

## Strawman Document for the Workshop

The National Academies' Project on the  
Impact of Information Technology  
on the Future of the Research University

### Overview

Since first convening in February 2000, the National Academies' Steering Committee on the project *Impact of Information Technology on the Future of the Research University* project has held three separate meetings and several conference calls. Attached below are preliminary observations of the Committee as a result of its deliberations that relate to trends, issues and questions on the topic. These preliminary observations are provided to share with you some of the Committee's thinking at this stage of the project and to help stimulate discussion during the workshop as we seek your input to assist the Steering Committee in preparing the final report of the project.

### Key Trends Identified by the ITFRU Project

1. The pace of evolution of information technology (e.g., Moore's Law)
2. The ubiquitous/pervasive character of the Net (e.g., wireless, photonics)
3. Relaxing (or obliterating) conventional constraints of space, time, monopoly
4. Democratizing character of IT (access to information, education, research)
5. Changing ways we handle digital data/information/knowledge
6. Growing importance of intellectual capital relative to physical or financial capital

### Observations of ITFRU Steering Committee

1. The extraordinary evolutionary pace of information technology will not only continue for the next several decades, but it could well accelerate on a superexponential slope. The event horizons are moving ever closer. Technological surprises are becoming more common. The future is becoming less certain.

2. The impact of information technology on the university will be profound, just as it has been and will continue to be on the economy, our society, and our social institutions (e.g., corporations, governments, and learning institutions). It will affect our activities (teaching, research, outreach), our organizations (academic structure, faculty culture, financing and management), and the broader higher education enterprise as it evolves into a global knowledge and learning industry.
3. For at least the near term, meaning a decade or less, the university will continue to exist in much its present form, although meeting the challenge of emerging competitors in the marketplace will demand significant changes in how we teach, how we conduct scholarship, and how we are financed. Universities must anticipate these forces, develop appropriate strategies, and make adequate investments if they are to prosper during this period.
4. Over the longer term, the basic character and structure of the research university may be challenged by the IT-driven forces of aggregation (e.g., new alliances, restructuring of the academic marketplace into a global learning and knowledge industry) and disaggregation (e.g., restructuring of the academic disciplines, detachment of faculty and students from particular universities, decoupling of research and education).
5. Procrastination and inaction are the most dangerous courses for colleges and universities during a time of rapid technological change. To be sure, there are certain ancient values and traditions of the university that should be maintained and protected, such as academic freedom, a rational spirit of inquiry, and liberal learning. But, just as in earlier times, the university will have to transform itself to serve a radically changing world if it is to sustain these important values and roles.
6. Although we feel confident that information technology will continue its rapid for the foreseeable future, it is far more difficult to predict the impact of this technology on human behavior and upon social institutions such as the university. It is important that higher education develop mechanisms to sense the changes that are being driven by information technology and to understand where these forces may drive the university.

7. Because of the profound yet unpredictable impact of this technology, it is important that institutional strategies include : 1) the opportunity for experimentation, 2) the formation of alliances both with other academic institutions as well as with for-profit and government organizations, and 3) the development of sufficient in-house expertise among the faculty and staff to track technological trends and assess various courses of action.

## Possible Issues and Questions Identified by the ITFRU Project

### Concerning the Activities of the University

1. What will be the impact of this technology on the basic activities of the university, upon teaching and research?
2. How should the university integrate information technology into its educational programs at the undergraduate, graduate, and professional school level?
3. Will e-learning environments affect traditional teacher-centered instruction and promote more student-centered learning? How will the residential campus experience be affected? Will the classroom disappear?
4. Just-in-time lifelong learning and the growing desire to be educated anyplace, anytime are driving the demand for distributed education. How should the university approach the challenges and opportunities of IT-based distributed learning? What role should third-party content providers play? Should institutions partner with others to develop "virtual universities" and who might those partners include?
5. Will information technology alter the priorities among various university activities, e.g., the balance of educational activities related to socializing high school graduates compared to the rapid growth in the need for advanced education of adults in the high performance workplace?

6. Has information technology brought us to an inflection point in recasting the social contract for scientific research and in finding and utilizing new tools and methods for tackling major research problems?

Concerning the Organization, Management, and Financing of the University

1. What kind of information technology infrastructure (hardware, software, staffing) will the research university need?
2. How will it finance the acquisition and maintenance of this infrastructure?
3. How should the university approach its operations and management to best take advantage of this technology?
4. How can institutions better link planning and decision making with likely technological developments and challenges?
5. How do university leaders get the attention of faculty and governing boards concerning the imperative nature of these issues?
6. What role should the faculty play in making the key decisions concerning IT issues? Are faculties motivated to adopt IT? What is the primary barrier to faculty adoption of technology?
7. How can one provide students, faculty, and staff with the necessary training, support, and equipment to keep pace with the rapid evolution of information technology?
8. What policies does the university need to reconsider in light of evolving information technology (e.g., intellectual property, copyright, instructional content ownership, and faculty contracts)?

Concerning the Post-Secondary Education Enterprise

1. How do colleges and universities address the rapidly evolving commercial marketplace for educational services and content, including, in particular, the for-profit and dot.com providers?
2. What alliances are useful for colleges and universities in this rapidly changing environment? With other academic institutions? With business? On a regional, national, or global scale?
3. How can colleges and universities grapple with the forces of disaggregation and aggregation associated with a possible technology-driven restructuring of the higher education enterprise? Will universities be forced to merge into larger units as the corporate world has experienced? Will they find it necessary to outsource or spinoff existing activities?
4. Will more (or perhaps most) universities find themselves competing in a global marketplace, and how will that square with the responsibilities of publicly supported universities?
5. What is the role of universities with respect to the “digital divide”, the stratification of our society with respect to access to technology?

### Possible Recommendations from the ITFRU Project

#### To Institutions

1. To whom should we address our recommendations? University presidents? Provosts, deans, and other academic leaders? Intellectual leaders of the faculty? Trustees?
2. What do university leaders need to understand?
  - The nature of the IT forces driving the evolution of the university?
  - Possible future scenarios? Or paths to possible futures?
  - A long term strategic context for making near term decisions?

3. What are the key decisions that university leaders need to consider?
  - The IT environments that faculty and students need (and will demand)?
  - How institutions position themselves, e.g. bricks vs. clicks?
  - Policies governing the ownership of intellectual property (including courseware)?
  - How important are alliances...and for addressing which issues?
  
4. What should research universities strive to be?
  - Leaders? If so, then how is leadership achieved and sustained?
  - Competitive followers? What are the benefits and risks of a conservative approach?
  - Is the status quo still an option for some institutions?
  
5. How do universities address the array of cultural issues?
  - The diversity among disciplines and faculty in IT needs?
  - How to institutionalize and sustain IT-based activities?

#### To the Higher Education Enterprise

1. What needs to be done by institutions? By consortia? By governments?
2. Who pays for IT infrastructure? Students? Taxpayers? Patrons?
3. Where is leadership likely to appear in IT-based education and scholarship?
4. What resources should be provided by consortia of universities or alliances with other sectors (commercial, government, foundations)?

#### To the States and the Nation

1. What are the state and national interests in keeping the universities on pace with evolving information technology?
2. What modifications in existing state and federal policies and investments are important or necessary for higher education to flourish in the digital age?

3. What new policies and programs need to be considered (e.g., a 21<sup>st</sup> Century Learn Grant Act or a Millennium Education Trust Fund)?

#### Possible Next Steps for the ITFRU Project

1. The current project could launch a second phase involving a series of more detailed studies of issues identified in the first phase (e.g., the changing nature of scholarship and teaching, the impact of market forces, federal research funding policies), guided by the steering committee and conducted through task forces, workshops, and commissioned papers. Key in this effort would be the development of a web-based knowledge environment, serving both to link together project participants and to engage the broader communities in higher education, government, and the private sector. We anticipate that this second phase would continue for two years, resulting in a series of reports, policy recommendations, and electronic archives.
2. Since this technology is evolving rapidly, with many uncertainties and surprises, there is a need for an ongoing forum involving technologists, educators, and patrons of higher education (government, foundations, corporations). One possibility would be for the National Academies to host such a roundtable group, similar to the *Government-University-Industry Research Roundtable (GUIRR)*, that would continue to meet on a regular basis over the next several years to track the technology and identify key issues for the campuses.
3. There needs to be a better mechanism for triggering and sustaining dialog among campus constituencies such as early adopters of IT technology among the faculty, faculty intellectual leadership, campus administrators, and governing boards. Beyond this, there is a need for a dialog between research universities and their various patrons in government, foundations, and business/industry. A possible model would be the *Stresses on the Academy ("Stresses on Research and Education at Colleges and Universities")* study, conducted jointly by the GUIRR and the National Science Board and sponsored by the National Science Foundation during the 1990s. This effort stimulated town hall meetings on two dozen campuses across the country, bringing together faculty and administrators to discuss key issues. The results of

these grassroots discussions culminated in two national conferences bringing together campus leaders with leaders of government agencies.

4. There needs to be better coordination of the resources available to campuses as they grapple with the issues and decisions triggered by information technology. Perhaps a web portal or web-based knowledge environment could be constructed that would link together interested communities in higher education, government, and the private sector.