The role of University as a catalyst for science, technology and society

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Globalisation: facilitators

- Ease of mobility
- Fall of transportation costs
- Information and Communication Technology
- Role of Multinational Enterprises and emergence of a more global/internationalized share of the labor market
- English as a lingua franca (probably more an outcome than a driver though)

More interconnectedness, more visibility to and of the world
Globalisation: effects

- People mobility
  - Increasing migration
  - Increasing highly skilled migration
  - Student and academic mobility

- Liberalization and competition
  - Privatization in higher education
  - Trade in higher education, GATS
  - Economic competition for students and for first mover advantage

- Global area of higher education
  - International rankings
  - International actors: EU, WTO, etc.
  - University networks
  - Research networks

Demand for global universities?

- Expansion of HE will likely continue
  - Political factors
  - Demand of the economy
  - Projection: +15% on average by 2025 in the OECD area

- Expansion of cross-border education
  - Student and programme mobility mainly
  - Its nature may change over time

Does that imply a market for global universities?
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An «investment for the future» should stress:
- Blue skies research
- A multidisciplinary advantage
- Research and education and culture
- Knowledge transfer for a competitive economy

Top 10 Strategic Technology Trends

1. Computing Everywhere
2. The Internet of Things
3. 3D Printing
4. Advanced, Pervasive and Invisible Analytics
5. Context-Rich Systems
6. Smart Machines
7. Cloud/Client Computing
8. Software-Defined Applications and Infrastructure
9. Web-Scale IT
10. Risk-Based Security and Self-protection
Merging the real world and the virtual world

Computing Everywhere

The Internet of Things

3D Printing

Intelligence everywhere

Advanced, Pervasive and Invisible Analytics

Context-Rich Systems

What is Watson?

From hospitals to kitchens, Watson has clocked in to work and is already taking impressive strides across industries. But to understand the power of Watson, we must first understand cognitive computing and how it enhances, scales, and accelerates human expertise.
The new IT reality emerges

Social, Mobility, Analytics, Cloud

- Internet of things

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Investments priorities

<table>
<thead>
<tr>
<th>Rank</th>
<th>Investment priority</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BI/analytics</td>
<td>41%</td>
<td>50%</td>
</tr>
<tr>
<td>2</td>
<td>Infrastructure and data center</td>
<td>31%</td>
<td>37%</td>
</tr>
<tr>
<td>3</td>
<td>Cloud</td>
<td>27%</td>
<td>32%</td>
</tr>
<tr>
<td>4</td>
<td>ERP</td>
<td>26%</td>
<td>34%</td>
</tr>
<tr>
<td>5</td>
<td>Mobile</td>
<td>24%</td>
<td>36%</td>
</tr>
<tr>
<td>6</td>
<td>Digitalization/digital marketing</td>
<td>17%</td>
<td>11%</td>
</tr>
<tr>
<td>7</td>
<td>Security</td>
<td>13%</td>
<td>11%</td>
</tr>
<tr>
<td>8</td>
<td>Networking, voice and data comms</td>
<td>12%</td>
<td>12%</td>
</tr>
<tr>
<td>9</td>
<td>Customer relationship/experience</td>
<td>11%</td>
<td>8%</td>
</tr>
<tr>
<td>10</td>
<td>Industry-specific applications</td>
<td>9%</td>
<td>10%</td>
</tr>
<tr>
<td>11</td>
<td>Legacy modernization</td>
<td>7%</td>
<td>7%</td>
</tr>
<tr>
<td>12</td>
<td>Enterprise applications</td>
<td>6%</td>
<td>2%</td>
</tr>
</tbody>
</table>

ICT in higher education 2014 survey

Applications in cloud

<table>
<thead>
<tr>
<th>Application</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email</td>
<td>87%</td>
</tr>
<tr>
<td>Social networking</td>
<td>40%</td>
</tr>
<tr>
<td>Course/Learning Management (LMS or CMS)</td>
<td>50%</td>
</tr>
<tr>
<td>Data Storage</td>
<td>34%</td>
</tr>
<tr>
<td>Library applications</td>
<td>38%</td>
</tr>
<tr>
<td>Business continuity/disaster recovery</td>
<td>25%</td>
</tr>
<tr>
<td>CRM</td>
<td>29%</td>
</tr>
<tr>
<td>Desktop tools (i.e. MS Office)</td>
<td>33%</td>
</tr>
<tr>
<td>Portal</td>
<td>20%</td>
</tr>
<tr>
<td>Data Center</td>
<td>13%</td>
</tr>
<tr>
<td>Student applications (registration, enrollment..)</td>
<td>15%</td>
</tr>
<tr>
<td>Financial application</td>
<td>15%</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>8%</td>
</tr>
</tbody>
</table>

Emerging technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Security</td>
<td>20%</td>
</tr>
<tr>
<td>Analytics and Big Data</td>
<td>10%</td>
</tr>
<tr>
<td>Mobile/BYOD</td>
<td>10%</td>
</tr>
<tr>
<td>Wireless</td>
<td>9%</td>
</tr>
<tr>
<td>Network and bandwidth issues</td>
<td>6%</td>
</tr>
<tr>
<td>Cloud</td>
<td>6%</td>
</tr>
<tr>
<td>Adaptive Learning/MOOCs</td>
<td>5%</td>
</tr>
<tr>
<td>Data management and storage</td>
<td>5%</td>
</tr>
<tr>
<td>Virtualization</td>
<td>4%</td>
</tr>
<tr>
<td>Business intelligence and CRM</td>
<td>4%</td>
</tr>
<tr>
<td>SaaS/PaaS</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>11%</td>
</tr>
</tbody>
</table>
The future of employment

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Probability of massive reduction of occupation by 2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telemarketers</td>
<td>99%</td>
</tr>
<tr>
<td>Accountants &amp; Auditors</td>
<td>94%</td>
</tr>
<tr>
<td>Retail Salespersons</td>
<td>92%</td>
</tr>
<tr>
<td>Real Estate Sales Agents</td>
<td>86%</td>
</tr>
<tr>
<td>Structural Iron and Steel Workers...</td>
<td>83%</td>
</tr>
<tr>
<td>Machinists</td>
<td>65%</td>
</tr>
<tr>
<td>Audio and Video Technicians</td>
<td>55%</td>
</tr>
<tr>
<td>Taxi drivers/drivers</td>
<td>55%</td>
</tr>
<tr>
<td>Firefighters</td>
<td>17%</td>
</tr>
<tr>
<td>Chemical Engineers</td>
<td>2%</td>
</tr>
<tr>
<td>Music Directors and Composers</td>
<td>1.6%</td>
</tr>
<tr>
<td>Marine Engineers - Naval</td>
<td>1.0%</td>
</tr>
<tr>
<td>Architects</td>
<td>0.8%</td>
</tr>
<tr>
<td>Clergy</td>
<td>0.8%</td>
</tr>
<tr>
<td>Athletic Trainers</td>
<td>0.7%</td>
</tr>
<tr>
<td>Dentists</td>
<td>0.4%</td>
</tr>
<tr>
<td>Source: Bureau of labor statistics, the Future of Employment (Frey &amp; Osborne, 2013)</td>
<td></td>
</tr>
</tbody>
</table>

Industry 4.0

The 4th Industrial Revolution - "Industry 4.0"

1st: 1782 Power generation Mechanical automation
2nd: 1913 Industrialization
3rd: 1954 Electronic Automation
4th: 2015 Smart Automation

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Scenarios for higher education systems

Scenario 1: Serving local communities

- Drivers
  - Backlash against globalization
  - More geo-strategic sensitivity in research

- Features
  - (Re)focus on national and local missions
  - Public funding and control of the academic profession
  - Convergence between universities and polytechnics
  - Elite universities **struggle to stay more internationalized**
  - **Less research**, mainly on humanities
  - Big science relocated to government sector (more secretive and less internationalized)

- Related developments
  - Highlight of regional missions
  - Anti-globalization movements

Source: Stéphan Vincent-Lancrin - OECD - www.oecd.org/edu/universityfutures
Scenario 2: New public responsibility

- **Drivers**
  - **Pressure on public budget** (ageing, public debt, etc.)
  - Diffusion of governance structures based on new public management
- **Features**
  - Mainly public funding but autonomous institutions controlled at arm’s length (incentives + accountability)
  - **Mixed funding**: new markets + more tuition fees (income contingent loans)
  - **Demand-driven system** with more marked division of labor (specialization but most HEIs continue to do some research)
  - Research funds allocated through *domestic competitive process*
- **Related developments**
  - Autonomy given to HEIs (sometimes legally privatized)
  - Debates on cost sharing
  - Encouragement of competition between HEIs

Source: Stéphan Vincent-Lancrin - OECD - www.oecd.org/edu/universityfutures

Scenario 3: Higher education, Inc.

- **Drivers**
  - **Trade liberalization in education** (GATS, bilateral)
- **Features**
  - **Global competition** for education & research services
  - Public funding for non-commercially viable disciplines exclusively
  - **Segmentation** of the education and research market
  - Vocational higher education is an important share of the market
  - Strong (international) division of labor according to competitive advantage
  - Concentration of research and worldwide competition for funding
  - **English as main language** of study
- **Related developments**
  - Rise of trade in HE & inclusion of education in trade negotiations
  - International competition for students
  - Increase of cross-border funding of research

Source: Stéphan Vincent-Lancrin - OECD - www.oecd.org/edu/universityfutures
Scenario 4: Open Networking

- Drivers
  - International cooperation & harmonization of systems
  - Technology
  - Ideal of open knowledge

- Features
  - Intensive networking among institutions, scholars, students (& industry)
  - Modularization of studies under academics’ control
  - International collaborative research
  - Strong hierarchy between networks but quick spillovers
  - Lifelong learning outside the HE sector

- Related developments
  - Bologna process, international academic partnerships and consortia,
  - Increasing computing power and culture of openness challenging traditional intellectual property rights

Source: Stéphan Vincent-Lancrin - OECD - www.oecd.org/edu/universityfutures

Collaboration, cooperation, networking... some proposals

- Joint pool and exchange of on-line courses
- Distant join use of research equipment by remote operators
- A common framework of joint summer schools
- On-line seminars directly broadcasted form research centers labs for high school classes
- Use of ICT for the development of social sciences and humanities
- Identification of common cross-borders smart specialization strategies
The ALADIN (ALpe Adria Danube universities INitiative) network

Established in Ljubljana on 23rd October 2002 by
- Karl-Franzens University Graz (Austria),
- University of Rijeka (Croatia),
- University of Trieste (Italy) and
- University of Maribor (Slovenia)

as an international network working at regional level
- to share common ideas and knowledge in teaching and research activities in the field of e-Commerce and ICT
- to cooperate creating mobility of students and professors, offering common lectures, creating virtual teams of students from different universities and professors lecturing at different universities,
- in order to harmonize with global and international activities of e-Commerce, involving SMEs

Today, universities, associated centers of excellence and Living Labs located in 11 European countries, namely Austria, Bosnia & Herzegovina, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Italy, Serbia, Slovakia and Slovenia, are represented.
21st Century Learning Competencies

- “We are responsible for preparing our students to address problems we cannot foresee with knowledge that has not yet been developed using technology not yet invented.”

- “The problems we have cannot be solved at the same level of thinking at which we created them.”

Albert Einstein

Is Higher Education Primarily for Economic Gain?
If you think education is expensive, try ignorance

Derek Bok - Presidente of Harvard University 1971-1990