively new, but it is an important factor when considering the creation of large-scale, high profile, and high-value collaborations. If the relationship is considered to mutually beneficial, it is reasonable to believe that over the long term the Chinese government or indigenous industry will provide funding to MIT for projects, similar to collaborations in other countries. However, substantial funding from China, at least in the near term, is unlikely. *Therefore, MIT's China strategy must be driven by*

faculty stakeholders who have reasons to sustain the mutual, long-term commitments that China seeks.

Finally, the MIT strategy for China is closely coupled with its long and successful collaborations with Hong Kong and Taiwan, two of the largest alumni bodies outside of the United States and sources of significant private philanthropic support, sponsored research, and academic collaborations over the last twenty years. Alumni, friends, and industry partners in these regions have shown a deep interest in supporting MIT's activities in China, partly because of their shared history and culture, and partly as a means of strengthening their own relationships with China and in supporting its growth and advancement. In building our relationship with Greater China, MIT must remain appreciative of their remarkable generosity while maintaining sensitivity to the political and geopolitical realities of the region.

CAPTURING THE OPPORTUNITIES AHEAD

MIT and China have had a deep and sustained relationship for more than a century. In the coming decades, we can safely assume that the number of Chinese students and scholars will increase, that our students and faculty will grow increasingly curious about China, and that the careers of many of our faculty and students will involve working with China to tackle significant societal problems together. To that end, the MIT Greater China Strategy Working Group makes the following set of recommendations.³

1. MIT should take steps to **increase awareness of China on campus**, and to **increase China's awareness of MIT**.

As mentioned earlier, many China-related educational and research activities already exist, and yet these activities are not as well known as those at our peer institutions. To increase visibility, MIT must create a communication strategy to broaden public awareness of these activities. We recommend that we establish a China-specific web presence, which will serve as a repository for China-related educational and research activities and opportunities. The web site can become a clearinghouse of information for our students to seek internship opportunities in China. It can also serve as a major source of information for Chinese students, scholars, industry, MIT alumni, and the media to learn about MIT's China activities.

In addition, we recommend that we establish an Institute-level forum in order to raise awareness of China on campus. We will invite prominent guests from government, academic, and industrial sectors, as well as prominent members of the media, to visit MIT. They will give public lectures on topics of

³ Throughout our period of deliberation, we have kept President Hockfield, Provost Reif, and senior members of their administration abreast of our activities, and we have made modest progress in the implementation of some of our recommendations, which are summarized in this section of the report.

general interest, meet with senior officials, and conduct round table discussions comparing and contrasting Chinese and western methodologies, approaches and problems. This forum will serve as a convening point for our faculty and students, with regard to the shaping of our China Strategy, and will extend MIT's reach in China.

Similarly, we recommend that MIT create an annual or biennial conference in China. This will give us the opportunity to highlight Institute-wide research accomplishments, promote cross-Pacific research collaborations on pressing problems, and inform and engage our growing body of alumni and alumnae. We also recommend that our president or members of the senior administration make regular visits to China to meet with academic leaders and government officials as signs of MIT's commitment to China.

Progress to Date:

- The Global MIT Web site has been revised to include a China-specific portal to highlight the many MIT China programs and accomplishments.
- The MIT China Forum was launched in 2008 to bring leading industrialists, scholars and government officials to campus on a quarterly basis. Our guests have included the Chinese Ambassador to the United States, the President of the Chinese Academy of Engineering, Dean of the School of Management and Economics, Tsinghua University, and many others⁴.
- In June 2010, President Hockfield led a delegation of faculty to China to visit Tsinghua University, Peking University, and Shanghai Jiao Tong University to explore avenues of collaboration. The delegation also met with government officials and alumni in Beijing, Shanghai, Hong Kong, and Taiwan.

⁴ See URL for a complete list of speakers: <http://global.mit.edu/initiatives/china/china-forum/>

2. MIT should **prepare students for increasingly global careers** – ones that may involve working with peers in China.

China is already a part of the intellectual life of students and faculty on campus measured in terms of the composition of our study body and the increasing number of educational, research and social activities. China represents a place where new problems are being posed, solutions are being sought, and opportunities constantly presented. We must take concrete steps to prepare our students for the increasing need for them to work in China or with people in China. For example, our students will be significantly disadvantaged by not being able to communicate competently in Mandarin Chinese – an increasingly important language for global interactions. We recommend that the Institute bolster its curriculum on China related studies. We need formal coursework in advanced Mandarin language studies, as well as in Chinese art and culture, history, politics, and media. Over the next five years, MIT must make significant commitments to expanding Chinese Language and Cultural Studies, rather than relying on neighboring universities to fill the void. We should offer Chinese language courses for at least as many years as we do any other foreign language.

In addition, we recommend that the Institute increase the opportunities for students to travel to China as part of their educational pursuit. At the moment, the MISTI program only has the capacity to send about 50 students to Greater China each year for international service, learning, and work experience. A worthy goal would be to quadruple the number to 200 within the next five years. In addition to sending our students to cities, MIT may want to work with rural townships and villages to create opportunities for our students to introduce courseware and technologies, as well as to promote social entrepreneurship.

Progress to Date:

- The Quanta Professorship in Chinese culture has been established.
 - The Chinese Scholarship Council has established a scholarship for at least one MIT student to study at a leading Chinese university at no expense.
3. MIT should **promote collaborations** between our faculty, researcher staff, students and their Chinese counterparts.

China and the United States differ in many respects, from social and cultural norms to political systems and technological solutions. For example, over 40% of Chinese users access the web through their cell phone, instead of relying on a PC the way most US users do. These vast differences, together with the emergence of high quality researchers in China, offer us the unique opportunity to tackle problems facing the world jointly based on different needs and from different perspectives. It is important for MIT to invest in our knowledge base so that we have a better understanding of these basic social, political and economic issues in China.

We recommend that the Institute help create opportunities for our faculty and research staff to work with their Chinese counterparts. Adopting the MIT Sloan School of Management's very successful MIT-China Management Education Program model, we should provide incentives for our faculty from other schools to host Chinese faculty to spend time at MIT, so that they can observe how courses are being taught at MIT and localize them upon return to China. Recognizing some of the important differences between China and the United States (for example, in the area of government decision making), MIT should also create mechanisms to reach out to and develop ties with key decision makers in China.

Furthermore, MIT should develop mechanisms to promote and fund faculty-led collaborations with Chinese partners to expand the number of faculty

engaged in China and to seed research collaborations, support extended faculty visits to China, as well as visits of our Chinese collaborators. By providing a competitive funding source, and requiring joint proposals, lasting partnerships between institutions and nations will result.

Progress to Date:

- A pilot version of the Empowering the Teacher Program has started in the Department of Electrical Engineering and Computer Science, with one faculty each from Fudan University and the Hong Kong University of Science and Technology
- The MIT China Innovation Fund has been established with a gift of \$2M toward a goal of \$20M.

4. MIT should consider **establishing a few special relationships with Chinese academic institutions.**

China is a vast country with thousands of universities and millions of students. It is clearly not possible for us to have deep and meaningful relationship with more than a handful of universities. We recommend that MIT explore the possibility of establishing special relationships with a handful of leading universities. However, these relationships must be faculty driven in order to be successful.

Progress to Date:

- A collaboration between MIT, Tsinghua University, and the University of Cambridge in the area of low carbon energy research was established in October 2009. The Alliance will advance collaborative projects in carbon capture and sequestration, nuclear power, efficient buildings, biomass, and heat management.

- In June 2010, President Hockfield signed an agreement establishing a Joint Center for Theoretical Computer Science among Tsinghua University, MIT, and the Chinese University of Hong Kong (CUHK). The activities will include student exchanges and joint research projects.

5. MIT should **consider establishing an MIT-China Innovation Hub** that links research, education and innovation.

As mentioned previously, we believe MIT now needs a large-scale unifying project, a key initiative that can at once put us on the map, organize our existing China-related activities, and serve as a magnet for China-focused donors and as a platform for building future activities. We recommend that MIT conduct a feasibility study on the concept of how an MIT-China Innovation Hub to support China-specific innovative activities in educational and research activities could be conceived, structured, implemented, and sustained. The concept of the Innovation Hub is further elaborated in Appendix IV.

6. MIT should **develop executive education style training programs** for governmental officials, educators and researchers in science, technology, and innovation, as well as business practitioners.

The Working Group proposed that MIT explore the establishment of a collaboration to provide leaders across a variety of sectors with an opportunity to update their skills and to expand their knowledge of science, technology and innovation by engaging in an in-depth program with MIT experts in a variety of areas of mutual interest including energy, water resources, information technology, biotechnology, etc. Training programs present an opportunity to build awareness about MIT within the government leadership (especially early in the careers of rising leaders) and across other strategically

important sectors, and would be understood within China as benefitting key domestic constituencies.

One model is a multi-day workshop to be held on the MIT campus. All courses would be taught by MIT faculty or industry experts, and will include formal presentations, panel discussions, case studies, tours, and guest speakers. Small class sizes would promote close interaction between faculty and attendees, encouraging lively exchanges on current topics. Simultaneous translation of lectures and conversations would be provided as needed. In addition, on-site customized versions of the program may be available to be held in China.

Progress to Date:

- In August 2009 the Li Ka-Shing Foundation funded 25 Chinese leaders to attend a short-course on innovation, led by the School of Engineering Professional Education Program.
- In June 2010, President Hockfield signed an agreement with Shanghai Jiao Tong University to develop and teach an executive education course in energy. The seven-day course will be offered multiple times annually at MIT for three years, under the auspices of the MIT Energy Initiative (MITEI).

7. MIT should **establish a resource development effort** to support the implementation of its China Strategy.

Our report offers an ambitious strategy for engagement with China.

To implement this strategy, funding is critical. We recommend that the administration establish support for the Institute's China Strategy as a resource development priority area.

Many corporations in China are State-owned enterprises (SOEs), whose needs, governing laws and operating processes are different from those of traditional companies. We recommend that the Industrial Liaison Program (ILP),

in conjunction with interested faculty, create a new model of engagement with these entities, and provide customized services to meet their needs.

Progress to Date:

- Nearly \$10M in private philanthropic support has been raised toward the MIT Greater China strategy.
- Haier Group just became the first company from China to join the MIT Industry Liaison Program.

APPENDIX I

Select Institutional Stakeholders in the MIT-China Relationship

Following is a partial list of offices, programs, and opportunities that are stakeholders in the emerging MIT-China strategy. The list highlights the need to position the Institutes distributed activities with China centrally, in a way that is able to leverage, support, align, and cooperate with academic and co-curricular activities with our partners abroad:

\$1K House	Leaders for Global Operations
Jameel Abdul Latif Poverty Action Lab	Legatum Center for Development & Entrepreneurship
Alumni Association	McGovern Institute for Brain Science
Careers Office	MIT Center for Real Estate
Center for International Studies	MIT China Forum
China Center for Financial Research	MIT China Management Education Project
China Development Initiative	MIT Energy Initiative (MITEI)
China Educational Technology Initiative	MIT Global Council
China Lab	MIT International Science and Technology Initiatives
China Planning Network	MIT Sloan China Management Education Project
D-Lab	MIT-Tsinghua Low Carbon Alliance
Division of Student Life	Novartis-MIT Center for Continuous Manufacturing
EECS VI-A International Program	Office of the Chancellor
G-Lab	Office of the Dean for Graduate Education
Hyperstudio	Office of the Dean for Undergraduate Education
IDEAS Competition	Office of the Deans for each school
Independent Activities Period	Office of the Provost
Industrial Liaison Program	OpenCourseWare
Industrial Performance Center	Public Service Center
Infectious Diseases Research Laboratory	Singapore-MIT Alliance for Research and Technology
International Advisory Committee	T-Party
International Development Initiative	Teaching and Learning Laboratory
International Research Opportunities	Technology and Culture Forum
International Students Office	Tsinghua-MIT Modular Pebble Bed Reactor
Languages and Literature Section	Urban Laboratory (UrbLab)

APPENDIX II

Select Faculty with Research Interests in Greater China

Robert C. Armstrong

Department of Chemical Engineering
Chevron Professor of Chemical Engineering
Deputy Director, MIT Energy Initiative

Alice H. Amsden

Department of Urban Studies and Planning
Professor of Economy
Chair, PhD Program

Abhijit Vinayak Banerjee

Department of Economics
Ford International Professor of Economics
Co-Director, Abdul Latif Jameel Poverty Action Lab (J-PAL)

Eran Ben-Joseph

Department of Urban Studies and Planning
Associate Professor of Urban Studies and Planning

Suzanne Berger

Department of Political Science
Raphael Dorman and Helen Starbuck Professor of Political Science
Director, MIT International Science and Technology Initiatives (MISTI)

Xavier de Souza Briggs

Department of Urban Studies and Planning
Associate Professor of Urban Studies and Planning

Ian Chapman

Department of History
Lecturer, History

Jianzhu Chen

Department of Biology
Cottrell Professor of Immunology and Professor of Biology

Joel P. Clark

Department of Materials Science and Engineering
Professor of Materials Systems

Yung Ho Chang

Department of Architecture
Professor of Architectural Design
Department Head

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APPENDIX III

Select Greater China Activities at MIT

Tsinghua-MIT-Cambridge Alliance (TMCA)

A collaboration between MIT, Tsinghua University, and the University of Cambridge in the area of low carbon energy research was established in October 2009. The Alliance will advance collaborative projects in carbon capture and sequestration, nuclear power, efficient buildings, biomass, and heat management. The core program will, in addition to workshops and seed funding, support a very important initiative to provide and utilize analytical tools for understanding the impacts of carbon policy in China. Specifically, the Emissions Prediction and Policy Analysis general equilibrium model of the global economy developed over the last 17 years within our Joint Program for the Science and Policy of Global Change will be elaborated and applied to detailed multi-sectoral studies of the Chinese economy and energy system, including regional differentiation. MIT researchers will develop the model, and Tsinghua colleagues will provide the needed large data bases that characterize the Chinese energy system and other related sectors (e.g. transportation, agriculture).

MIT 1K House Project

The MIT 1K House is a joint-research initiative started between the Department of Architecture and the Center for Real Estate in 2008. The goal of this research initiative is to harness the intellectual capacity of MIT faculty and students to improve the plight of the world's poor with respect to their housing needs. The intent of the project was established: how can design work to improve housing condition for the billions of people living in poor rural conditions on less than \$1 per day? The 1K House Project is aimed at improving the living conditions in these parts of the world where resources are scarce, infrastructure does not exist,

and natural disasters often have struck. The highly inadequate living conditions of the poor rural population is a widely prevailing and under addressed issue that could be significantly improved. In other words, we believe design and economic intelligence can help with the solution to the global rural poverty on the housing front.

International Research Opportunities (IROP)

International Research Opportunities (IROP) provides a forum for MIT students to connect with individuals from diverse cultural backgrounds who share similar intellectual goals. IROP has the added benefit of providing direct experiences with foreign cultures, promoting an authentic understanding of global competition in other parts of the world. IROP participants have a broad spectrum of research areas and interests and were placed in several locations throughout China. Their projects bridged the themes of management, computer science, and chemical engineering, all under the mentorship and guidance of MIT faculty members.

MIT International Science and Technology Initiative (MISTI), China

The MIT (MISTI) China Program is a pre-eminent center for applied Chinese studies, giving students the chance to work in a Chinese setting and participate in the rapidly expanding world of Chinese business and technology. Students combine their knowledge of Chinese language and culture with their technical or business expertise by working as interns in companies and universities in China, Hong Kong, and Taiwan. Through its teaching program, The MIT-China Educational Technology Initiative (CETI), MISTI-China also trains teams of students to introduce educational technologies and MIT course content at Chinese universities and secondary schools. Since its inception in 1995, the MIT (MISTI) China Program has placed more than 650 students from all courses of study as interns with partners in Greater China.

MIT-China Management Education Project

The MIT Sloan School established the MIT-China Management Education Project in 1996 with two distinguished Chinese educational institutions — Tsinghua University in Beijing and Fudan University in Shanghai. Lingnan College at Zhongshan University in Guangzhou joined the project in 1999. One of the highest priorities of the MIT-China Management Education Project is faculty development. The project brings Chinese faculty to MIT Sloan to work with MIT faculty and take classes with MBA students. MIT Sloan faculty believe strongly that transferring knowledge directly to Chinese faculty produces broad, longer-term value. In China, the MIT-China Management Education Project has been endorsed at the highest levels. During a visit to MIT, Chinese Premier Zhu Rongji expressed his enthusiasm for the project and his confidence in MIT Sloan.

The McGovern Institute for Brain Science

Neuroscientists often face a challenge in analyzing the large datasets produced by human brain imaging studies. This is especially true in countries with large populations, like China. Two McGovern Institute projects will apply new computational approaches to fMRI data from visual recognition studies, which could reveal new insights into the brain's functional organization. They could also advance the study of brain disorders by identifying relationships among brain activity, genetics, and clinical diagnostic categories.

New Media Action Lab (NMAL)

Established in 2002, the New Media Action Lab presents a six-way partnership with the University of Science and Technology of China (Hefei, Anhui Province), Ogilvy & Mather China, Sun Yat-sen University (Guangzhou), Friends of Nature (Beijing), and NGOCN Communication Net (Kunming, Yunnan Province). The six partner institutions launched an NGO 2.0 project in May 2009 for communication capacity building of grassroots NGOs in West China. The overall goal of NGO2.0 is to introduce Web 2.0 tools and improve the information and communication

technology literacy of NGOs in the lesser-developed regions of China. Because managing Web 2.0 requires a low financial and technological threshold, participating NGOs that did not have sufficient knowledge of Web 1.0 technology can leapfrog right into Web 2.0. Social media technology can help grassroots NGOs to enhance their organizational capacity, build their volunteer base more swiftly than before, and access and interact with information on a scale larger than currently possible. The project nurtures and develops clusters of NGOs to promote regional technological self-help and self-reliance.

The Urban Laboratory (UrbLab)

The UrbLab, short for Urban Laboratory, is a collaborative effort between MIT and Tsinghua University aimed at responding to the challenges associated with China's rapid growth, increasing industrialization, and urbanization. Officially known as the MIT-Tsinghua University Urbanization Laboratory, the project builds on a long history of cooperation between the two schools – including, most significantly, the Beijing Urban Design Studio, which celebrated its twentieth anniversary last summer. The UrbLab is exploring additional partnerships with China entities that will operate on a project basis, with an initial focus on Shenzhen. The goals include the development of urban planning expertise, with a special focus on areas experiencing explosive growth.

Tsinghua-MIT Modular Pebble Bed Reactor

China's economic development requires vast energy needs — and a dramatic expansion in the use of nuclear energy. Pebble bed reactors can enhance the nuclear industry's goal of reducing global climate change while still supplying far more energy than it does at present. These innovative reactors, for one, are inherently safe. In addition, the fact that they can be relatively small-scale while at the same time ready for future expansion helps make them more competitive with fossil fuels than conventional nuclear plant designs. Finally, they are far less susceptible than their conventional counterparts to proliferation.

The MIT Electrical Engineering and Computer Science VI-A International Program

MIT's Department of Electrical Engineering and Computer Science (EECS) VI-A engineering master's program matches industry mentors with Course VI undergraduate and master's students who have demonstrated excellent academic preparation and motivation. The program encourages students to relate the scientific and engineering principles learned in the classroom to current engineering problems, and also provides an opportunity for graduate students to complete an industry-based masters of engineering thesis. The EECS Department's VI-A international internship program began its global internship program in 2006 and targets companies with research and product development operations. Placements in Greater China are both popular and numerous. They include Google China in Beijing, Analog Devices in Shanghai, Microsoft Research Asia in Beijing, and Qualcomm in Beijing. The program provides professional experience in an industrial environment and offers students the opportunity to complete research under the supervision of both company engineers and MIT faculty. With today's global network of product definition, design, and manufacturing, the VI-A international program ensures that MIT's students are at the forefront of both theoretical and applied engineering.

MIT China Educational Technology Initiative (CETI)

While more than half of MISTI China Program participants work in individual internships in companies, the CETI program, since 1996, has trained small teams of MIT students to work with numerous high schools in China, building cross-cultural understanding between younger generations of Chinese and American students through the application of technology. In recent years, CETI has extended its educational technology programs to 10 Chinese universities through innovative partnerships with MIT-OpenCourseWare, MIT-iLabs, and MIT D-Labs.

Empower the Teachers

Guided by the synergy between education and research, MIT faculty share their curriculum and teaching methods with selected partners around the world. A truly global education program, foreign faculty are given the opportunity to work side by side with MIT faculty who teach early undergraduate subjects.

Participants also conduct research during their stay at the Institute, and are aided by MIT undergraduate and graduate students. The participants return to their host institutions with greater confidence in their teaching methods, as well as an enhanced ability to link the laboratory with the classroom. Following their experience at the Institute, participants host MIT students, professors, and researchers at their home university. The partnerships result in long-term engagements in global teaching and research. A pilot of this program was recently launched in the MIT Department of Electrical Engineering and Computer Science department. Presently, the Institute hosts two professors — one from Fudan University and another from the Hong Kong University of Science and Technology.

Global Entrepreneurship Lab and China Lab

MIT Sloan sends teams of engineering, science, and management students to work with the top management of international high-tech start-ups. The students gain hands-on experience in starting and running a new enterprise outside the United States. In turn, companies benefit from the leadership and expertise of MIT Sloan students, working under the guidance and mentorship of MIT Sloan faculty. China Lab projects are implemented in collaborations with Chinese students and they have ranged from high tech, finance, marketing, and healthcare to internet strategy. The program is complimented by classroom-based work in the issues and policies that affect the climate of innovation and start-up success around the world.

Leaders for Global Operations

Developed in 2005 at the request of a group of US industrial partners as a collaboration of Shanghai Jiao Tong University and the MIT Leaders for Global Operations (LGO) program, the China Leaders for Global Operations (CLGO) program is China's only dual-degree, graduate-level program in manufacturing and management. CLGO was created in order to enhance the global content of the LGO program for MIT faculty and students and to promote global manufacturing. With about a dozen multinational companies, CLGO seeks to strengthen its partners by developing leaders who apply both managerial and engineering expertise to global manufacturing and operations.

The CLGO collaboration with MIT gives MIT LGO students greater access to and working understanding of Greater China. Joint student groups from the two programs have conducted plant tours in Shanghai and Boston, executed “Lion Team” projects for Apple and other industry partners, and collaborated in case studies and ethics classes at MIT.

APPENDIX IV

MIT-China Innovation Hub: Linking Research, Education, and Innovation

MIT recognizes that solutions to global problems will involve innovative combinations of technology, public policy, markets, and organizations and that these solutions should be context-specific and tailored to the social, economic and political conditions of the country. For MIT to remain at the forefront of global problem solving, it must deeply engage China. The reason is two-fold. First, for a number of key global problems, China, like the U.S., has to be part of the solution. Second, in almost every science and technology -related field, new-to-the-world innovations (whether produced by Americans or others) are being deployed for the first time globally in China. For MIT to remain at the cutting edge of innovation, it has to be deeply involved with China.

Partnerships in which there is a true sharing of educational efforts or research investigation are preferable to one-sided projects where MIT researchers proceed without commensurate involvement of foreign peers. Active international collaboration is important to advancing knowledge and to promoting cross cultural and political understanding. MIT understands that it will maintain excellence in research only by developing greater connections with path breaking work being done abroad, where some of the most interesting problems and best answers are located. MIT should strive to work with international partners that have faculty, staff or students of comparable quality to those here. We stand to learn most from partners who are at the global forefront of innovative research or educational methods that effectively complement our own.

Our goal, done in cooperation with Chinese partners, is to be the launching point for these solutions. We aim to be the key node in US-Chinese joint innovation efforts. To this end, MIT endeavors to establish the first of its global Innovation Hubs in Beijing, China with the goals to:

- Solve complex global problems in areas important to MIT and China, in partnership with government, academia and industry
- Develop new models for innovation and entrepreneurship
- Facilitate cross-school research and education efforts
- Develop and train leaders for interdisciplinary complex problems
- Develop new models of teaching

Together with Chinese partners, be they in academia, industry, government or the public sector, we will work to effect positive global change through new technologies, newly engineered systems, new forms of entrepreneurial organizations, and new models for public policy. Moreover, the hub will explore solutions that integrate across these domains. Activities will of course include primary research. So too will they include the training of societal leaders (in both the US and China) in the management of complex problems and building of innovation-capable organizations (whether in the public or private sector).

The Innovation Hubs will then be the convening venues for MIT faculty, students, alumni and staff interested in engaging in research that solves global problems in partnership with Chinese entities. The MIT-China Innovation Hub office(s) would facilitate these partnerships, provide support (housing, travel, visas), serve as a center for conferences, and provide seed funds through the MIT-China Innovation Fund. The Hub office will help build regional and national networks, provide support to the growing number of MIT alumni in China, and support resource development.

The Hub office would also support MIT's growing array of unique, China-focused education efforts, including the China Lab, MISTI, etc. The Hub office also will support frequent exchanges of leading innovators and decision makers from both the US and China, including visiting programs for Chinese public officials, science and technology researchers, and organizational innovators in industry. MIT will establish the initial pilot Hub in China in Beijing in June 2010.

Over time, additional Hubs will be considered in Taipei, Dalian, Shanghai, Guangzhou and Hong Kong.

Sample Research Platforms

Energy

Example: Tsinghua-MIT-Cambridge Alliance

Computer Science

Example: Tsinghua-MIT-CUHK Joint Center for Theoretical Computer Science

Sustainability

Example: MIT-Tsinghua University Urbanization Laboratory

Integrative Sciences

Example: MIT Infectious Disease Interdisciplinary Research Group

Management

Example: Chinese Leaders for Global Operations

Applied Humanities and Social Sciences

Example: New Media Action Lab

Transportation Systems

Example: Urban Transportation

Sample Education Platforms

Management

Examples: MIT-China Management Education Project
MIT China Educational Technology Initiative
CDIO

Executive Education

Examples: Sloan Fellows
Professional Engineering Program
Sustainable Energy Leaders Program

Sample Innovation Platforms

MIT Venture Mentoring Service
Entrepreneurship Center
Deshpande Center
Industrial Liaison Program
MIT Global \$100K Competition
IDEAS Competition – Global Service Challenge

Industry Partnerships

MIT will develop a model to engage industry in the Innovation Hub through consortia, the Industrial Liaison Program or equivalent.

Academic Partnerships

MIT will develop strategic partnerships based on research platform needs.

Funding the Innovation Hub

- \$10M over 5 years, for each of the 5 hubs (\$50M total)
- Launch Beijing, including establishment of an Innovation Hub offices in Beijing and Cambridge with appropriate staffing
- Seed grants for faculty at MIT and faculty members in Chinese, Taiwanese and Hong Kong universities
- Develop industry consortia model and recruit initial partners
- Host an Annual Innovation Summit

APPENDIX V

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