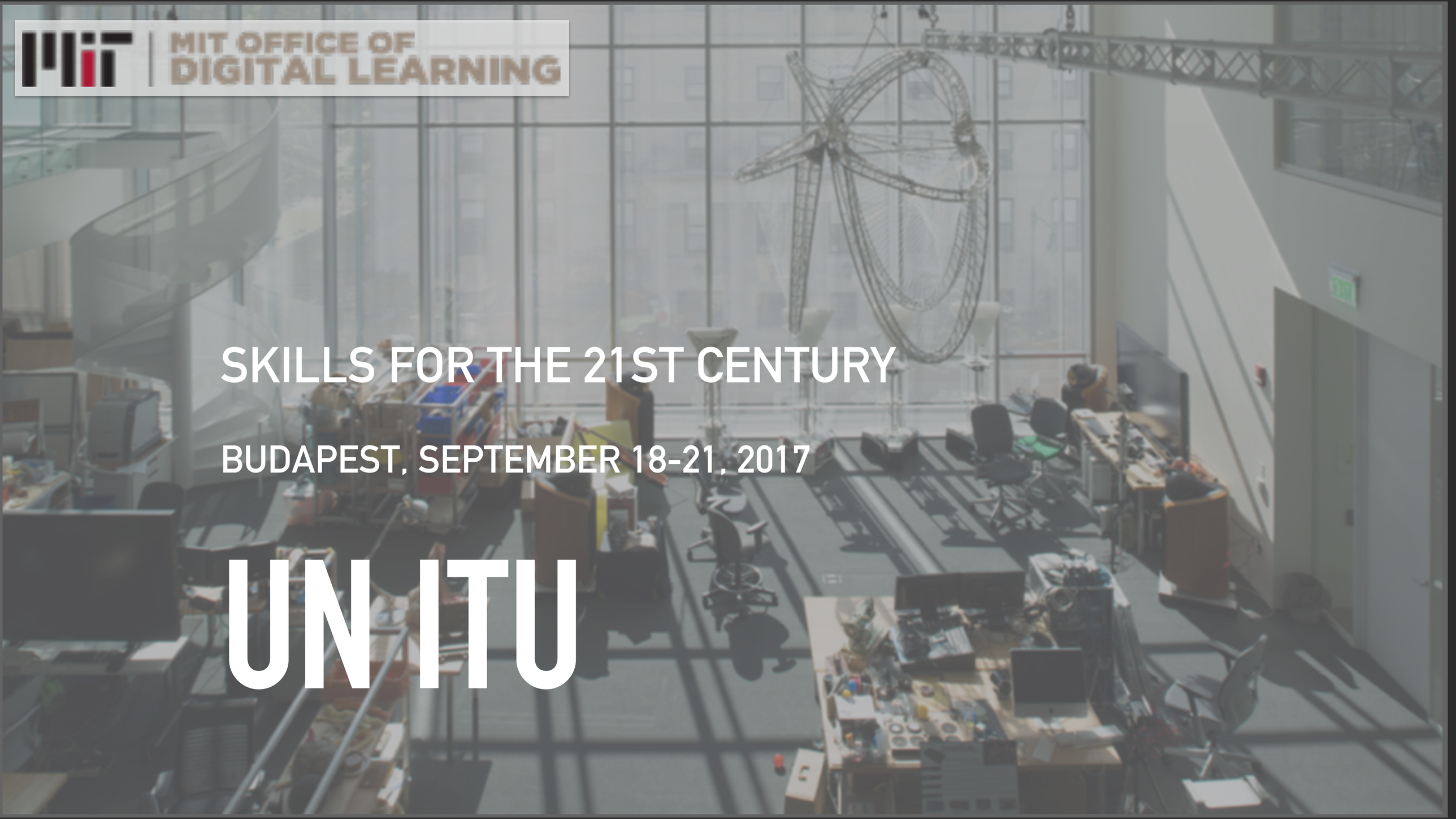

MIT OFFICE OF
DIGITAL LEARNING
SKILLS FOR THE 21ST CENTURY
BUDAPEST, SEPTEMBER 18-21, 2017
UN ITU

# IMPORTANT NOTE

The views expressed in this presentation and its associated discussion are those of the speaker and do not constitute an official position of the Massachusetts Institute of Technology.

# ENRIQUE SHADAH

Head, MIT Workplace Learning Collaborative

15+ Years Venture Creation

10+ Years Advisory

5+ Years Academia-Industry Collaborations

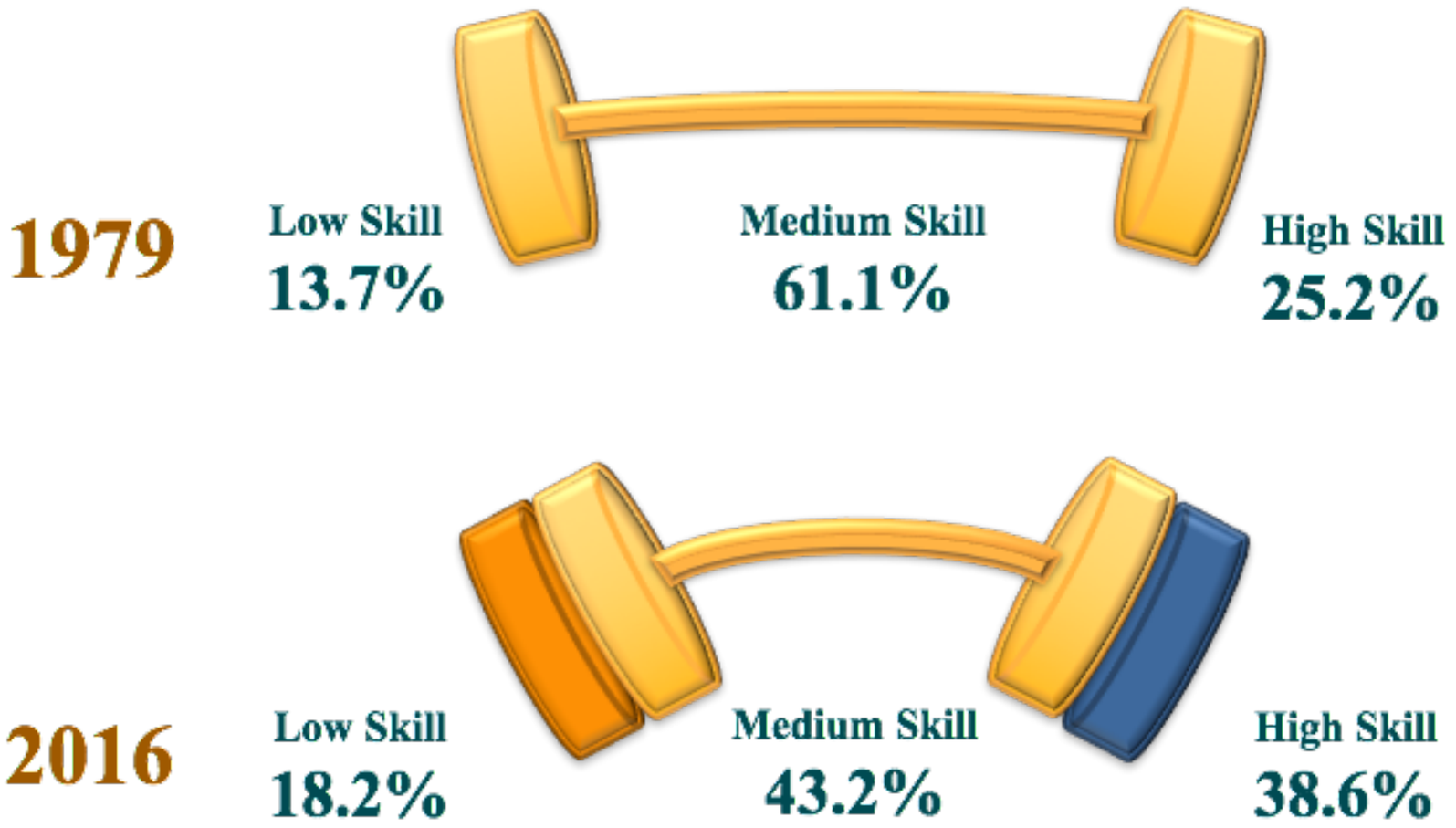
# ROLE OF ACADEMIC INSTITUTIONS

- The characteristics of the future digital ecosystem
- The role universities are playing in shaping the future digital ecosystem
- The sets of skills required for the future
- New academic programs and changes in the curriculum to better prepare 21st century students

# LOOK AT THE SYSTEM

- Employment and employment readiness
- Learning and training and practice
- Science-informed pedagogy

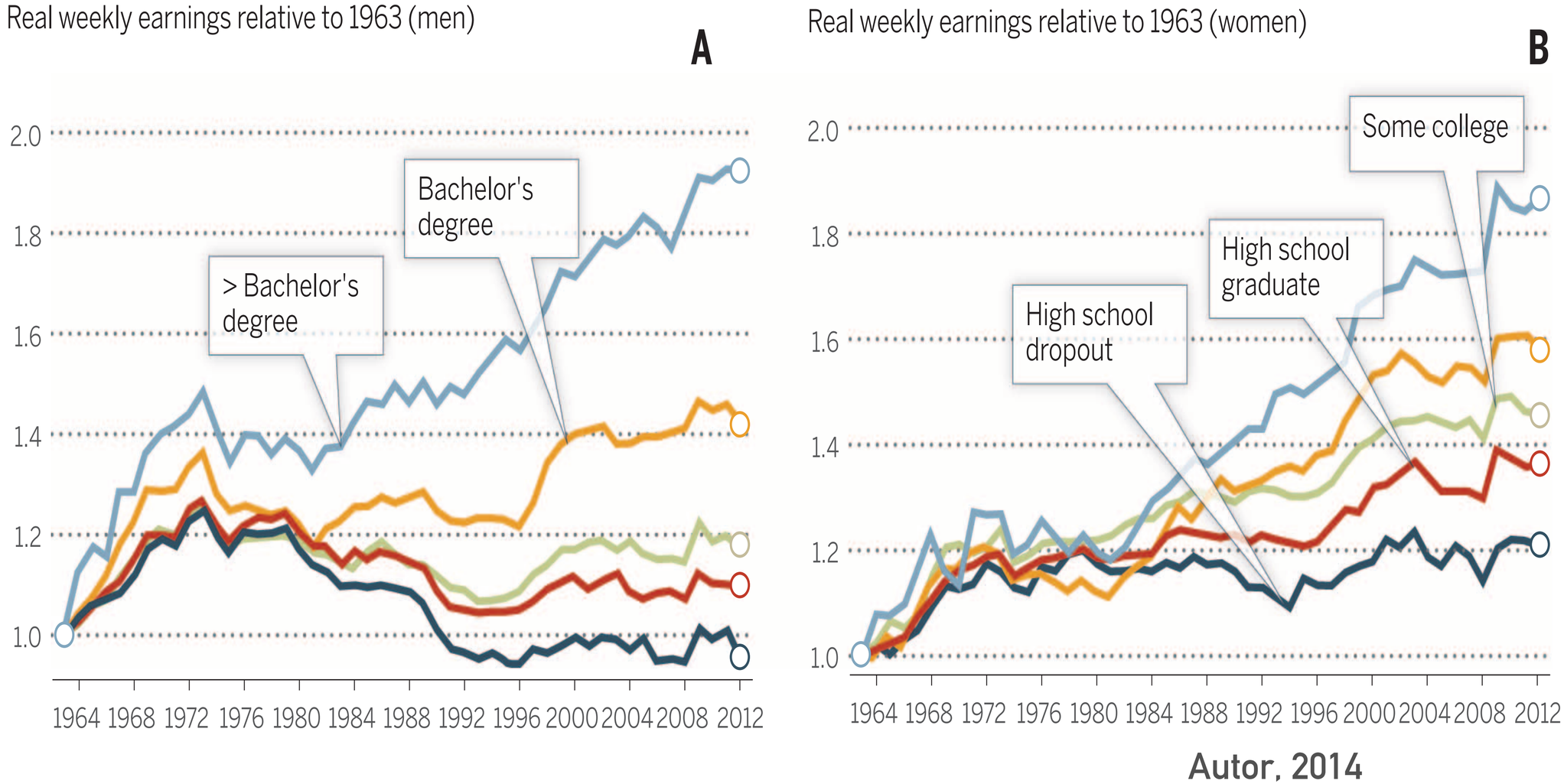
# JOB POLARIZATION




Tüzemen and Willis 2013
Autor and Dorn 2013

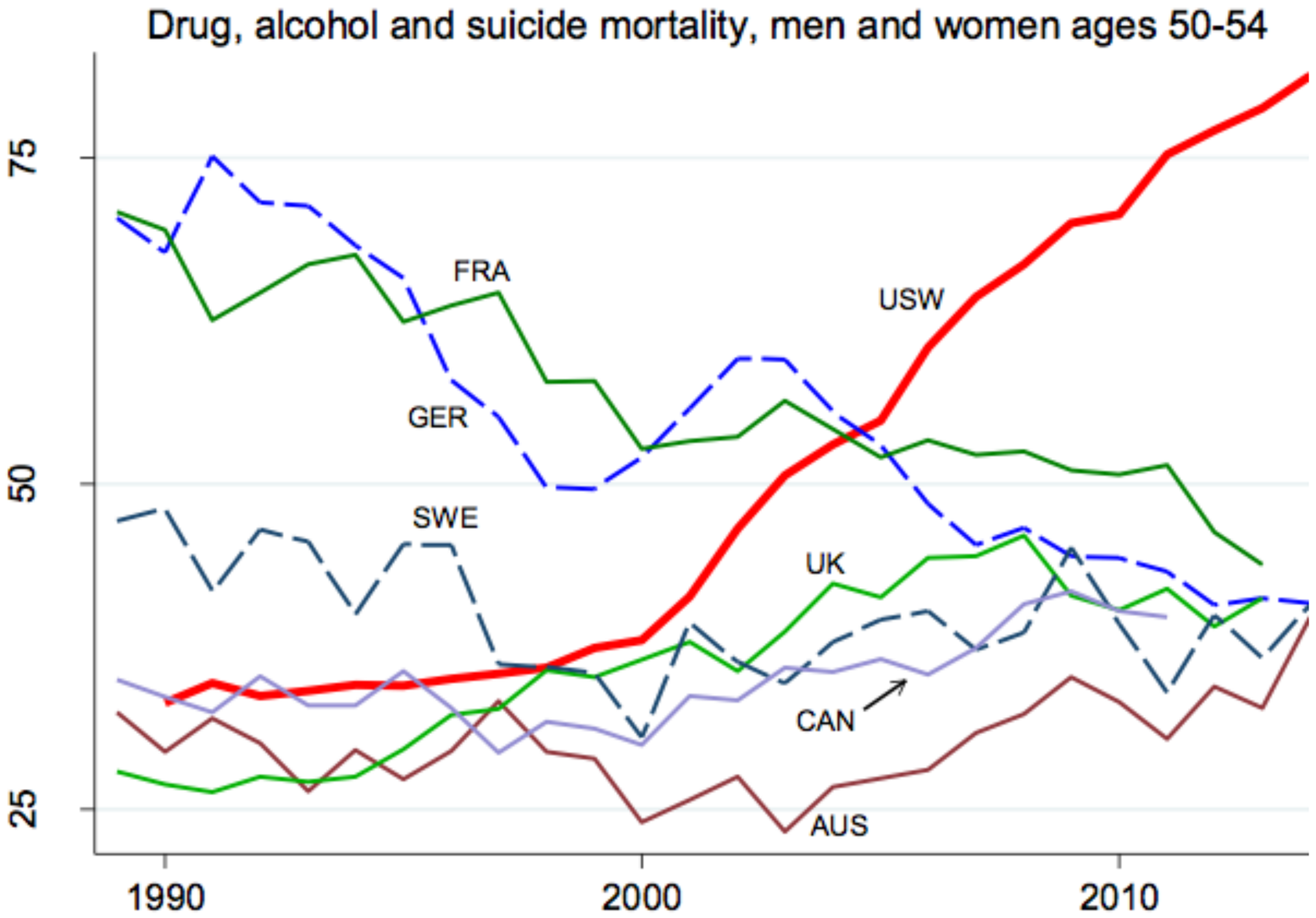
# MUST DEAL WITH CONSEQUENCES

## Diverging: Earnings of College Grads Rose 40 – 80% in 1980 – 2012, Earnings of High School or Lower Stagnated or Fell 20%




Autor, 2014

# MUST DEAL WITH CONSEQUENCES

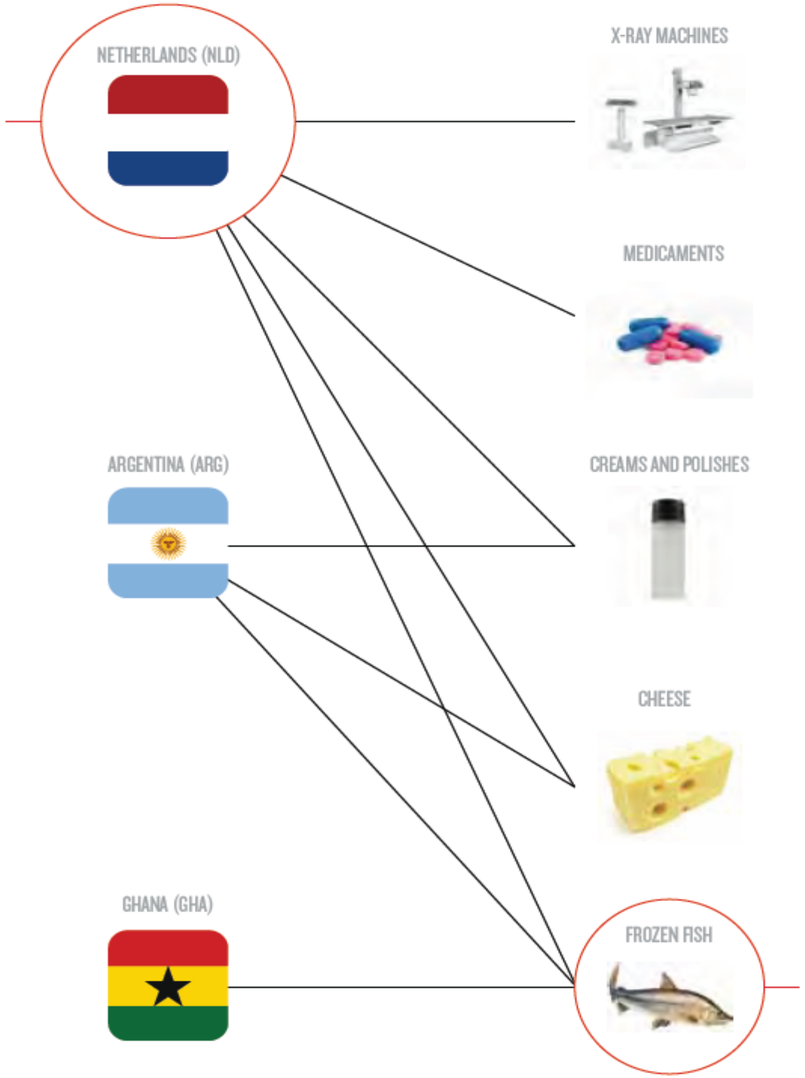



Joblessness is Not Exclusively About Income

Case and Deaton 2017

# LOOK AT PRODUCT SPACE VIA INDUSTRY–LOCATION NETWORKS

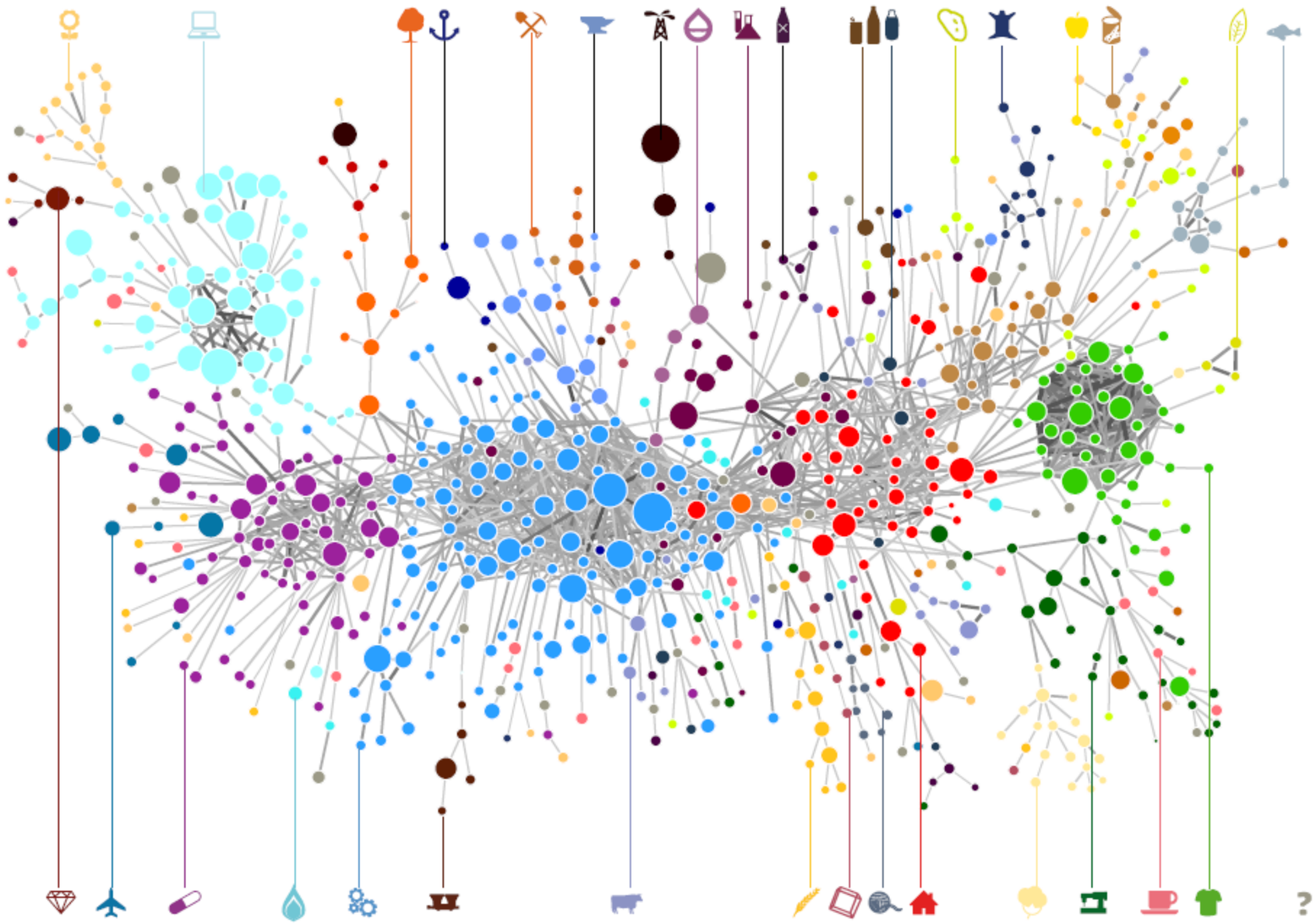
**DIVERSITY ($k_{c,0}$):**
Diversity is related to the number of products that a country is connected to. This is equal to the number of links that this country has in the network. In this example, using a subset of the 2009 data, the diversity of Netherlands is 5, that of Argentina is 3, and that of Gana is 1.




**UBIQUITY ($k_{p,0}$):**
Ubiquity is is related to the number of countries that a product is connected to. This is equal to the number of links that this product has in the network. In this example, using a subset of the 2009 data, the ubiquity of Cheese is 2, that of Fish is 3 and that of Medicaments is 1.

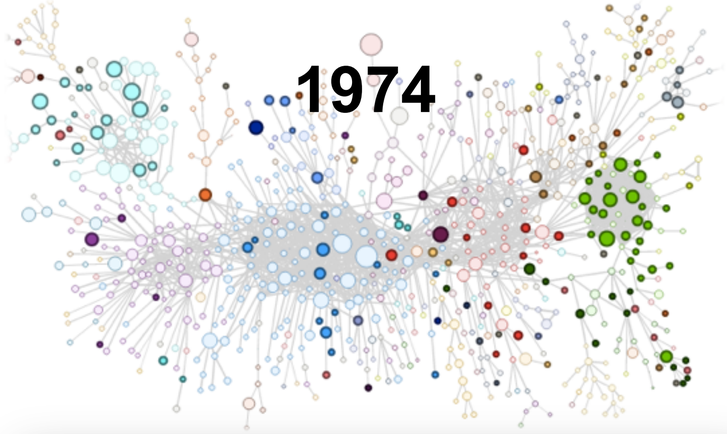
Cesar Hidalgo,
MIT Media Lab

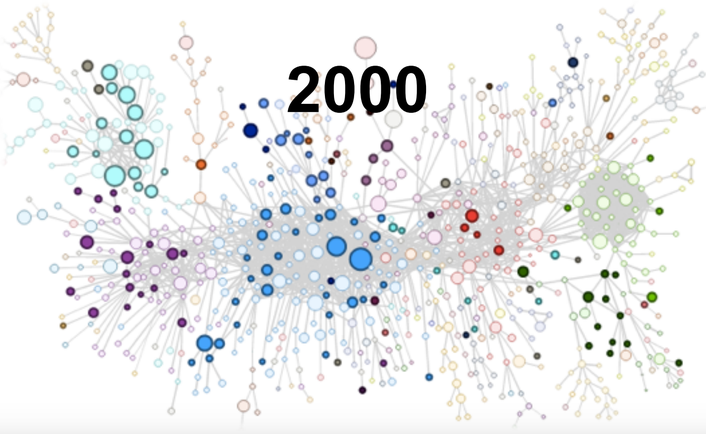
# WHAT IS A PRODUCT SPACE?

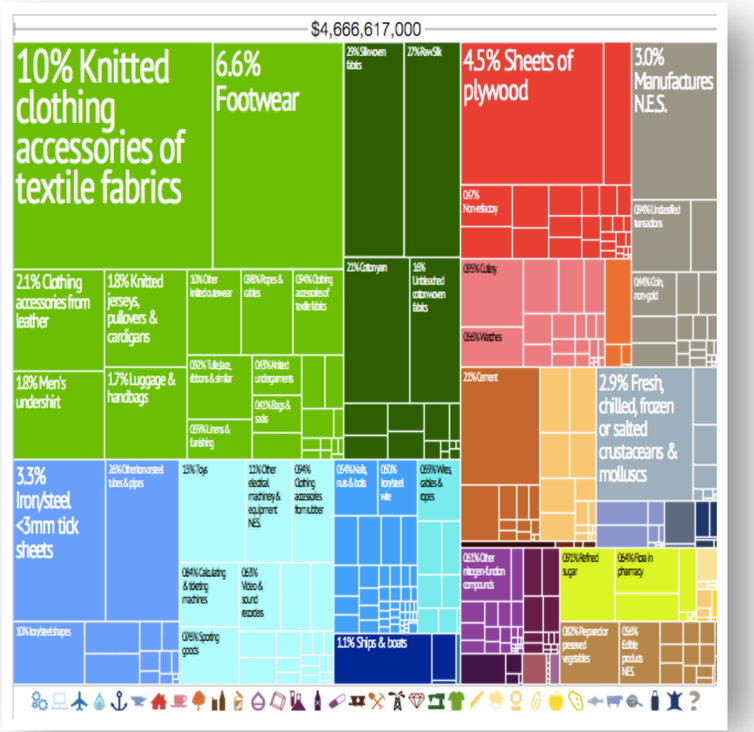


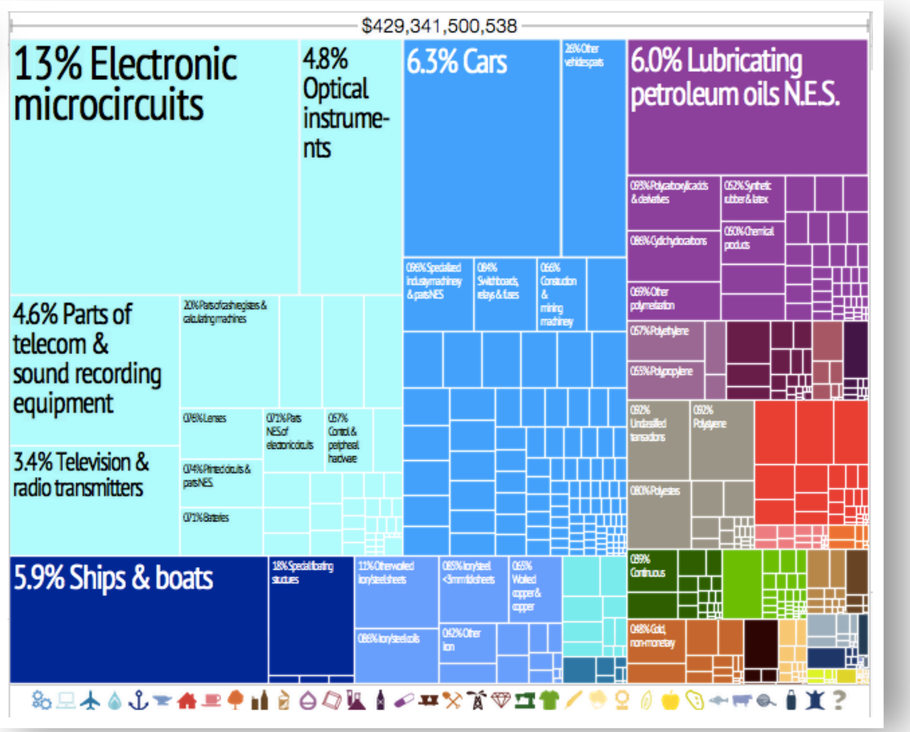
Hausmann, Hidalgo et al.
The Atlas of Economic Complexity (2011)

# DEVELOPMENT THROUGH THE EYES OF THE PRODUCT SPACE

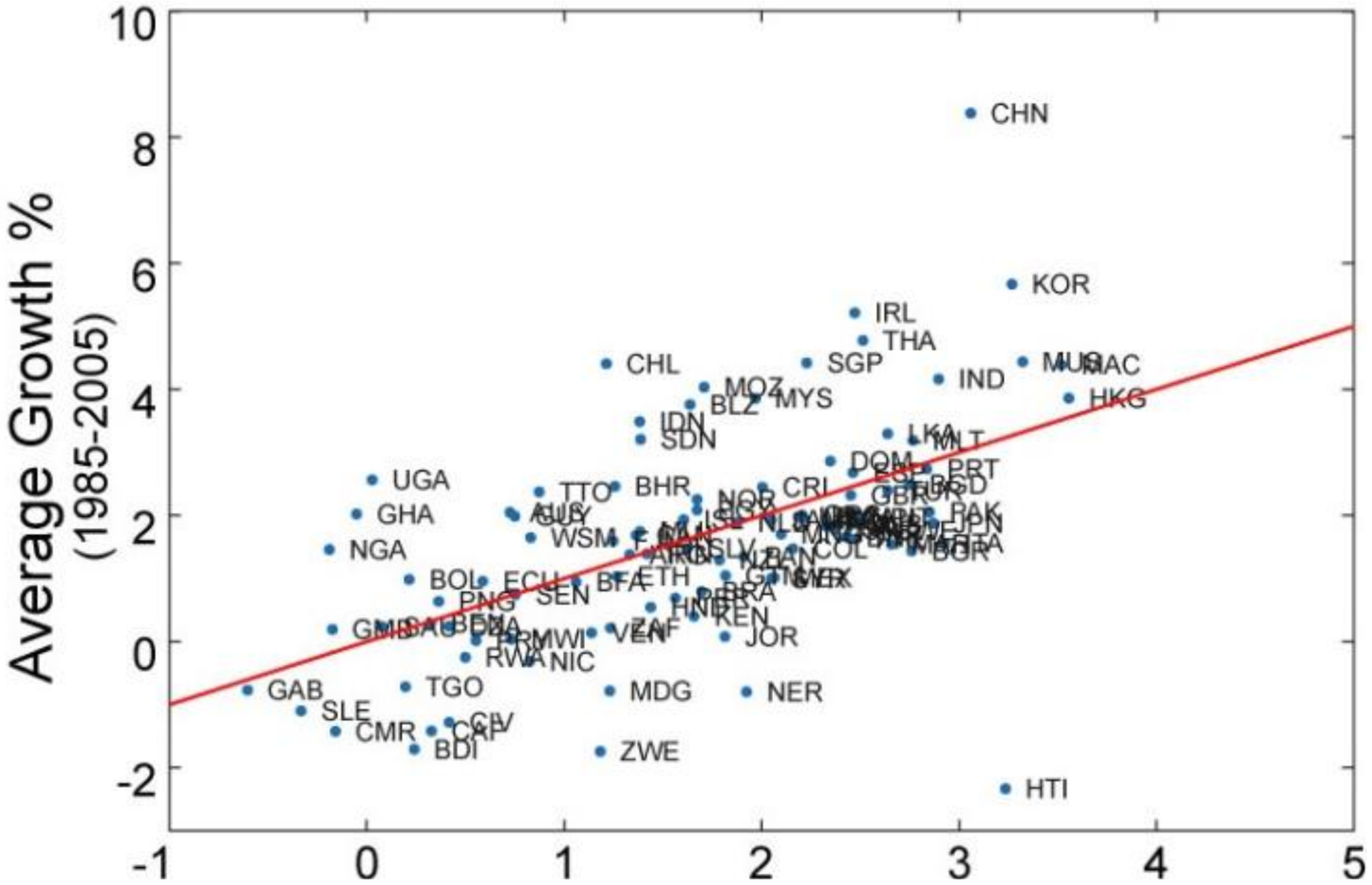


# EXCESSES OF INPUT DIVERSITY PREDICTS FUTURE GDPPC GROWTH




Complexity in 1985 (Controlling for GDP per capita at ppp)

Hidalgo, Hausmann (2009) PNAS 106(26): 10570-10575

# HOW TO LEARN?



PLURALSIGHT




…and many others…

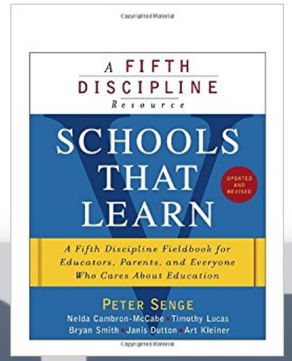
# SCIENCE CRITICAL FOR AGILE LEARNING

## Mind Wandering

John Gabrieli, Director of MITili

## Systems Thinking

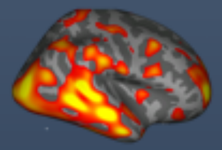
Peter Senge, MIT Sloan




## Life-long Kindergarten

Mitch Resnick, MIT Media Lab

Discovery



Development

Testing

Scaling

SCRATCH

MIT EARLY CHILDHOOD COGNITION LAB
PlayLab
AT BOSTON CHILDREN'S MUSEUM

Laura Schulz, Professor MIT

Learning From Instruction And Exploration

# APPLY SCIENCE TO THE LEARNING DISCIPLINE

| | **MITili**<br>Learning Science and Research | **J-WEL**<br>Best Practices Transfer<br>Learning Engineering | **Digital Learning**<br>Learning<br>Creation and Delivery |
|---|---|---|---|
| Workplace/ Lifelong Learning | | Workplace Learning Collaborative | Digital Learning Solutions, MicroMasters, Bootcamps |
| Higher Education | | Higher Education Collaborative | MITx, Residential MITx, OCW, MicroMasters, Bootcamps |
| Birth through pK-12 | | pK-12 Collaborative | Teaching Systems Lab |

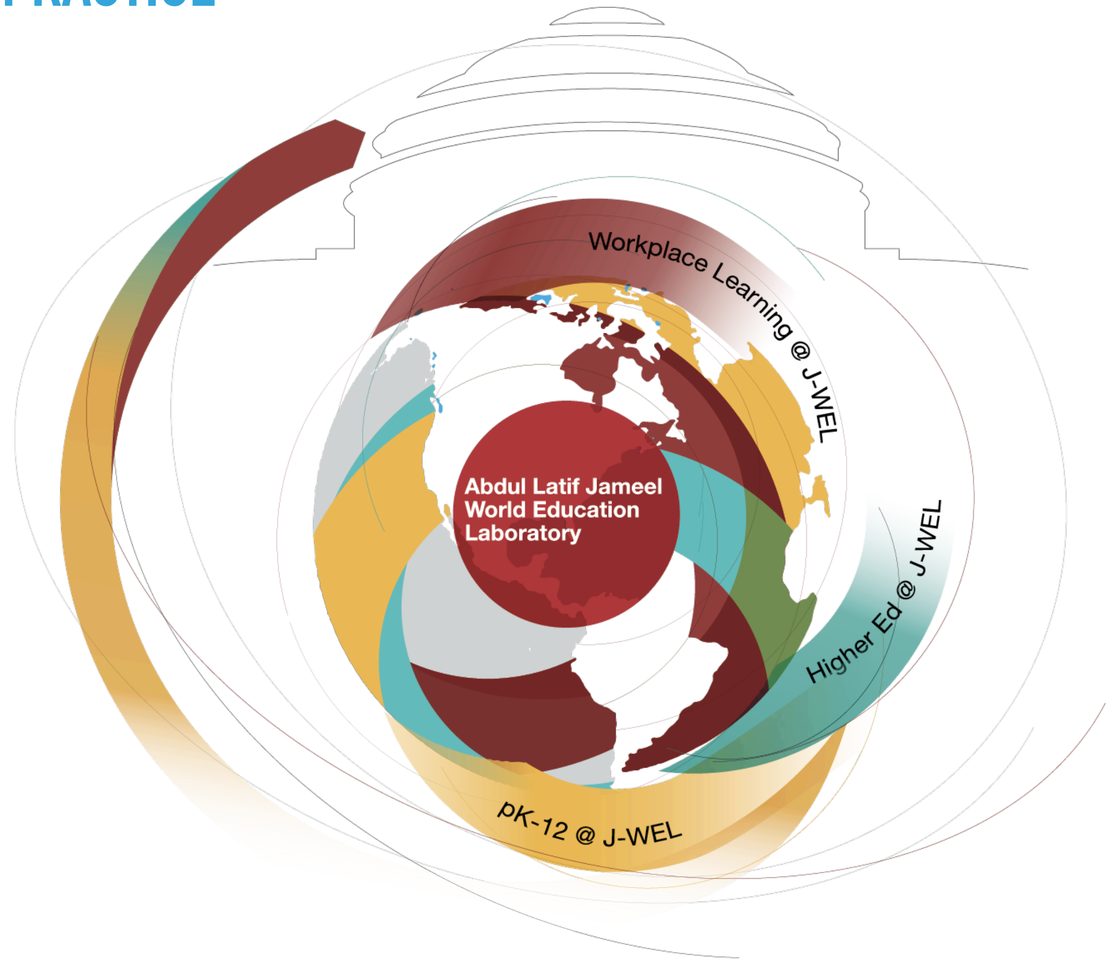
# MITILI: TESTING OF METHODS TO IMPROVE RECALL IN VIDEO-BASED INSTRUCTION

- Interpolated testing increased retention of video information by 27%
- Science of learning made videos more interesting
- Successfully detected attention and mind wandering in the brain during video training

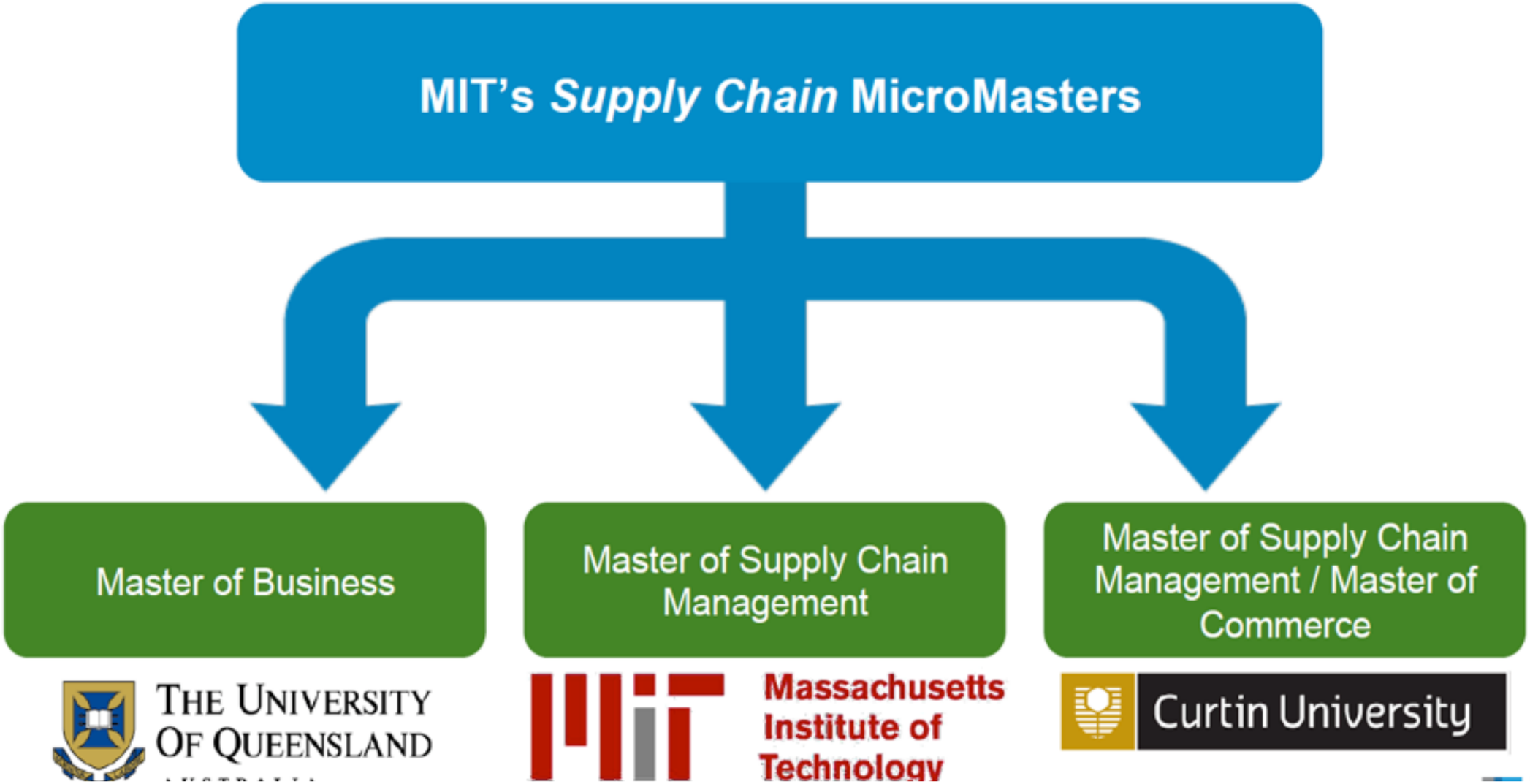

Okano, Gabrieli, MIT, 2016

# JWEL: APPLIED SCIENCE + COMMUNITY + PRACTICE

- J-WEL Weeks (Oct. 9-12, 2017)
  - Training+development
  - Outcome oriented
  - Scientist and practitioner led
- J-WEL Exchanges
  - Deep dive on specific topics
  - Focus on transformational change



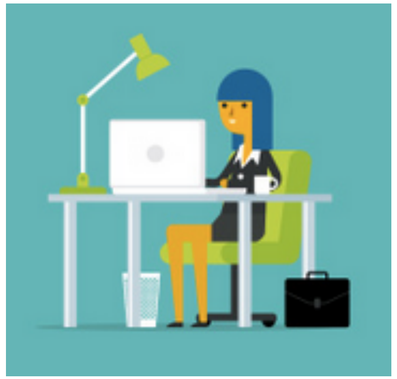
# DL: MICROMASTERS CREDENTIAL OPENS A NEW WORLD FOR LEARNERS



# MIT OFFICE OF DIGITAL LEARNING - HIGHER EDUCATION

# DL: NEW ONLINE LEARNING CONTENT, NEW EXPERIENCES

## Video

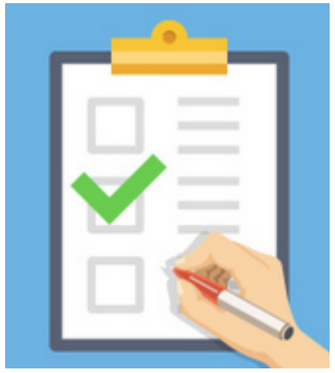


## Polls & Surveys

## Industry Expertise

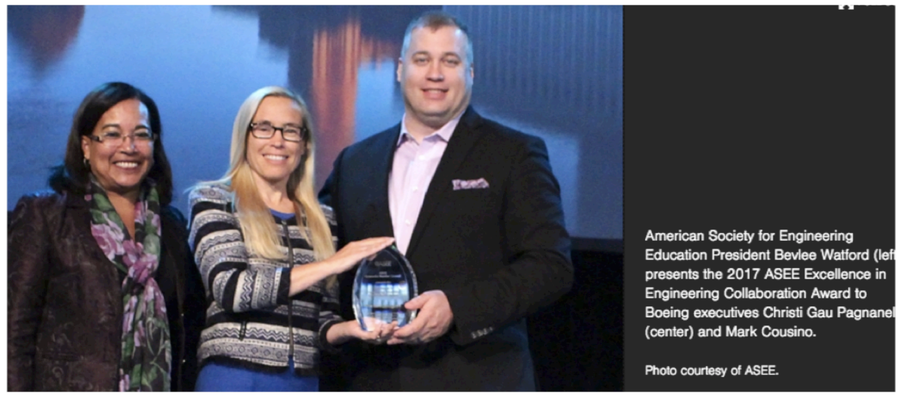
## Social

## Graded assessments



## Ungraded assessments

## Team project



American Society for Engineering Education President Bevlee Watford (left) presents the 2017 ASEE Excellence in Engineering Collaboration Award to Boeing executives Christi Gau Pagnanelli (center) and Mark Cousino.

Photo courtesy of ASEE.

# ARCHITECTURE and SYSTEMS ENGINEERING:

## MODELS and METHODS to MANAGE COMPLEX SYSTEMS

## 4-COURSE ONLINE CERTIFICATE PROGRAM



**COURSE 1:**
*Architecture of Complex Systems*

**COURSE 2:**
*Models in Engineering*

**COURSE 3:**
*Model-Based Systems Engineering*

**COURSE 4:**
*Quantitative Methods in Systems Engineering*

MIT PRESENTATION TO THE UN ITU

# APPENDIX

# **WHAT THE DATA TELL US:** COMPLEXITY OF COUNTRIES

## Top 10

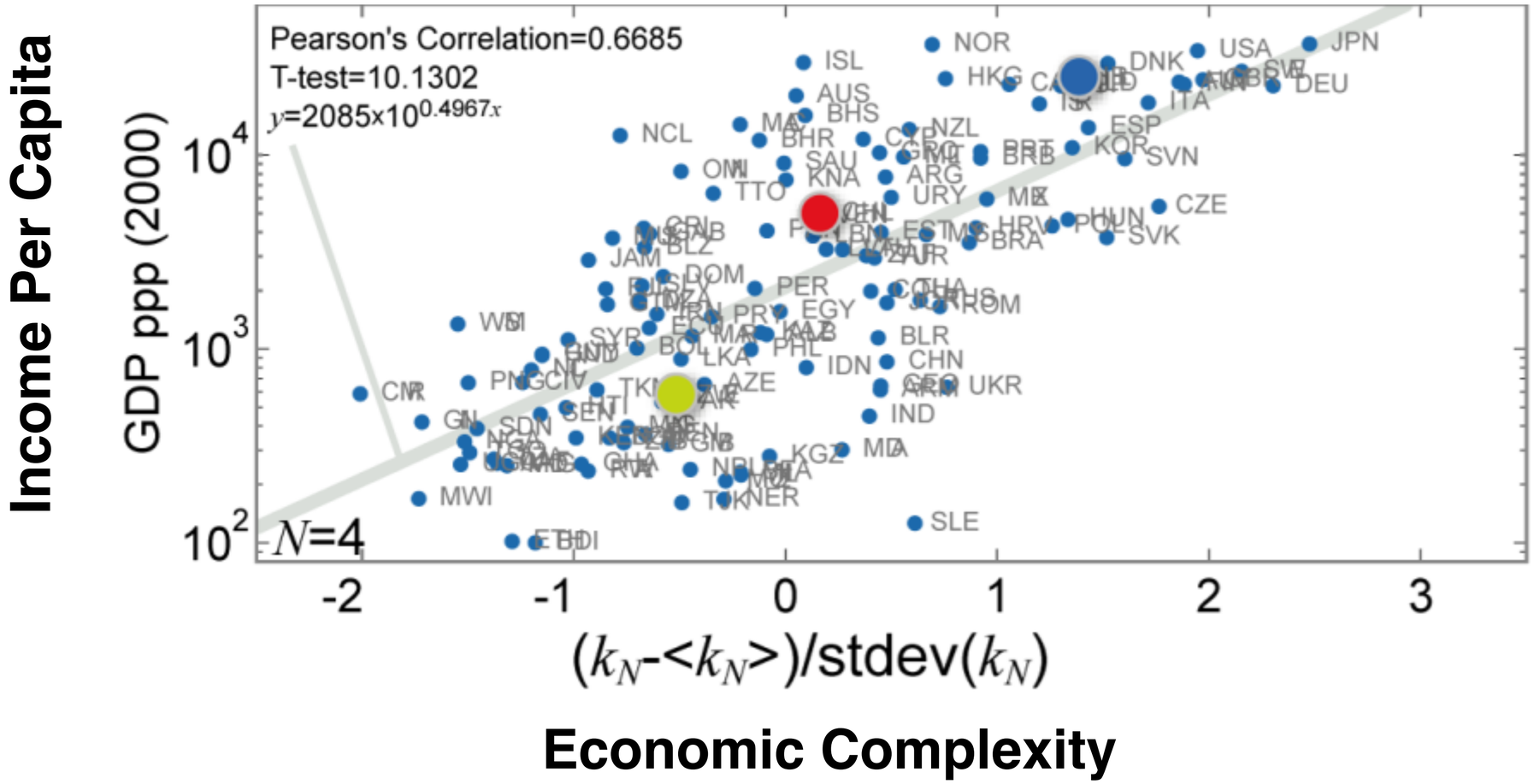
RANKING I. ECONOMIC COMPLEXITY INDEX

| RANK ECI COMPLEXITY (2008) | REGIONAL ECI RANKING | COUNTRY NAME | ISO CODE | ECI 2008 | RANK INCOME 2009 [USD] | INCOME 2009 [USD] | REGION |
|---|---|---|---|---|---|---|---|
| 1 | 1/16 | JAPAN | JPN | 2.316 | 17 | 39,738 | EAST ASIA AND PACIFIC |
| 2 | 1/16 | GERMANY | DEU | 1.985 | 16 | 40,670 | WESTERN EUROPE |
| 3 | 2/16 | SWITZERLAND | CHE | 1.935 | 3 | 63,629 | WESTERN EUROPE |
| 4 | 3/16 | SWEDEN | SWE | 1.859 | 13 | 43,654 | WESTERN EUROPE |
| 5 | 4/16 | AUSTRIA | AUT | 1.807 | 10 | 45,562 | WESTERN EUROPE |
| 6 | 5/16 | FINLAND | FIN | 1.715 | 11 | 44,581 | WESTERN EUROPE |
| 7 | 2/16 | SINGAPORE | SGP | 1.639 | 19 | 36,537 | EAST ASIA AND PACIFIC |
| 8 | 1/27 | CZECH REPUBLIC | CZE | 1.628 | 29 | 18,139 | EASTERN EUROPE AND CENTRAL ASIA |
| 9 | 6/16 | UNITED KINGDOM | GBR | 1.558 | 20 | 35,165 | WESTERN EUROPE |
| 10 | 2/27 | SLOVENIA | SVN | 1.523 | 27 | 23,726 | EASTERN EUROPE AND CENTRAL ASIA |

## Bottom 5

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 124 | 16/16 | PAPUA NEW GUINEA | PNG | -1.577 | 100 | 1,172 | EAST ASIA AND PACIFIC |
| 125 | 23/26 | CONGO, REP. | COG | -1.707 | 85 | 2,601 | SUB-SAHARAN AFRICA |
| 126 | 24/26 | SUDAN | SDN | -1.768 | 98 | 1,294 | SUB-SAHARAN AFRICA |
| 127 | 25/26 | ANGOLA | AGO | -1.793 | 75 | 4,081 | SUB-SAHARAN AFRICA |
| 128 | 26/26 | MAURITANIA | MRT | -1.907 | 113 | 919 | SUB-SAHARAN AFRICA |

# "INPUT" DIVERSITY EXPLAINS INCOME PER CAPITA




Hidalgo, Hausmann (2009) *PNAS* 106(**26**):10570-10575