2009/ED/HED/FRK/ME/RP/W3
Original: English

United Nations
Educational, Scientific and
Cultural Organization

The UNESCO Forum on Higher Education, Research and Knowledge

WCHE CMES 2009

2009 WORLD CONFERENCE ON HIGHER EDUCATION

The New Dynamics of Higher Education and Research for Societal Change and Development

5-8 July 2009 (UNESCO, Paris)

THEMATIC SESSION: LEARNING, RESEARCH AND INNOVATION

PANEL I: Session on World-Class Universities and Innovative Tertiary Education Institutions

Tuesday 7 July (9h30 – 11h), Room IX

COORDINATION:
The UNESCO Forum on Higher Education, Research and Knowledge

- **Background**

The recent proliferation of national and international rankings reflects the widespread recognition that economic growth and global competitiveness are increasingly driven by knowledge. Tertiary education institutions play a key role in that context. The tertiary education system has the mission of training the professionals, high-level specialists, scientists, and researchers needed by the economy and generating new knowledge in support of each country's national innovation system. In this context, an increasingly pressing priority of many governments is to make sure that their universities and other types of tertiary education institutions successfully operate at the cutting edge of intellectual and scientific development.

CHAIR
• Jean-Pierre BOURGUIGNON (France)
Director of the Institut des Hautes Etudes Scientifiques

PANELISTS
• Jamil SALMI (Marocco)
Tertiary Education Coordinator, Human Development Network, The World Bank

• Richard MILLER (USA)
President, Olin College of Engineering

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• Amara ESSY (Burkina Faso)
President, International Institute for Water and Environmental Engineering

• Dirk VAN DAMME (Belgium)
Director, Center for Education Research and Innovation,
Organization for Economic Cooperation and Development (OECD)

RAPPORTEUR
• Mammo MUCHIE (Denmark)
Director of the Research Centre on Development and International Political Economy, Aalborg University, Denmark
South African National Chair on Innovation Studies, Institute for Economic Research on Innovation, Tshwane University of Technology, Pretoria, South Africa.

Expected Outcomes of the Debate

The main objective of this session is to explore the challenges involved in setting up world-class institutions that can compete effectively with the best of the best. This will involve presenting an operational definition of a world-class university, outlining possible strategies and pathways for establishing such institutions, and show-casing examples of innovative tertiary education institutions.

Bionotes of the participants

CHAIR

• Jean-Pierre BOURGUIGNON
Jean-Pierre Bourguignon is the Director of the Institut des Hautes Etudes Scientifiques. He holds a PhD in Mathematical Sciences from the University of Paris 7 (France**).** In 1980, Jean-Pierre Bourguignon was visiting Professor at Stanford University. Since 1986, he is part of the École Polytechnique as Professor of Mathematics.
From 1999 to 2004, he was member of the Conseil Supérieur de la Recherche et de la Technologie at the French Ministry of Research. Directeur de Recherche at the Centre National de la Recherche Scientific (CNRS), he also became in 2007 the president of the Ethics Committee of the CNRS.
From 1991 to 2007, he was editor of *Differential Geometry and its Applications (Elsevier).*
He has been appointed Honorary Member of the London Mathematical Society (2005) and he received the Doctor Honoris Causa from the Keio University (2008). Since 2008, he is Chairman of the panel «Mathematics and Foundations » of the « Starting Grants » programme of the European Research Council.

RAPPORTEUR

• **Mammo MUCHIE** (Denmark)

Mammo Muchie is a Department of Science and Technology Sponsored and National Research Foundation Managed Research Professor on Science, Technology, Innovation and Development at the Institute of Economics Research on Innovation in Tshawane university of Technology, Pretoria, South Africa. He is also part time professor at Aalborg University, Denmark. He is chief editor of the African Journal on Science, Technology, Innovation and Development (AJSTID) and is inspiring the foundation of the African Globelics Academy on Research, Innovation and Capability (AGARIC). He holds a DPhil degree from Sussex University with joint supervision from IDS and SPRU. Between July 2003 and September 2004, he was the director of the research programme on "Civil Society and African Integration" at the Centre for Civil Society/School of Development Studies at the University of KwaZulu-Natal (Durban, South Africa). Besides, he is chairman of the Network of Ethiopian Scholars that was established in 2001 (www.nesglobal.org).

Mammo Muchie has published over 200 publications over the last twenty years and has been a consultant for UNESCO on The Forum on Higher education, Knowledge and Research Systems.

PANELISTS

• **Amara ESSY** (Burkina Faso)

Amara Essy, diplomat, is nominated UN permanent delegate for the Ivory Coast in New York with responsibilities as Ambassador in Argentine and Cuba. In 1990, he became the UN Security Council President and the Ivory Foreign Secretary. From 1998 to 1999, Amara Essy is appointed Cabinet Minister and Secretary for Foreign Affairs and International Cooperation. From 1998, he also became the Vice-President of the 40th and 49th UN General Assemblies. Author of various written pieces on Africa and Culture, Amara Essy, retired from the public scene, is now the President of the International Institute for Water and Environmental Engineering.

• **Richard MILLER** (USA)

Dr. Miller served as Dean of the College of Engineering and Professor at the University of Iowa from 1992-1999, where he initiated a comprehensive curriculum revision and the first Technological Entrepreneurship Certificate Program for engineers in the U.S. He is the author or co-author of about 100 reviewed journal articles and other technical publications. In 1976, he earned his PhD in Applied Mechanics from the California Institute of Technology. He has been a consultant to many companies including the Aerospace Corporation and NASA's Jet Propulsion Laboratory and made significant contributions to Solares, Milstar and Mobile Transporter and many other space hardware projects.

• **Jamil SALMI** (Marocco)
Jamil Salmi is the World Bank's tertiary education coordinator. He was the main author of the World Bank's strategy for higher education entitled Constructing Knowledge Societies: New Challenges for Tertiary Education. His latest book (The Challenge of Establishing World-Class Universities) was published in February 2009. He is currently a member of the International Advisory Network of the UK leadership Foundation for Higher Education, and a member of the Editorial Committee of OECD's Journal of Higher Education Management. He holds a PhD in Development Studies from the University of Sussex, United Kingdom. In the past fifteen years, he has provided policy and technical advice on tertiary education reform to the governments of over 35 countries around the world.

• **Dirk VAN DAMME** (Belgium)
Dirk van Damme, head of the Centre for Education Research and Innovation at the Organization for Economic Co-operation and Development (OECD), holds a PhD degree in educational sciences from Ghent University and is also professor of educational sciences in the same university (since 1995).
He has been professionally involved in educational policy development as expert for the implementation of the Bologna Declaration and as Director of the Cabinet of the Flemish Minister of education. Besides that, he has served as an expert on issues related to international higher education policy, quality assurance and accreditation for several international organizations such as the agency for the Dutch universities.

UNESCO FORUM ON HIGHER EDUCATION, RESEARCH AND KNOWLEDGE

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2009/ED/HED/FRK/ME/RP/W3
Original: English

Session Title: Women in Higher Education, Research, and Innovation (HERI)
Gains and Further Challenges for a Research Agenda

Rapporteur: Murielle Joye-Patry IFUW, Switzerland, muriellejoye@bluewin.ch

Speakers: Stella Hughes, Rose Maria Salazar Clemena, Saniye Gulser Corat, Germaine Doop, Iman El-Kaffass, Celeste Schenck, Rose Rita Kingamknono.

Summary of Main Points Introduced:
There are trends showing an increase in women in higher education, the private sector, and research institutions around the world. Despite this increase, there still needs to be a lot more women in leadership positions everywhere. **Cultural and social views** on gender have a heavy **impact** on enrollment and **equality in higher education**. Even in countries where women are equally represented in higher education institutions at the basic level, they face social barriers in the labor market. Obstacles affect women disproportionately because of their **lack of opportunities and networks** as compared to men. **Equal access does not happen on its own**, we must take innovative steps to create new curriculum and offer scholarships for young women. At the university level there is a lack of entrepreneurial skills training for both men and women. This especially affects women because there is a lack of female entrepreneur role models. **Gender equality** has been declared as one of the two **main focus priorities** on the UNESCO agenda from 2008 until 2013, and the implementation of this priority relies heavily on individuals. Mary Louise Kearney the present director of the UNESCO forum on higher education was praised for her efforts to promote women's empowerment and gender equality utilizing networks, UNESCO chairs, as well as women's research and study centers.

Summary of general discussion:
Higher education is a mirror of society at large. Steps need to therefore be taken to break down gender barriers and create opportunities for women. Oftentimes, there is not so much a lack of qualified women; as **a lack of concerted will to empower them**. Some of the **strategies suggested included affirmative action for women, research to support change in attitude toward women, review of curriculum, and a stronger voice for NGOs and civil society**. The way to avoid dehumanization of HERI institutions is through attaining a critical **mass of women with access to top positions** in administration, academia, research, and tenure positions in teaching. This will ensure that human values and social responsibility are the core of efficient institutions of higher learning. Men have an important role in this debate because gender equity is an issue that affects society as a whole. A **major barrier** that needs to be addressed in research is the **idea that boys are threatened by gender equity policies**. This mental block inhibits women's post graduate success, and proactive measures must be taken to reverse this attitude. Teachers must take a larger part in being positive role models for young women and men. Gender stereotypes must be eliminated in the classroom, not reinforced, and it is up to educators and administrators to ensure that this happens.

Brief Sentence for the Conference Communiqué:
Complement available statistics with strong emphasis on key processes (eg affirmative action mechanisms) that create effective policies for gender equity at all levels within higher education.

Creating an Innovative Engineering College from Scratch: Lessons Learned

Richard K. Miller
President
Franklin W. Olin College of Engineering

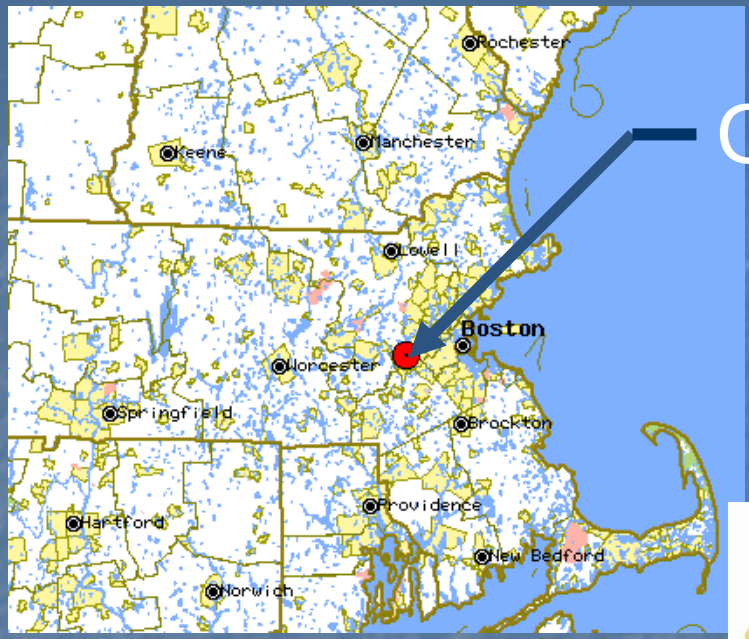
2009 World Conference on Higher Education:
The New Dynamics of Higher Education and Research for Societal Change and Development
~ World Class Universities and Tertiary Education ~

UNESCO, Paris, France
7 July 2009

Olin College Overview

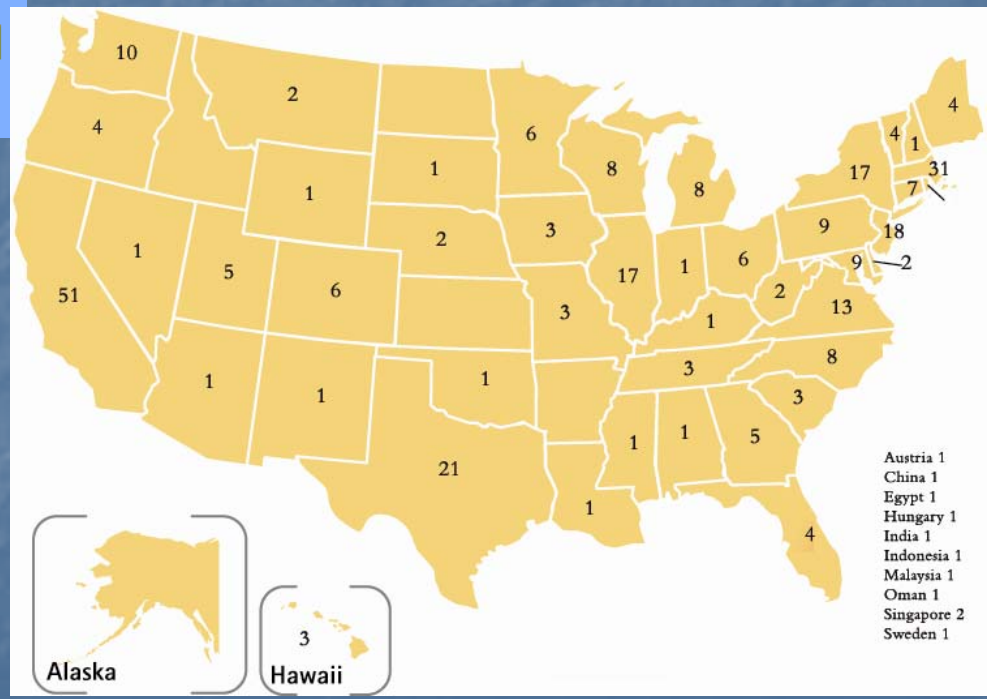
- Undergraduate residential engineering education
- Total enrollment of about 300
- BS degrees in ECE, ME, Engr
- 9-to-1 student/faculty ratio
- Founded in 1997, first graduates in 2006
- 75 acres and 400,000+ sq. ft. new buildings
- Endowment ~ $350 million
- Research expenditures ~ $1 million/yr
- Adjacent to Babson College, Wellesley College
- No academic departments
- No tenure
- No tuition
- Continuous improvement

Franklin W. Olin College of Engineering
Olin Way
Needham, MA 02492



Olin College

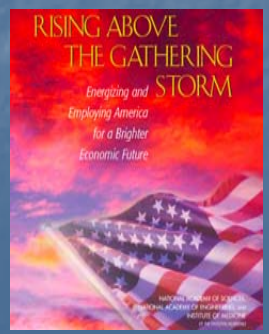
Where Do Olin Students Come From?

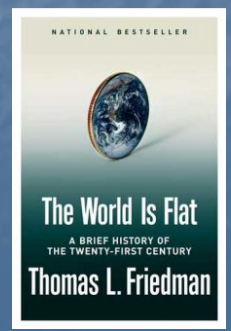


Motivations and educational philosophy

The Need for Change in Engineering Education:

- Thomas L. Friedman, *The World is Flat: A Brief History of the Twenty-first Century*
- Council on Competitiveness, *National Innovation Initiative*
- National Academy of Engineering, *Rising Above the Gathering Storm*
- National Academy of Engineering, *Educating the Engineer of 2020*
  - *Teamwork, communication, creativity, leadership, entrepreneurial thinking, ethical reasoning, global contextual analysis*





Illustrations:

- Boeing and the end of the Cold War

- And now the NAE Grand Challenges:
  - Global Climate Change
  - Sustainable Energy Sources
  - Security in an age of asymmetry and terrorism
  - Affordable health care for all
  - Global water and food supplies

- *Technology alone will not solve any of them!*

  - *Teamwork, communication, creativity, leadership, entrepreneurial thinking, ethical reasoning, global contextual analysis*

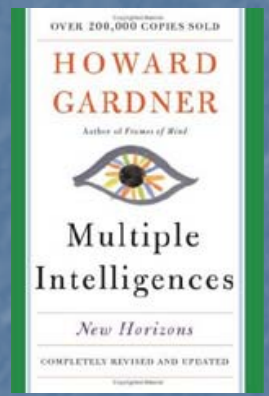
Multiple Intelligences (Howard Gardner, *Frames of Mind*, 1983)

- All people have at least 7 "intelligences"
  - Linguistic
  - Logical/mathematical

  Academic Intelligence (IQ, SAT, etc.)
  - Spatial
  - Bodily-kinesthetic
  - Musical

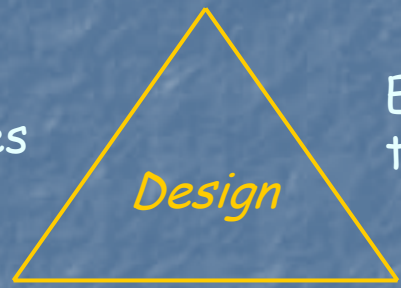
  Artistic Intelligence
  - Interpersonal
  - Intrapersonal

  Persuasion, Management



Our Evolving Curriculum

Creativity,
Arts, Humanities



Entrepreneurial thinking

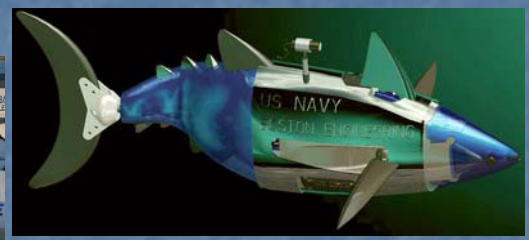
Rigorous Engineering

Cross-enrollment Partners:

Wellesley College

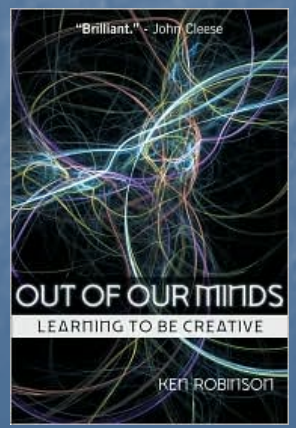
BABSON

Brandeis University



Creativity and Innovation

- *Select for creative intelligence*
- *Enhance visual thinking*
- *Enhance vivid thinking*
- *Create an environment with constant collisions between diverse experts on common projects*



Google:
Sir Ken Robinson
(TED Conference 2006)

Entrepreneurial Thinking

- *Identify opportunities, not problems*
- *Take initiative, assume responsibility and risk*
- *Persuade others to invest resources*
- *Make a positive difference in the world!*

Some Features of the Olin Curriculum

- Candidates' Weekend: interviews required for admission
- Required DESIGN core
- Team design projects in 6+ semesters
- SCOPE senior project: corporate sponsored, year-long
- EXPO at end of each semester: "stand and deliver"
- Integrated Course Blocks in Science, Math, and Engineering
- Study Away in Junior year
- Summer internships: REU and corporate experience
- Business and entrepreneurship:
  all students must start and run a business for a semester
- Nine competencies across all four years: quantitative analysis, qualitative analysis, teamwork, communication, life-long learning, context, design, diagnosis, opportunity assessment
- Continuous improvement: annual curriculum retreat

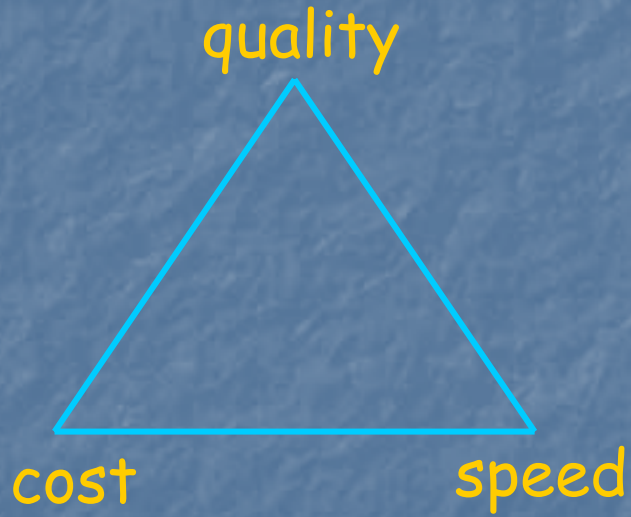
- BUT, the learning culture is far more important than the curriculum!

Early planning

- Graduate vs. undergraduate
- Existing institution vs. new institution
- Location, location, location
- Founding Precepts
  - *No Departments*
  - *No Tuition*
  - *No Tenure*
  - *Continuous Improvement*
- Phases
  - *Invention*
  - *Realization*
  - *Sustainability*

Infrastructure development

- First step = campus master plan
- No faculty or staff yet!
- Lessons learned
  - community relations
  - registered land
  - buried aqueduct
  - 22 inch gas main
  - traffic patterns

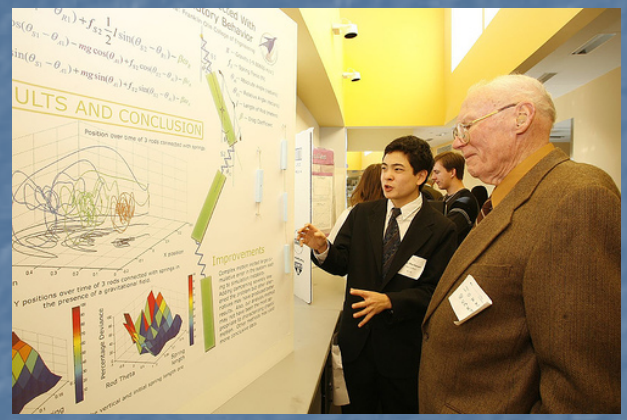


Faculty and staff

- Inspirational undergraduate teaching
- Intellectual vitality
- Rethink educational process
- Teamwork
- Entrepreneurial/risk taking
- Credentials: PhD?
- Student-centered vs. faculty centered
- Faculty governance: manual
- Start-up issues
  - recruiting process
  - compensation
  - contracts

Student recruitment and placement

- Recruitment – it's all about quality
- Olin Partners
- Publications
- Candidates' Weekend
- Accreditation?
- Gender balance?
- Diversity
- International students & 9-11
- Placement – it's all about opening doors
- Graduate school
- Engineering vs. other professions
- Large companies vs. small
- Rhodes, Fulbright, Marshall, etc.



Finances and operating expenses

- Estimating costs
  - construction (x2)
- Budgeting
  - uncertainty
  - "just in case"
  - mentality: quality vs. sustainability
- Benchmarking
- Current numbers:
  - Endowment = $350 million
  - Operating budget = $32 million
  - Enrollment = 320
  - Employees = 100

Governance

- *Trust!*
- Board growth: 5 → 25
- Transition to committees
- Role of the Founders
- Endowment management

- President's Council

- Internal governance
- President's Cabinet
- CDMB
- Academic freedom (& responsibility)

Continuous Improvement

1. Learn to listen well, we can always learn from others outside of our community
2. Seek objective measurement of everything we do, to guide our efforts to improve
3. Accept the occasional need for radical change, not all necessary improvement is incremental

- Vice President for Innovation and Research
- Expiration dates on everything
- Organizational health survey
- 360-degree evaluation

The Challenge of Establishing World-Class Universities in Developing Countries

Jamil Salmi
WCHE
6 July 2009

EDUCATION
THE WORLD BANK

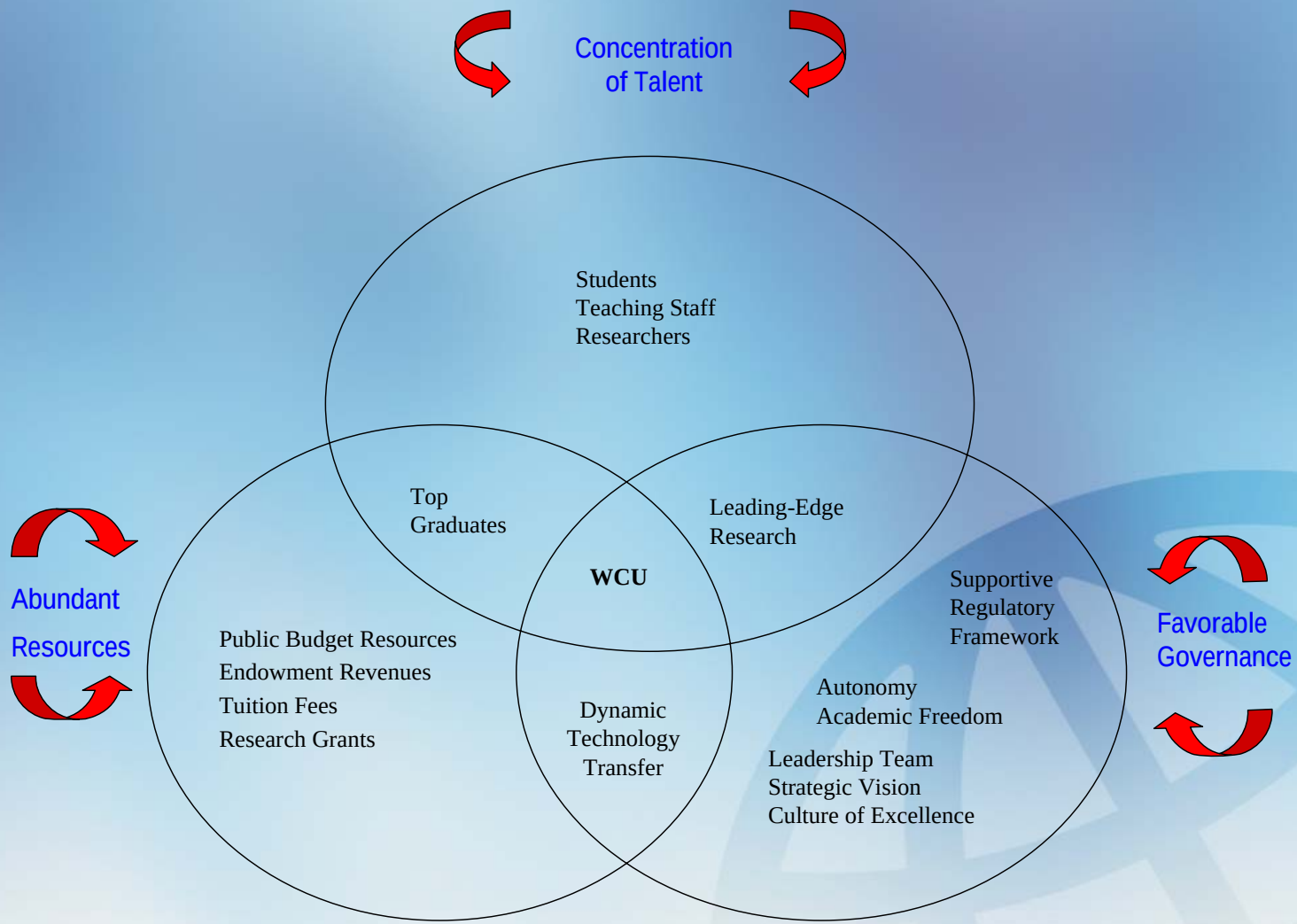
natural lab experiment: U. of Malaya vs. NUS

- early 1960s: 2 branches of University of Malaya
- today:
  - NUS ranked # 19
  - UM only # 192

outline of the presentation

- defining the world-class university
- the path to becoming a world-class university

Characteristics of a World-Class University
Alignment of Key Factors



Source: Elaborated by Jamil Salmi

weight of graduate students

University	Undergraduate Students	Graduate Students	Share of Graduate Students (%)
Harvard	7,002	10,094	59
Stanford	6,442	11,325	64
MIT	4,066	6,140	60
Oxford	11,106	6,601	37
Cambridge	12,284	6,649	35
LSE	4,254	4,386	51
Beijing	14,662	16,666	53
Tokyo	15,466	12,676	45

international dimensions

- foreign students
  - Harvard (19%)
  - Cambridge (18%)
- foreign faculty
  - Caltech (78%)
  - Harvard (30%)
  - Oxford (36%)
  - Cambridge (33%)

abundant resources

- government funding
  - US spends 3.3% of GDP ($54,000 per student)
  - Europe (E25) only 1.3% ($13,500 per student)
- endowments


1967

Comparison of US and UK Endowment Levels

US Institutions	Endowments Assets (2005 million $)	UK Institutions	Endowment Assets (2005 million $)
Harvard University	25,460	Cambridge	6,080
Yale University	15,200	Oxford	5,320
Stanford University	12,160	Edinburgh	340
University of Texas	11,590	Manchester	228
Princeton University	11,210	Glasgow	228


A R C E L O N A

favorable governance

- freedom from civil service rules (human resources, procurement, financial management)
- management autonomy
  - flexibility and responsiveness with power to act
- selection of leadership team
- independent Board with outside representation

U. Of Malaya vs. NUS

- talent
  - UM: selection bias in favor of Bumiputras, less than 5% foreign students, no foreign professors
  - NUS: highly selective, 43% of graduates students are foreign, many foreign professors

U. Of Malaya vs. NUS (II)

- **finance**
  - **UM: $118 million, $4,053 per student**
  - **NUS: $750 million endowment, $205 million, $6,300 per student**

U. Of Malaya vs. NUS (II)

- governance
  - UM: restricted by government regulations and control, unable to hire top foreign professors
  - NUS: status of a private corporation, able to attract world-class foreign researchers
    - 52% of professors (9% from Malaysia)
    - 79% of researchers (11% from Malaysia)

outline of the presentation

- defining the world-class university
- **the path to becoming a world-class university**

the path to glory

- upgrading existing institutions
- mergers
- creating a new institution

upgrading approach

- less costly
- challenge of creating a culture of excellence
- focus on governance


Hegart
hp
COMPAQ
DELL

the end

a word of caution

- need for diversified tertiary education system
- not all institutions can be “world-class”
- a few select world-class research universities
- money is not enoug

Institut International d'Ingénierie de l'Eau et de l'Environnement
International Institute for Water and Environmental Engineering

M. Amara Essy

2iE, un centre d'excellence au service du développement de l'Afrique

Eau
Energie
Génie Civil
Environnement

Pourquoi investir dans un centre d'excellence qui forme dans les domaines de l'eau, de l'environnement, de l'énergie et des infrastructures?

- **Répondre à un besoin de développement:**
  - ✓ **320 millions d'Africains n'ont pas accès à l'eau et ce nombre augmente de 25% par an**
  - ✓ **les ODM prévoient de réduire ce nombre de moitié d'ici 2015**
  - ✓ **pour 1 Million de US$ investi dans le secteur il faut un ingénieur et trois techniciens**
- **Créer au niveau régional des capacités pérennes de formation d'ingénieurs et techniciens**

Le 2iE, un projet qui rassemble

- **Des partenaires:**
  - **Burkina Faso et 14 Etats d'Afrique Sub-Saharienne**
  - **UEMOA, CEDEAO**
  - **Partenaires au développement: MAE (Cooperation française), AUF, AFD, BM, BOAD, Suisse, Danemark, USA, Canada, Japon, Allemagne, Chine**
- **Autour d'une base commune constituée par :**
  - ✓ **Un plan d'entreprise et un plan de financement**
  - ✓ **Une évaluation de la rentabilité de l'investissement et des risques**
  - ✓ **Des indicateurs de performance**
  - ✓ **Des mécanismes de gestion et de suivi des résultats**

Le 2iE, une référence en matière de réformes pour les institutions d'enseignement supérieur en Afrique

- **Gouvernance et viabilité financière**
- **Qualité, sélection des étudiants et reconnaissance internationale des diplômes**
- **Réponse à la demande du marché de l'emploi et liaison constante avec les entreprises**
- **Dimension régionale de l'institution et mise en réseau des capacités**

La gouvernance du 2iE est adaptée aux enjeux de qualité et d'employabilité

- **Un partenariat public privé international créé en janvier 2007**
- **Une association internationale reconnue d'utilité publique enregistrée au Burkina Faso**
- **Centre régional disposant d'un accord de siège au Burkina Faso**
- **Un conseil d'administration issu de 4 collèges de poids équivalent**
  - **États Africains**
  - **Partenaires institutionnels et financiers**
  - **Partenaires Scientifiques (Qualité)**
  - **Entreprises (Employabilté)**

Institut International d'Ingénierie de l'Eau et de l'Environnement
International Institute for Water and Environmental Engineering

Un modèle financier original

- En 2008, suppression des contributions des Etats
- Les subventions sont strictement réservées à l'investissement
- Le fonctionnement courant (y compris salaires et amortissement) est autofinancé selon le modèle :

  50% frais de scolarité

  25% prestations d'ingénierie, formation continue et formation à distance

  25% apportés sur contrats financés sur fonds publics

Institut International d'Ingénierie de l'Eau et de l'Environnement
International Institute for Water and Environmental Engineering

Dès 2005, une Offre de Formation conforme au système international Licence Master Doctorat (LMD)

Un parcours en 5 ans

en 2 cycles

1er cycle
Bachelor / Ingénieur des travaux + C2i

6 semestres

2ème cycle
Ingénieur 2iE/Master en Ingénierie
+TOEFL

4 semestres

Un troisième cycle de 3 à 4 ans

6/8 semestres

Démarrage de l'école doctorale internationale et interuniversitaire sur l'eau et l'environnement en octobre 2008

Des effectifs en forte croissance

Depuis 40 ans, le 2iE auparavant Groupe EIER-ETSHER a formé plus de 3 200 ingénieurs et techniciens

Années universitaires	1993/94	1998/99	2005/06	2006/07	2007/08	2008/09	2009/10
Nombre d'étudiants en formation initiale	220	220	320	455	550	650	1000
Pays d'origine	14	12	12	18	20	21	30
Nombre d'étudiants en Formation à distance	0	0	0	0	40	170	450
Pays d'origine					16	24	30

Impacts des reformes de 2005

Lancement 1er Master à Distance

Des Diplômes reconnus sur le Plan International

- **Pôle d'Excellence de l'UEMOA**
- **Centre d'Excellence de la CEDEAO**
- **Centre d'Excellence du NEPAD**

Accréditation des Diplômes par la CTI :

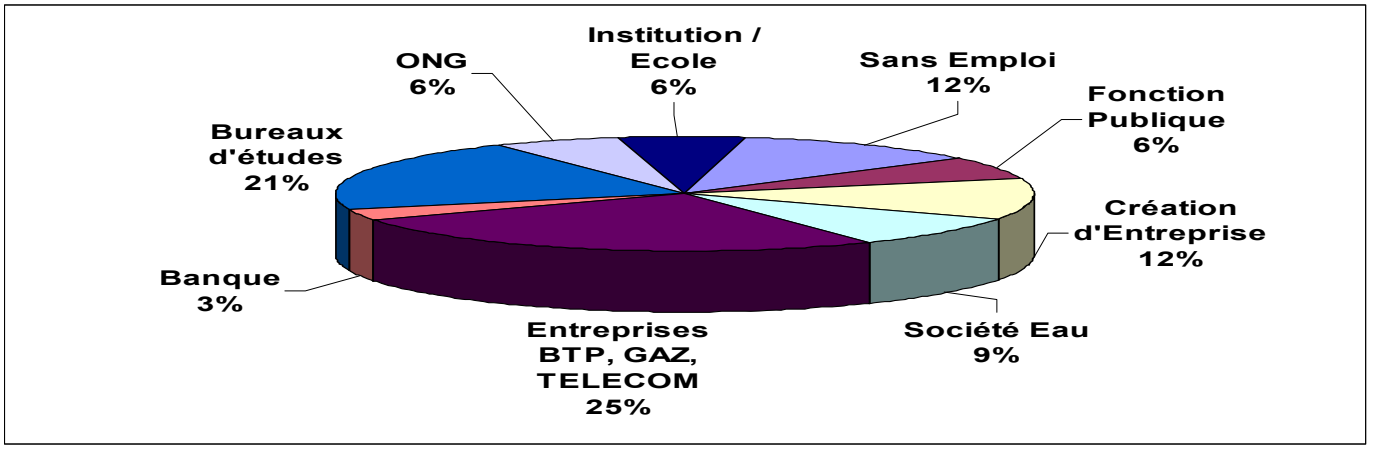
Seul établissement de formation supérieure en Afrique dont le diplôme d'ingénieur est reconnu sur l'espace européen au travers d'une accréditation par la Commission française des Titres d'Ingénieur (CTI)

Premier établissement d'Afrique Subsaharienne membre associé de la Conférence française des Grandes Écoles (CGE)

En cours: Processus d'accréditation sur le continent nord-américain

Une formation qui garantit l'emploi

Taux d'Employabilité des étudiants du 2iE				
Année du diplôme	**2005**	**2006**	**2007**	**2008 ***
3 mois après le diplôme	**80%**	**69%**	**87%**	**83%**
6 mois après le diplôme	**90%**	**81%**	**93%**	**97%**
12 mois après le diplôme	**100%**	**100%**	**100%**	*À venir*



Institut International d'Ingénierie de l'Eau et de l'Environnement
International Institute for Water and Environmental Engineering

Les Entreprises et le 2iE

Objectif: Assurer l'adéquation des formations avec les besoins du secteur privé : les Journées Entreprises et rencontres sectorielles

- 120 entreprises présentes aux journées Entreprises
- 20 business plans d'étudiant sélectionnés, dont 5 primés
- rencontres sectorielles avec les entreprises d'électricité et des mines pour l'évaluation de leurs besoins
- Montrer le savoir-faire des étudiants aux entreprises
- Entretiens de recrutement pour étudiants

Institut International d'Ingénierie de l'Eau et de l'Environnement
International Institute for Water and Environmental Engineering

Une dimension internationale qui garantit l'excellence

- **Des étudiants de 24 nationalités (dont des français)**
- **Des Enseignants/chercheurs permanents de 14 nationalités (dont France et USA)**
- **Des professeurs associés du monde entier**
- **Une école doctorale internationale et interuniversitaire: 13 universités partenaires**
  - ✓ ***Afrique:*** ***Burkina Faso, Côte-d'Ivoire, Ghana***
  - ✓ ***France:*** ***Paris VI, Montpellier 2, Brest, Rennes 1, Poitiers, UTC Compiègne, Strasbourg***
  - ✓ ***Suisse:*** ***Ecole polytechnique fédérale de Lausanne***
  - ✓ ***Amérique du Nord:*** ***Princeton***
  - ✓ ***Asie:*** ***Hokkaido***

Institut International d'Ingénierie de l'Eau et de l'Environnement
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La Recherche au 2iE

Une plate-forme technologique au service de l'innovation et de la recherche: laboratoires, amphithéatres, centres de recherche dotés d'équipements modernes;

Des équipes scientifiques de niveau mondial animent l'Ecole Doctorale dont les axes de recherche portent sur les problèmes actuels et fururs de l'économie africaine: Eau, Assainissement, Irrigation, Systèmes Complexes, Energies Renouvelables, Biomasse, Biocarburants et éco-matériaux.

Lauréat du Grand Prix de la Fondation Suez Environnement en 2009

Une offre compétitive au sud: un puissant levier pour enrayer la fuite des cerveaux

A niveau et diplôme équivalent on peut former quatre africains en Afrique pour le prix d'un Africain en Europe

*** Formation en Europe ➔ Taux de retour inférieur à 40 %**

*** Formation au 2iE ➔ Plus de 95 % travaillent en Afrique**

Coût annuel de la Formation d'un ingénieur

En Euros	Coûts Formation Annuels	Subsistance	TOTAL
École d'Ingénieur référence France	13 220	13 200	26 420
Au 2iE (2008/2009)	6 100	1 500	7 600

Institut International d'Ingénierie de l'Eau et de l'Environnement
International Institute for Water and Environmental Engineering

Attractivité du 2iE

Quelques statistiques des candidatures pour étudier au 2iE

(inscriptions en cours jusqu'au 15 Juillet 2009)

- **En Formation présentielle à ouagadougou:**

  2556 candidats de 36 nationalités

- **En Formation Ouverte à Distance:**

  1567 candidats de 43 nationalités

À la date du 1er Juillet 2009

Merci de votre attention

Plus d'infos sur

www.2ie-edu.org

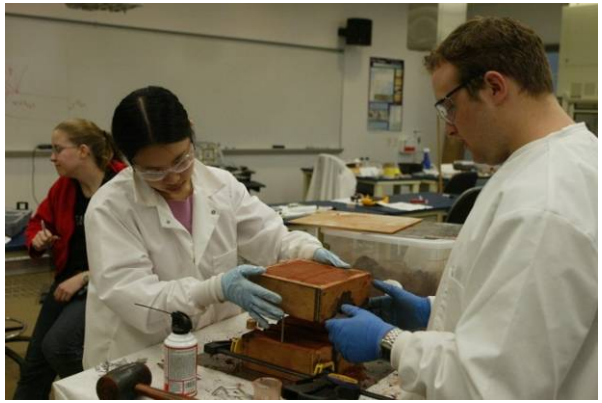
Creating an Innovative Engineering College from Scratch: Lessons Learned

Richard K. Miller, President
Franklin W. Olin College of Engineering
Needham, Massachusetts

2009 World Conference on Higher Education
World Class Universities and
Innovative Tertiary Education Institutions
UNESCO *7 July 2009*
Paris, France

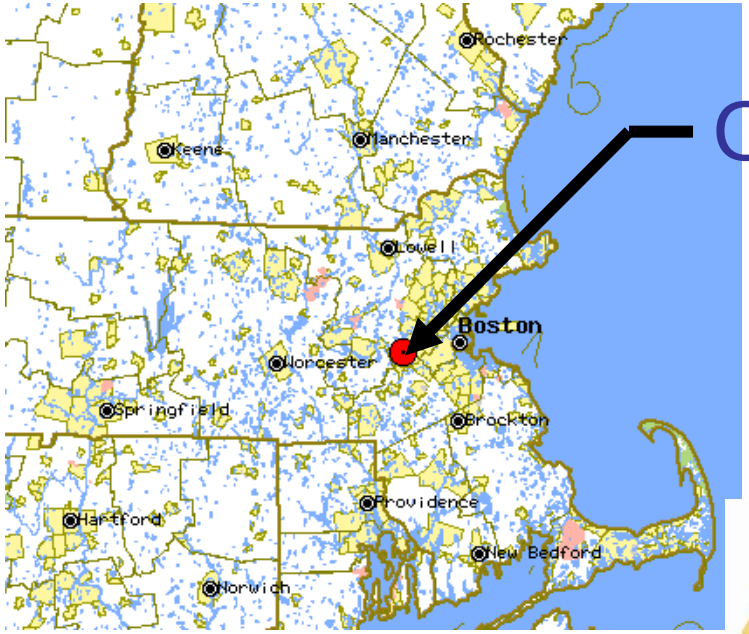
Olin College Overview

- Undergraduate residential engineering education
- Total enrollment of about 300
- BS degrees in ECE, ME, Engr
- 9-to-1 student/faculty ratio
- Founded in 1997, first graduates in 2006
- 75 acres and 400,000+ sq. ft. new buildings
- Endowment ~ $350 million
- Research expenditures ~ $1 million/yr
- Adjacent to Babson College, Wellesley College
- *No academic departments*
- *No tenure*
- *No tuition*
- *Continuous improvement*



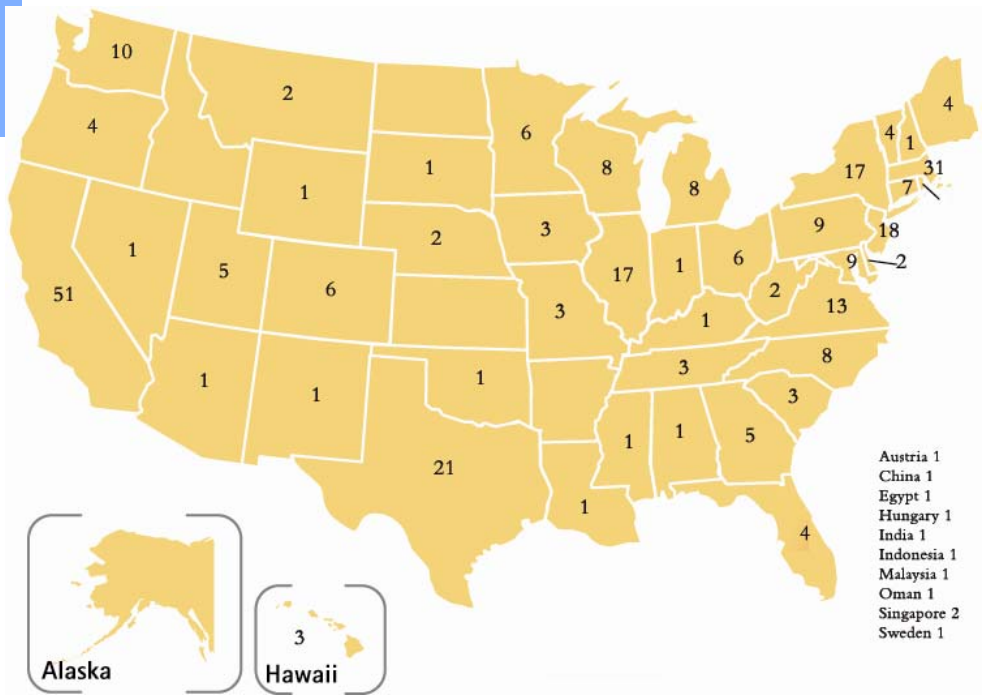
Franklin W. Olin College of Engineering

Olin Way
Needham, MA 02492



Olin College

Where Do Olin Students Come From?

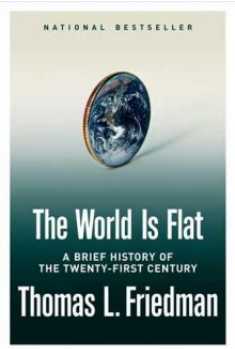


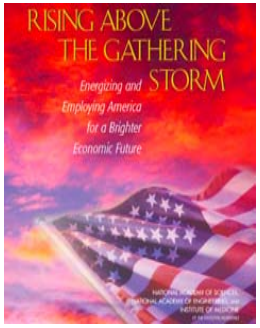
Motivations and educational philosophy

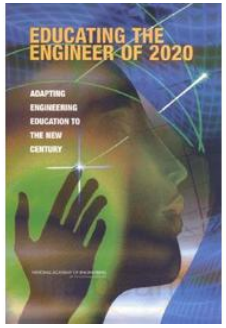
The Need for Change in Engineering Education:

- Thomas L. Friedman, *The World is Flat: A Brief History of the Twenty-first Century*
- Council on Competitiveness, *National Innovation Initiative*
- National Academy of Engineering, *Rising Above the Gathering Storm*
- National Academy of Engineering, *Educating the Engineer of 2020*

→ • *Teamwork, communication, creativity, leadership, entrepreneurial thinking, ethical reasoning, global contextual analysis*







Illustrations

- And now the NAE Grand Challenges:
  - Global Climate Change
  - Sustainable Energy Sources
  - Security in an age of asymmetry and terrorism
  - Affordable health care for all
  - Global water and food supplies

- *Technology alone will not solve any of them!*

  - *Teamwork, communication, creativity, leadership, entrepreneurial thinking, ethical reasoning, global contextual analysis*

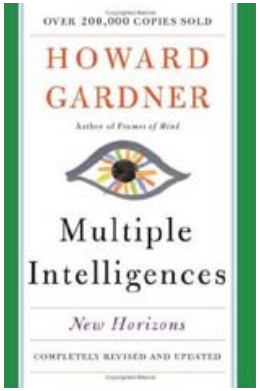
Multiple Intelligences (Howard Gardner, Frames of Mind, 1983)

- All people have at least 7 “intelligences”
  - Linguistic
  - Logical/mathematical

  Academic Intelligence (IQ, SAT, etc.)
  - Spatial
  - Bodily-kinesthetic
  - Musical

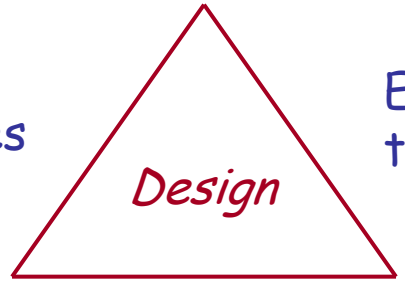
  Artistic Intelligence
  - Interpersonal
  - Intrapersonal

  Persuasion, Management



Our Evolving Curriculum

Creativity,
Arts, Humanities



Entrepreneurial thinking

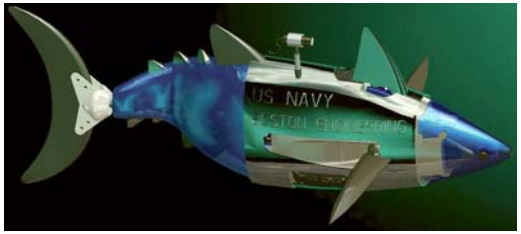
Rigorous Engineering

Cross-enrollment Partners:

Wellesley College

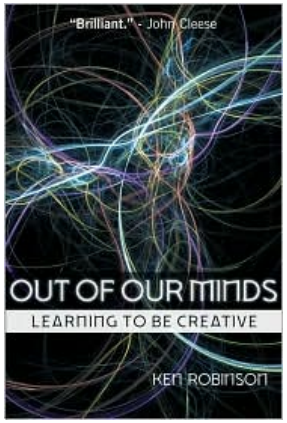
BABSON

Brandeis University



Creativity and Innovation

- *Select for creative intelligence*
- *Enhance visual thinking*
- *Enhance vivid thinking*
- *Create an environment with constant collisions between diverse experts on common projects*



Google:
Sir Ken Robinson
(TED Conference 2006)

Entrepreneurial Thinking

- Identify opportunities, not problems
- Take initiative, assume responsibility and risk
- Persuade others to invest resources
- Make a positive difference in the world!

Some Features of the Olin Curriculum

- ***Candidates' Weekend***: interviews required for admission
- Required ***DESIGN*** core
- ***Team*** design projects in 6+ semesters
- ***SCOPE*** senior project: corporate sponsored, year-long
- ***EXPO*** at end of each semester: "stand and deliver"
- Integrated Course Blocks in Science, Math, and Engineering
- Study Away in Junior year
- Summer internships: REU and corporate experience
- Business and entrepreneurship:
  all students must start and run a business for a semester
- Nine ***competencies*** across all four years: quantitative analysis, qualitative analysis, teamwork, communication, life-long learning, context, design, diagnosis, opportunity assessment
- Continuous improvement: ***expiration date on curriculum***

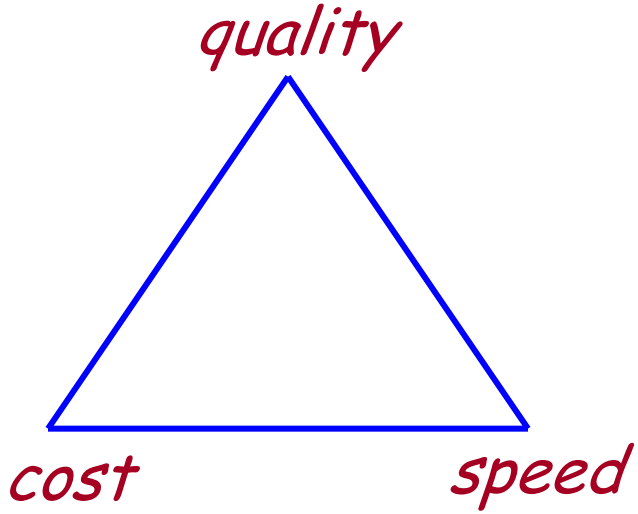
- *BUT, the learning culture is far more important than the curriculum!*

Early planning

- Graduate vs. undergraduate
- Existing institution vs. new institution
- Location, location, location
- Founding Precepts
  - *No Departments*
  - *No Tuition*
  - *No Tenure*
  - *Continuous Improvement*
- Phases
  - *Invention*
  - *Realization*
  - *Sustainability*

Infrastructure development

- First step = campus master plan
- No faculty or staff yet!
- Lessons learned
  - community relations
  - registered land
  - buried aqueduct
  - 22 inch gas main
  - traffic patterns

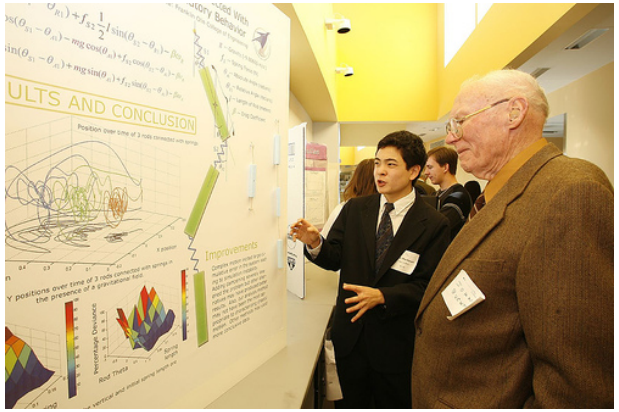


Faculty and staff

- Inspirational undergraduate teaching
- Intellectual vitality
- Rethink educational process
- Teamwork
- Entrepreneurial/risk taking
- Credentials: PhD?
- Student-centered vs. faculty centered
- Faculty governance: manual
- Start-up issues
  - *recruiting process*
  - *compensation*
  - *contracts*

Student recruitment and placement

- *Recruitment – it's all about quality*
- Olin Partners
- Publications
- Candidates' Weekend
- Accreditation?
- Gender balance?
- Diversity
- International students & 9-11
- *Placement – it's all about opening doors*
- Graduate school
- Engineering vs. other professions
- Large companies vs. small
- Rhodes, Fulbright, Marshall, etc.



Finances and operating expenses

- Estimating costs
  - construction (x2)
- Budgeting
  - uncertainty
  - *"just in case"*
  - mentality: quality vs. sustainability
- Benchmarking
- Current numbers:
  - Endowment = $350 million
  - Operating budget = $32 million
  - Enrollment = 320
  - Employees = 100

Governance

- *Trust!*
- Board growth: 5 → 25
- Transition to committees
- Role of the Founders
- Endowment management

- *President's Council*

- Internal governance
- President's Cabinet
- CDMB
- Academic freedom (& responsibility)

Continuous Improvement

1. Learn to *listen well*, we can always learn from others outside of our community
2. Seek *objective measurement* of everything we do, to guide our efforts to improve
3. Accept the occasional need for *radical change*, not all necessary improvement is incremental

- Vice President for Innovation and Research
- Expiration dates on everything
- Organizational health survey
- 360-degree evaluation

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Innovation and Diversification in Higher Education

Dirk Van Damme

Head of CERI

OECD/EDU

Innovation

The higher education institutions of the 21st century need to be much more innovative to successfully address the challenges of knowledge societies

- 20th century massification leading to standardization
- Challenges of expansion, access, equity, diversity and success can only be met by real efficiency gains in teaching and learning arrangements
- The quest for 'excellence' is sometimes leading to innovation, but often diverting institutional energies

Innovation

CERI's work on human capital strand in OECD's *Innovation Strategy*

- Skills for innovation
- Innovation in education, including technology

•Towards an open model of innovation

- Need for new top-level knowledge; more science & technology qualifications
- But also a much broader skills base: '21st century skills', 'skills for innovation', 'soft skills', such as: creativity, entrepreneurship, critical thinking, etc.

Diversification

The 21st century knowledge economies need much more diversified higher education systems

- The 'convergence as similarity' illusion, for example in Europe's Bologna Process
- More institutional diversity is needed to address all challenges and to avoid institutional mission overload
- Multi-dimensional evidence (instead of reputation) is needed to make institutional diversity transparent,
- but existing rankings offer a too simplistic view on the complexities of knowledge creation and transfer

Diversification

The 21st century knowledge economies need much more diversified higher education systems

- Concentration of 'world-class' research universities in some parts of the world, expansion in other parts should create a level-playing field
- We also need to value 'world-class' universities in teaching & learning
- Towards more open systems of knowledge transfer, distribution, etc.

Conclusions

- We need world-class universities and more global competition at the frontiers of knowledge
- We also need many other types of institutions, also with high added-value in learning
- Institutions should innovate more drastically to address challenges and make efficiency gains
- Diversification of the global HE system needs transparency based on evidence and multi-dimensional

www.oecd.org/edu/ceri

THANK YOU !