Hype vs. Reality: A.I./Robotics and the impact on employability

Charles Fadel

New York City – March 19, 2014

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Our World

Volatile

Uncertain

Complex

Ambiguous

Societal Challenges

Greed

Financial Meltdown

Global Warming

Personal Privacy

Intolerance

Religious fundamentalism

Political Absolutism

Personal Challenges

Employability
Belonging
→ Happiness

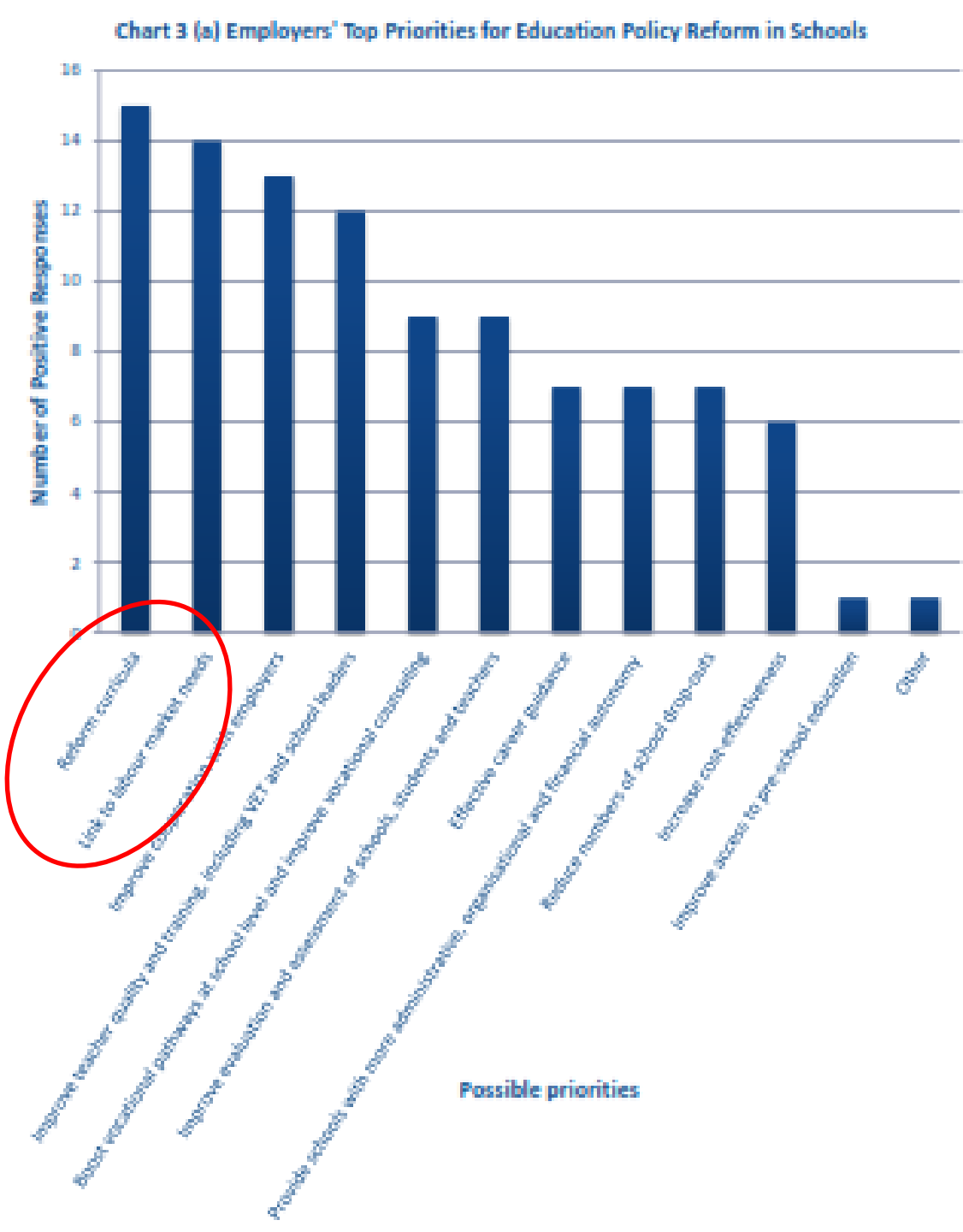
Economic Challenges

Globalization

Innovation

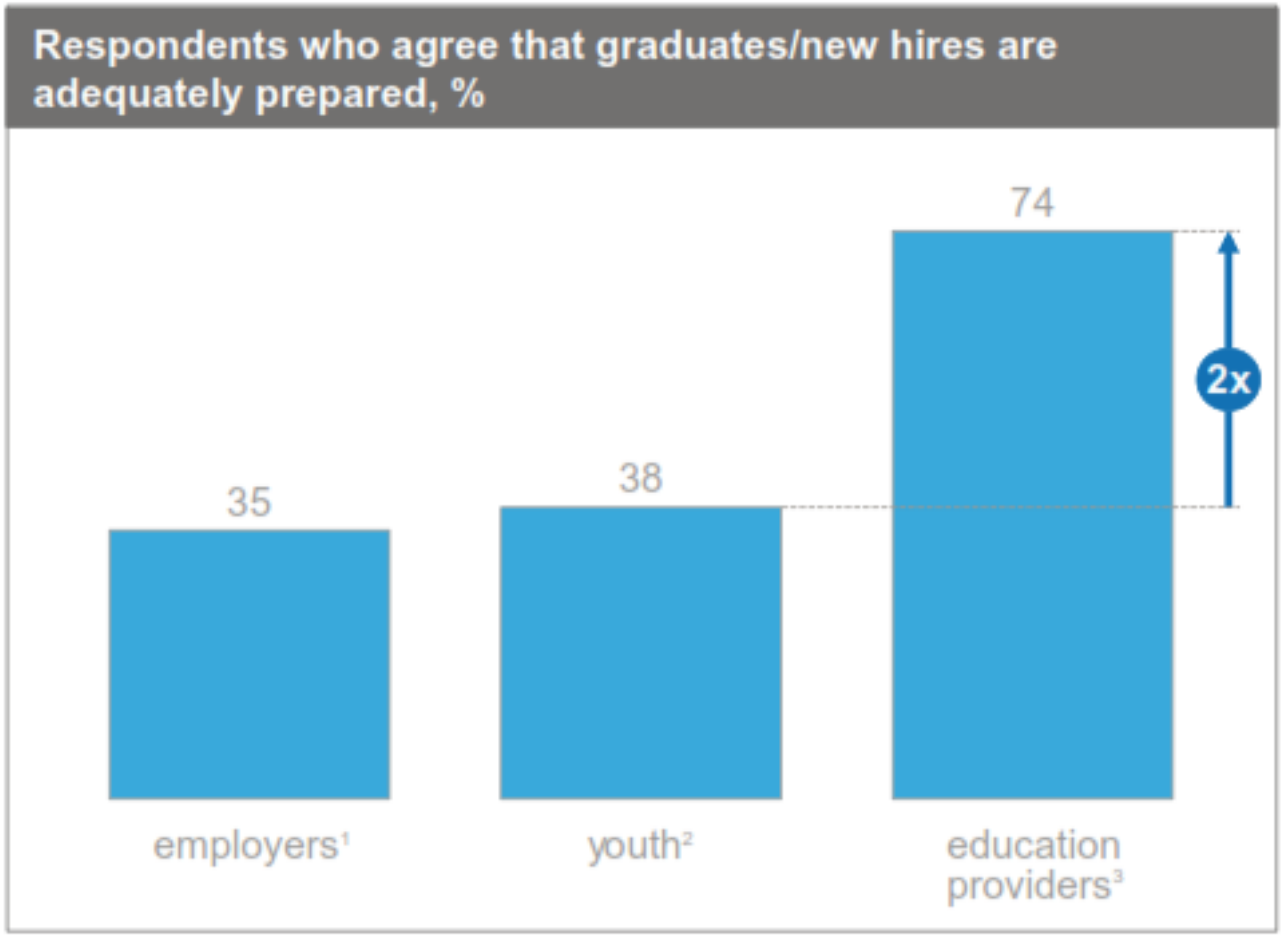
BIAC Voice of Employers Globally

1) Reform curricula
2) Link to labor market needs



Reality check

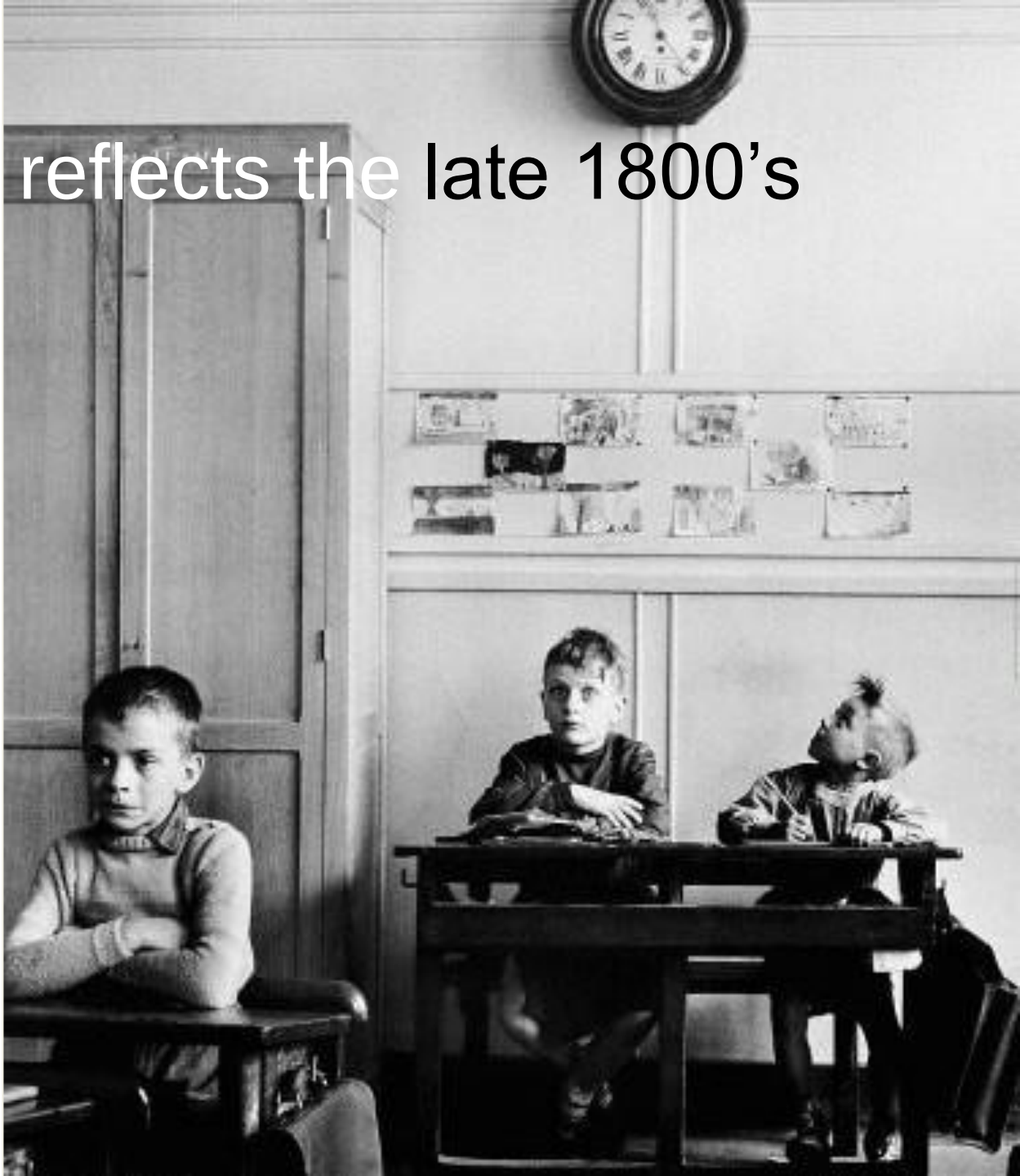
Providers are twice as likely as employers and youth to rate youth as prepared



1 Overall, the entry-level employees we hired in the past year have been adequately prepared by their prehire education and/or training.
2 Overall, I think I was adequately prepared for an entry-level position in my chosen career field.
3 Overall, graduates from my institution are adequately prepared for entry-level positions in their chosen field of study.

Source: McKinsey survey, Aug–Sept 2012, 2013

Curriculum reflects the late 1800's



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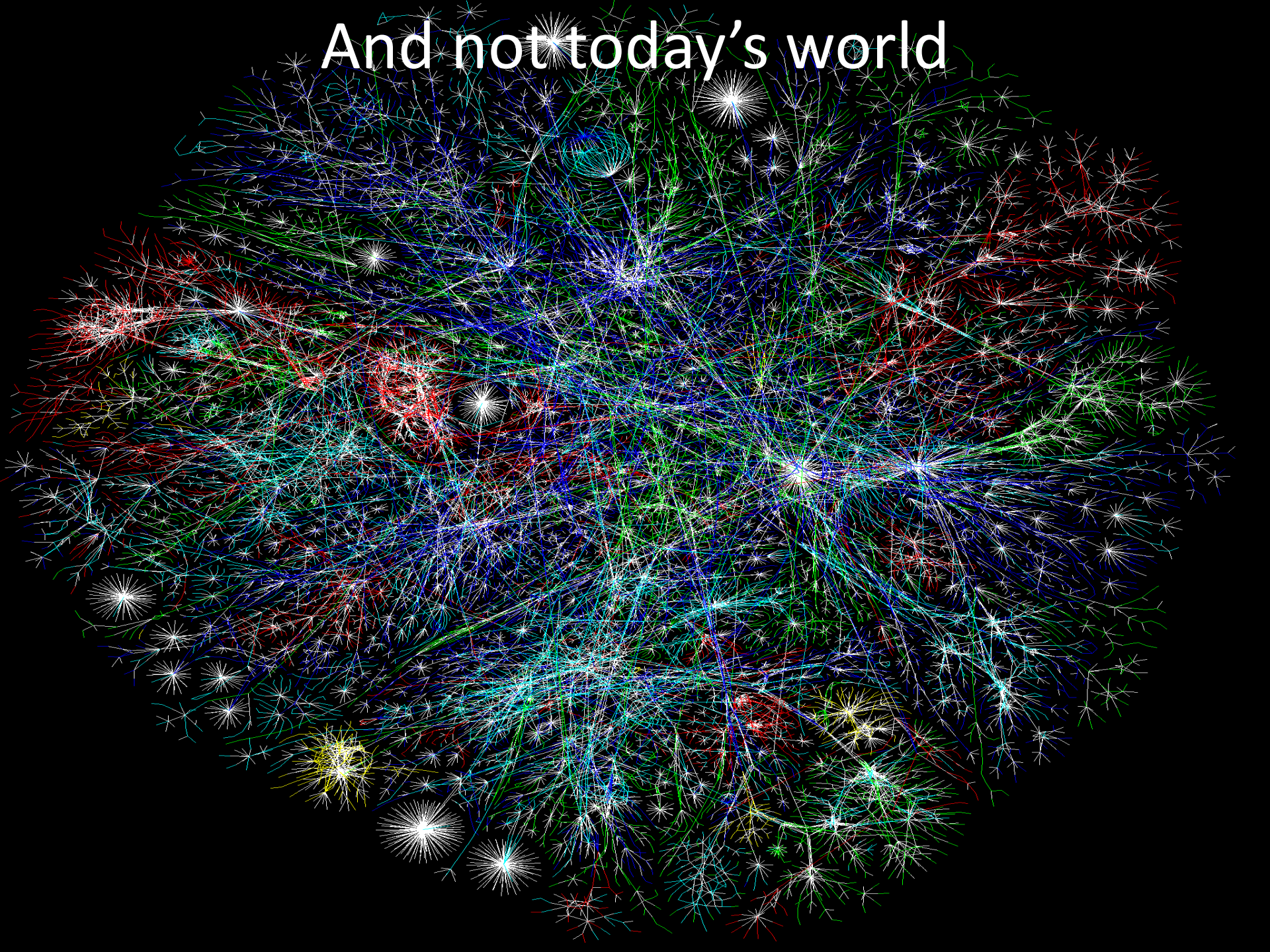
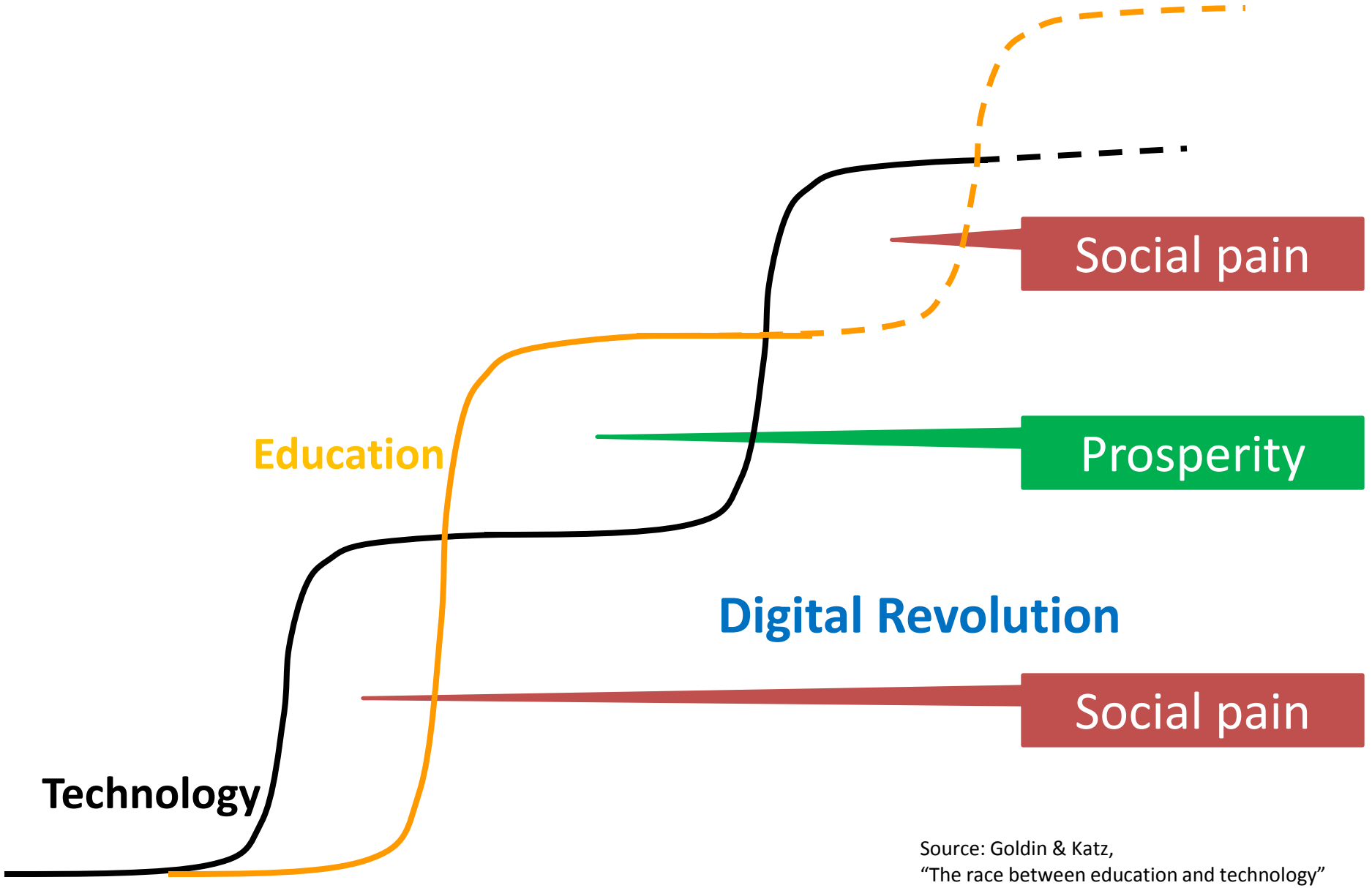
And not today's world



Nor tomorrow’s

Technology and education are in a race



Source: Goldin & Katz,
"The race between education and technology"

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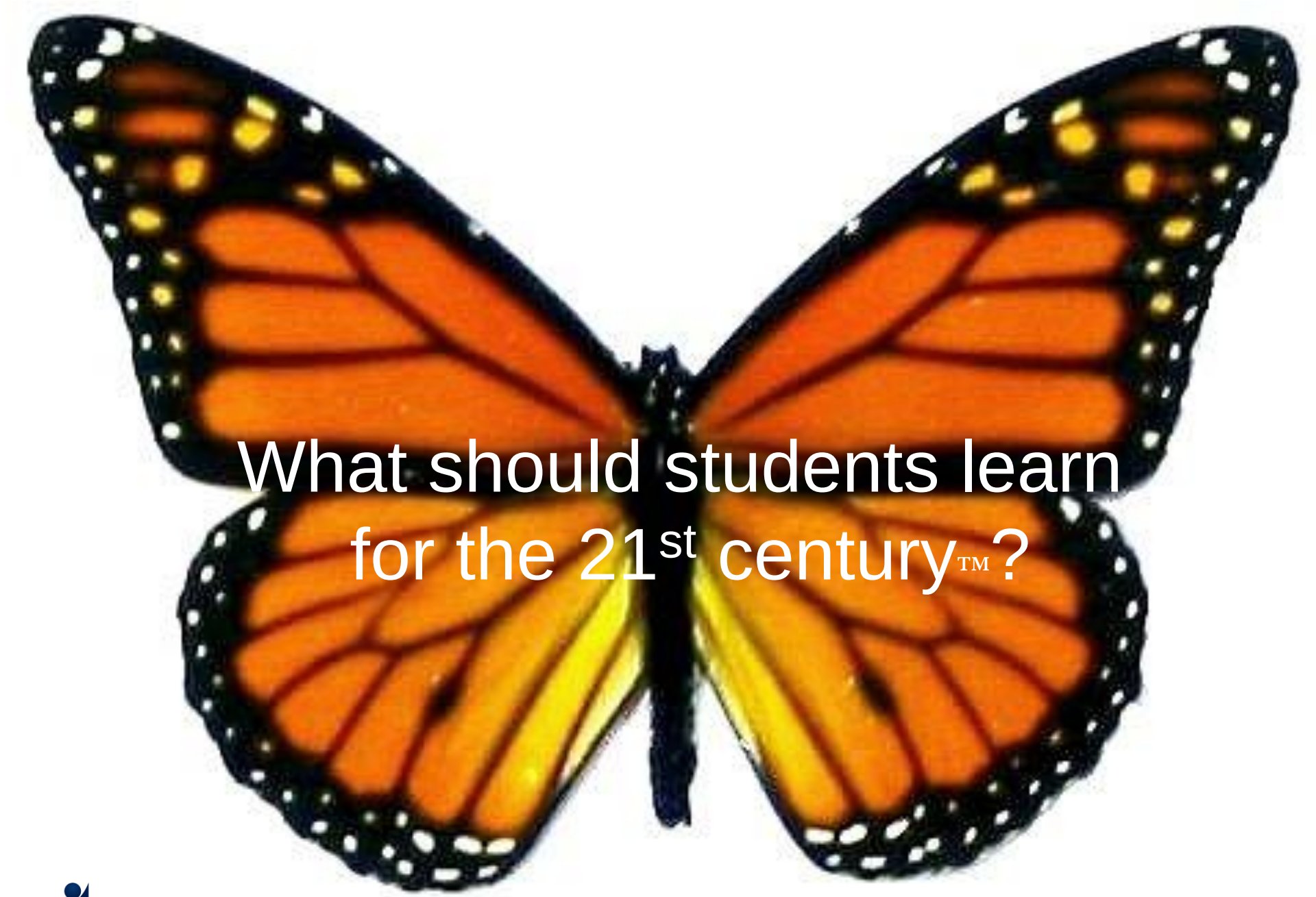
Is this time different ?



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For a better world

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Coalition of key global players

International organizations

ERB
OECD
United Nations Educational, Scientific and Cultural Organization
World Bank

Jurisdictions

Finnish National Board of Education
KEDI
Government of Alberta Education
Ontario
NSW Government
Victoria

Academia

Harvard
MIT Massachusetts Institute of Technology
Olin College
Penn University of Pennsylvania
Stanford University

Foundations & Non-Profits

Fondation Henri Moser
Fondation Helvetica Educatio
Bill & Melinda Gates foundation
21
MFF Mergridge Family Foundation
The William and Flora Hewlett Foundation
acara
McGraw-Hill Research Foundation
USCF United States Council Foundation
nellie mae EDUCATION FOUNDATION
nysci
AT&T Foundation

Corporations

Google
IBM
intel
Microsoft
PROMETHEAN Lighting the Flame of Learning
WOLFRAM Makers of Mathematica and Wolfram|Alpha

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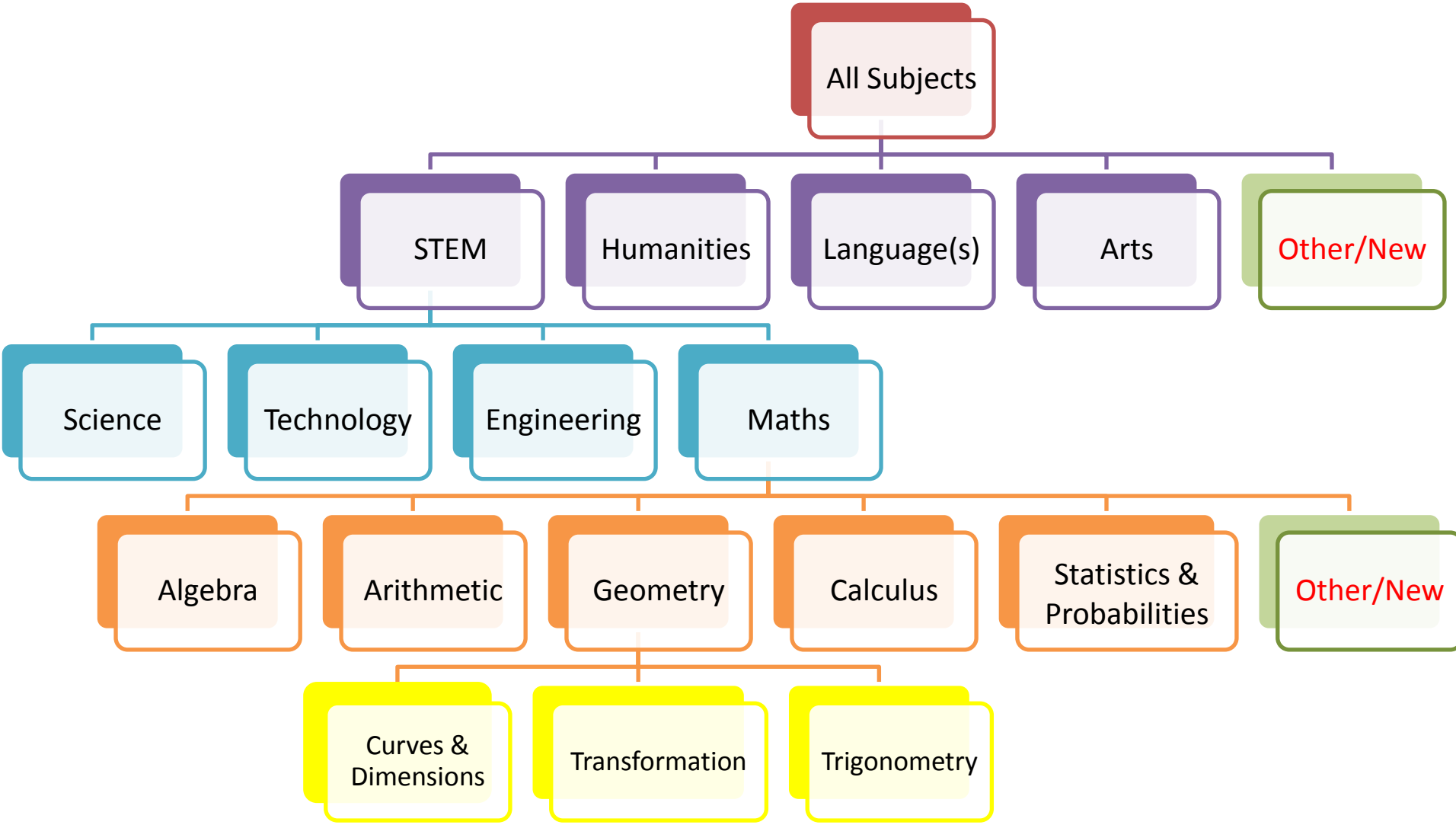
…to redesign education standards… (Math as example here)



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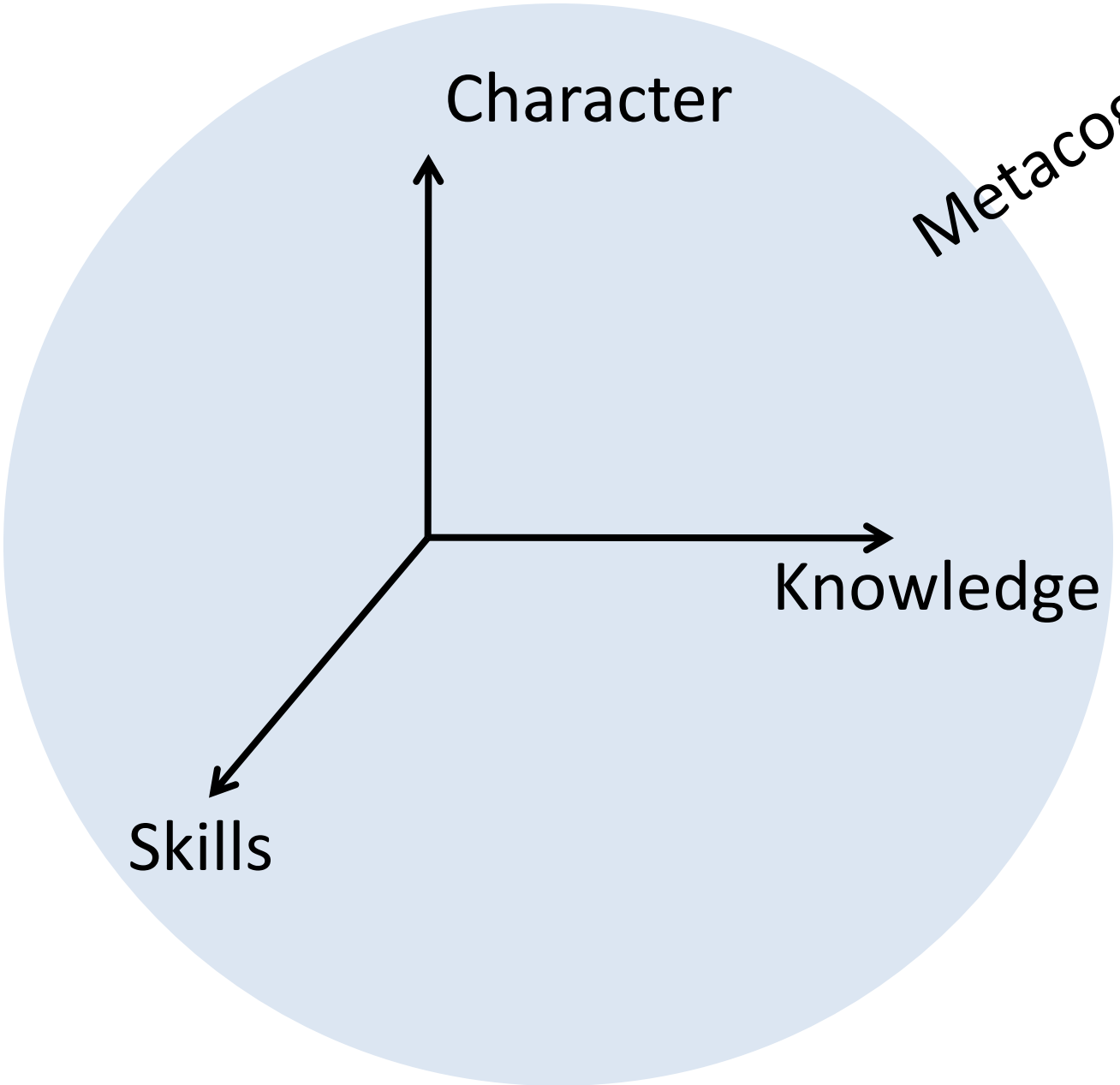
…on the basis of all dimensions,



Education with a capital "E"

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Leveraging our entire selves

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Reassess Knowledge for relevance

Learn Skills
Creativity
Critical Thinking
Communication
Collaboration

Build Character

Intrapersonal:

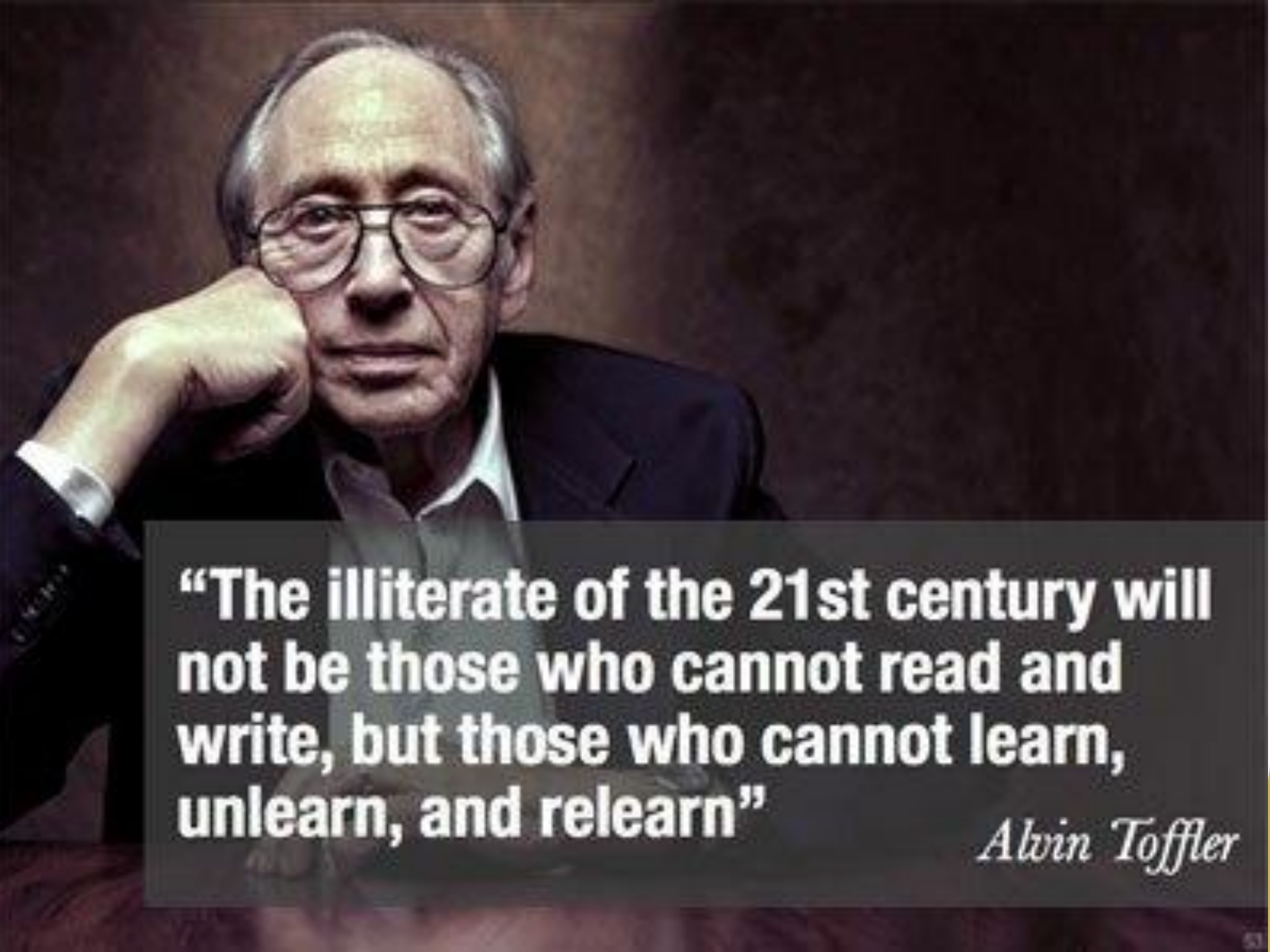
- Mindfulness
- Curiosity
- Courage
- Resilience

Interpersonal:

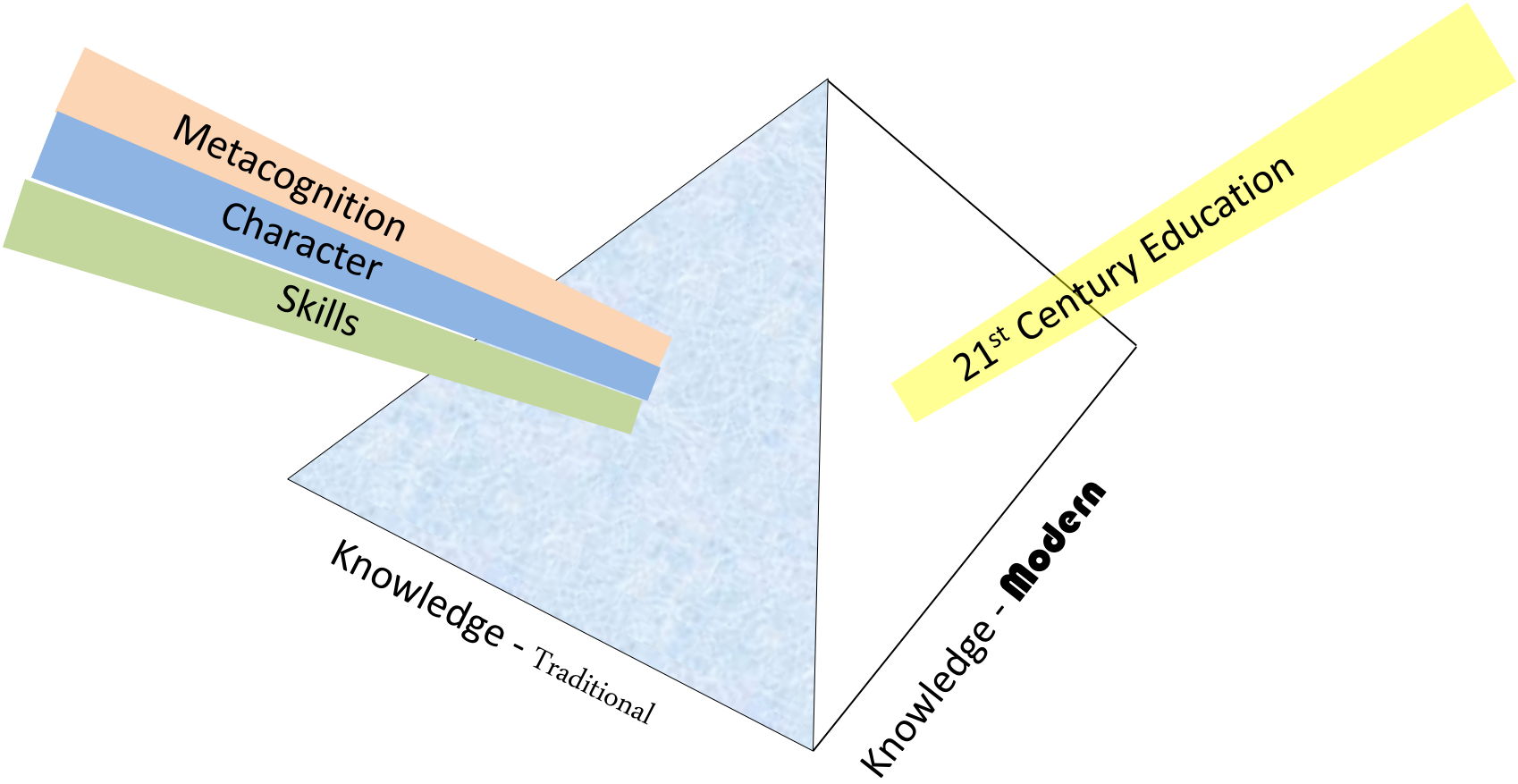
- Ethics
- Cooperation
- Leadership

Train metacognition

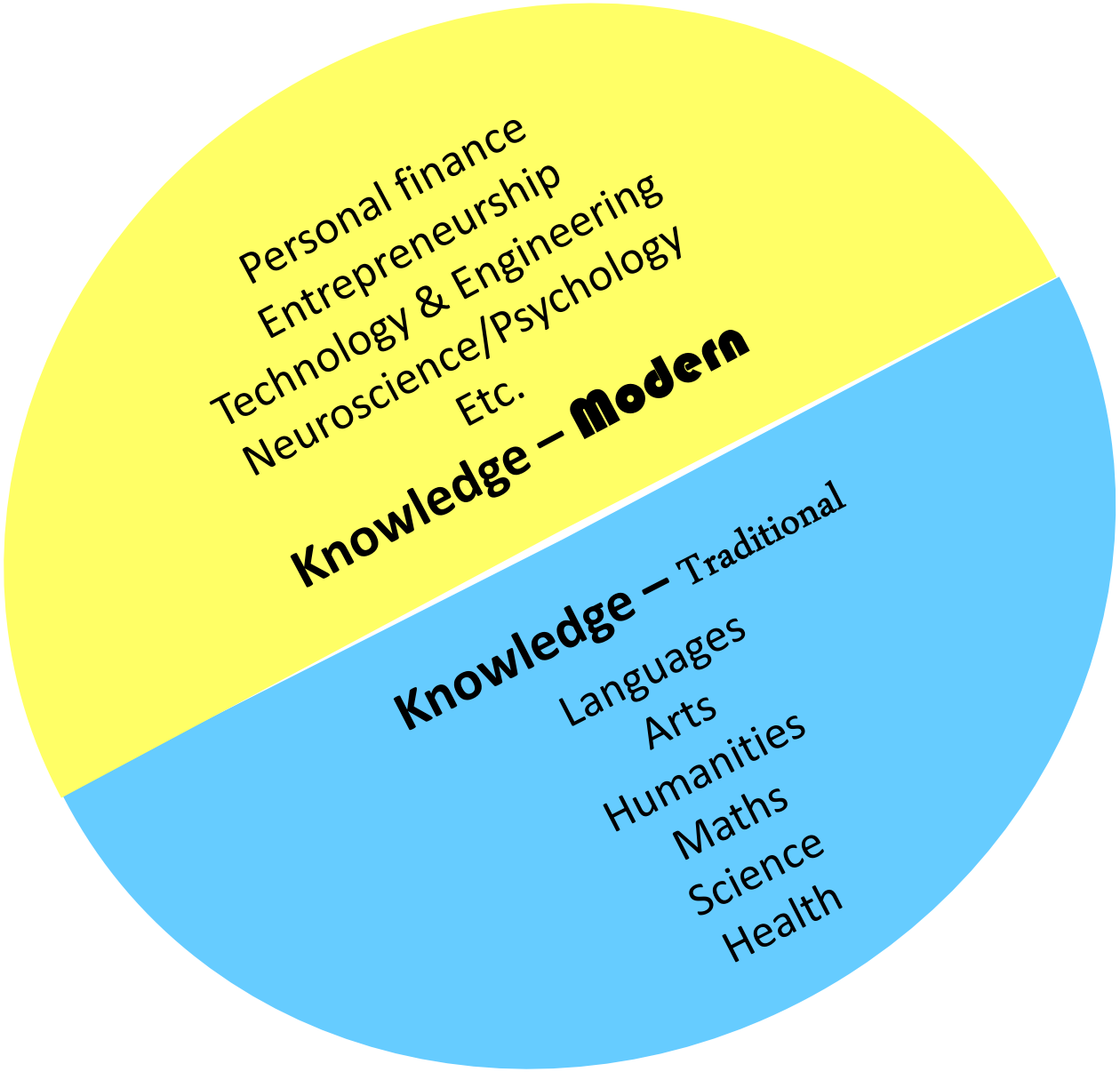
Learning how to Learn


"The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn"
Alvin Toffler

…through the prism of Knowledge



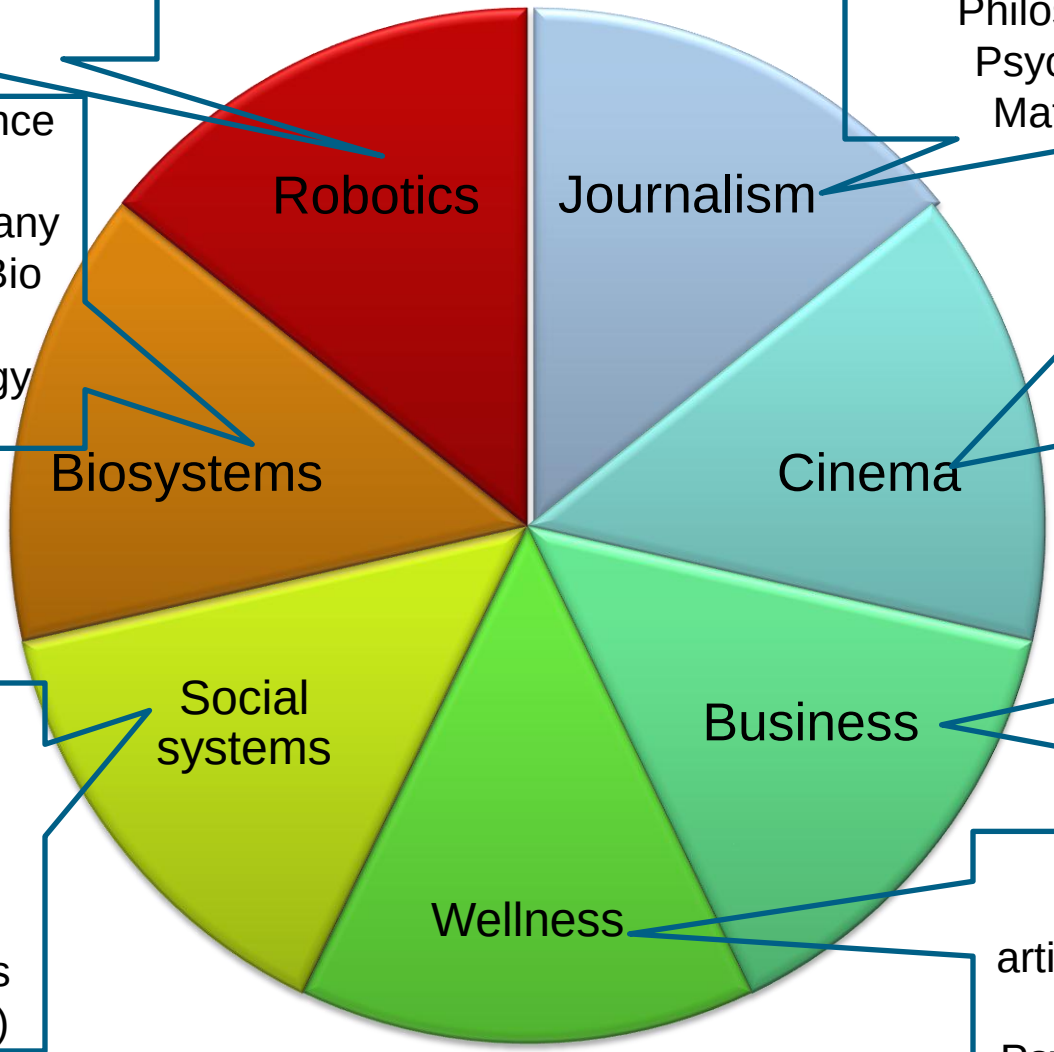
…while incorporating Modern knowledge,



Harness interdisciplinarity

Integrated Fields (reflecting subject domains only)

Skills/Character/Metacognition
Systems-centric
Ethical



Engineering & Technology
(M, EE, CS, etc)
Maths
Physics

Environmental science
Chemistry
Biology/zoology/botany
Biotech/Synthetic Bio
Medicine
Geography/Geology
Maths

Anthropology
Sociology
History
Political science
Linguistics
Mythology/Religions
Maths (Stats/Probs)

Language/writing/story
Media
Communication/Rhetoric
Philosophy/ethics/civics
Psychology/Sociology
Maths (Stats/Probs)

Storytelling/Poetry
Acting/Memory
Improv
Media Technology
Design/Graphism/Arts
(decors, photography, etc)

Economics
Marketing
Sales/Persuasion
Entrepreneurship
Law
Non-profit too

Health& Nutrition
Sports & exercise &
artistic expression (danse)
Meditation/yoga
Psychology/Neuroscience
Spirituality & Morality

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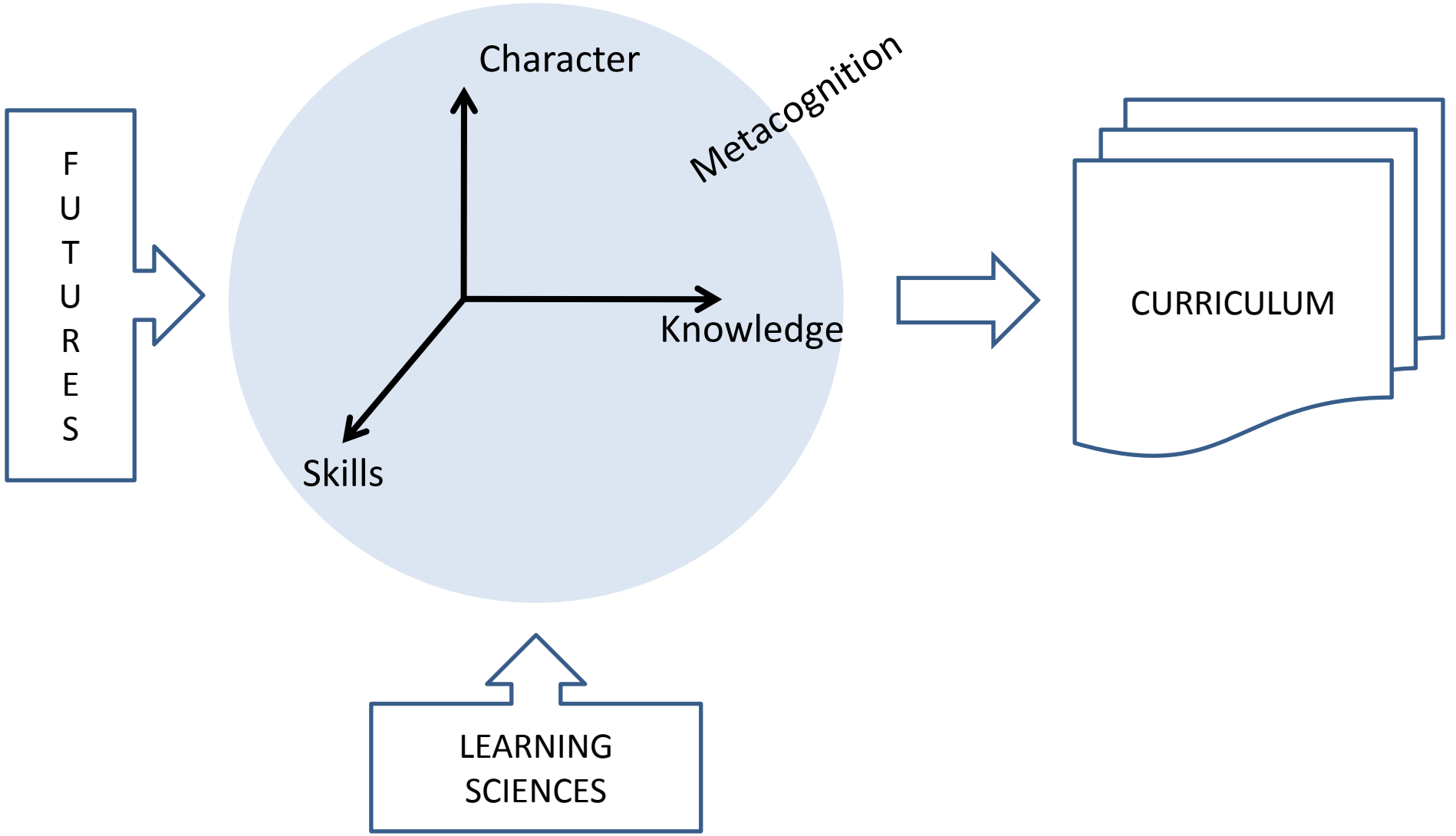
WHAT



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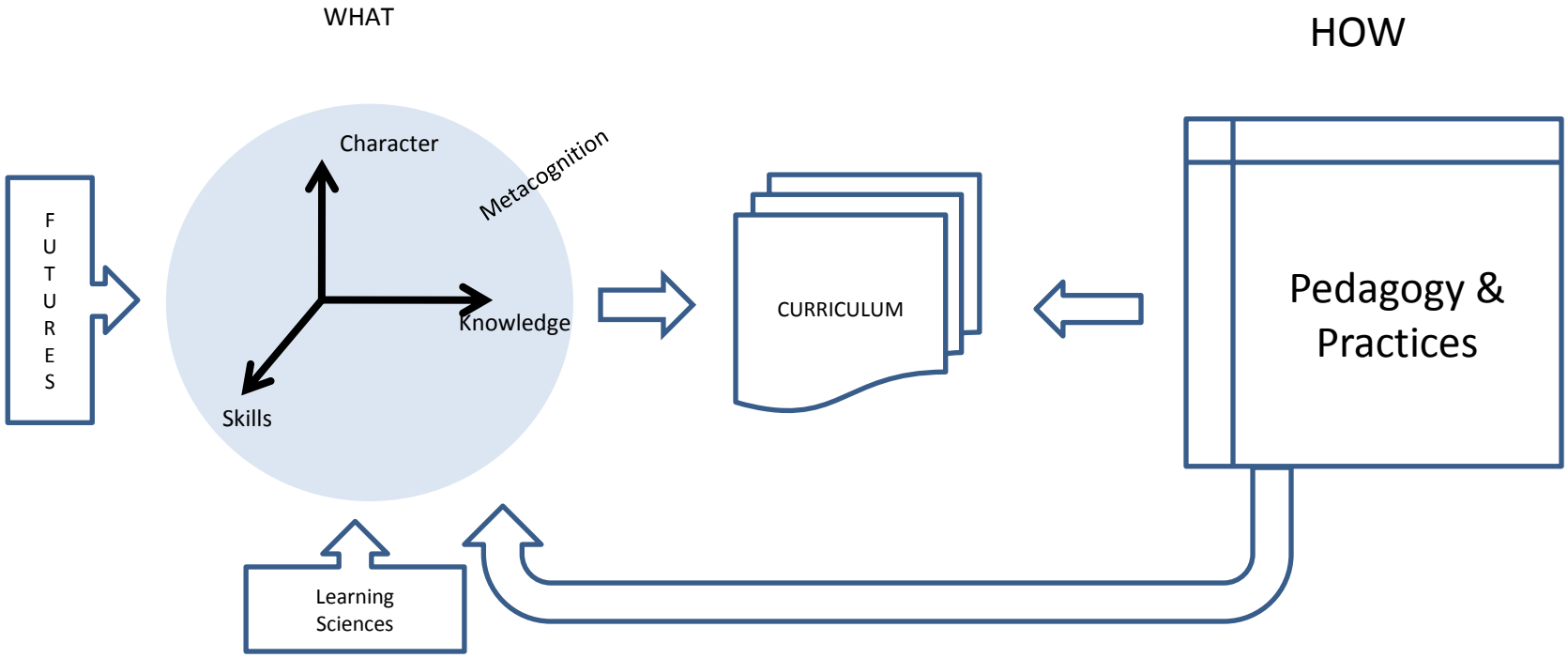
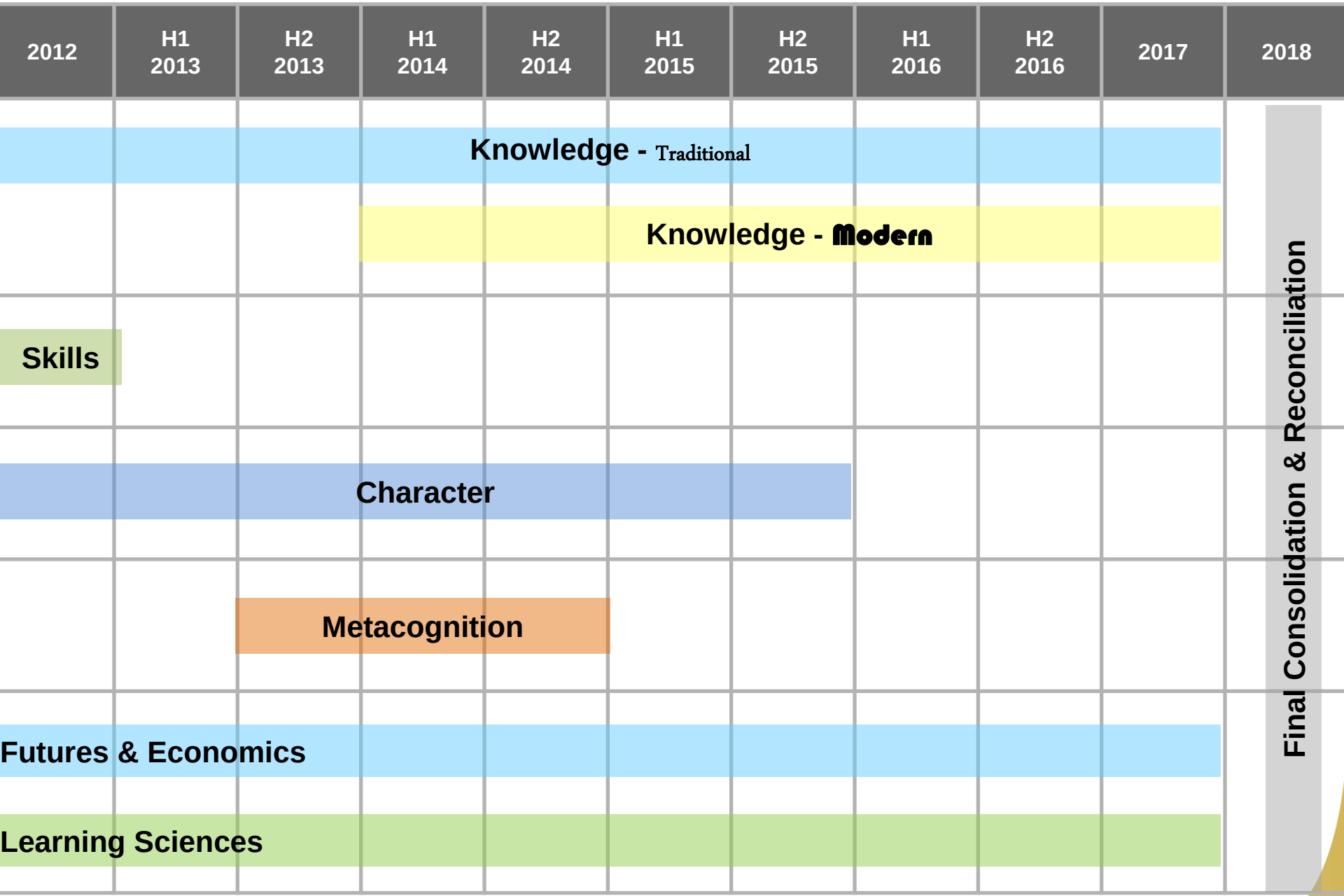

WHAT
HOW
FUTURES
Character
Metacognition
Knowledge
Skills
CURRICULUM
Pedagogy & Practices
Learning Sciences



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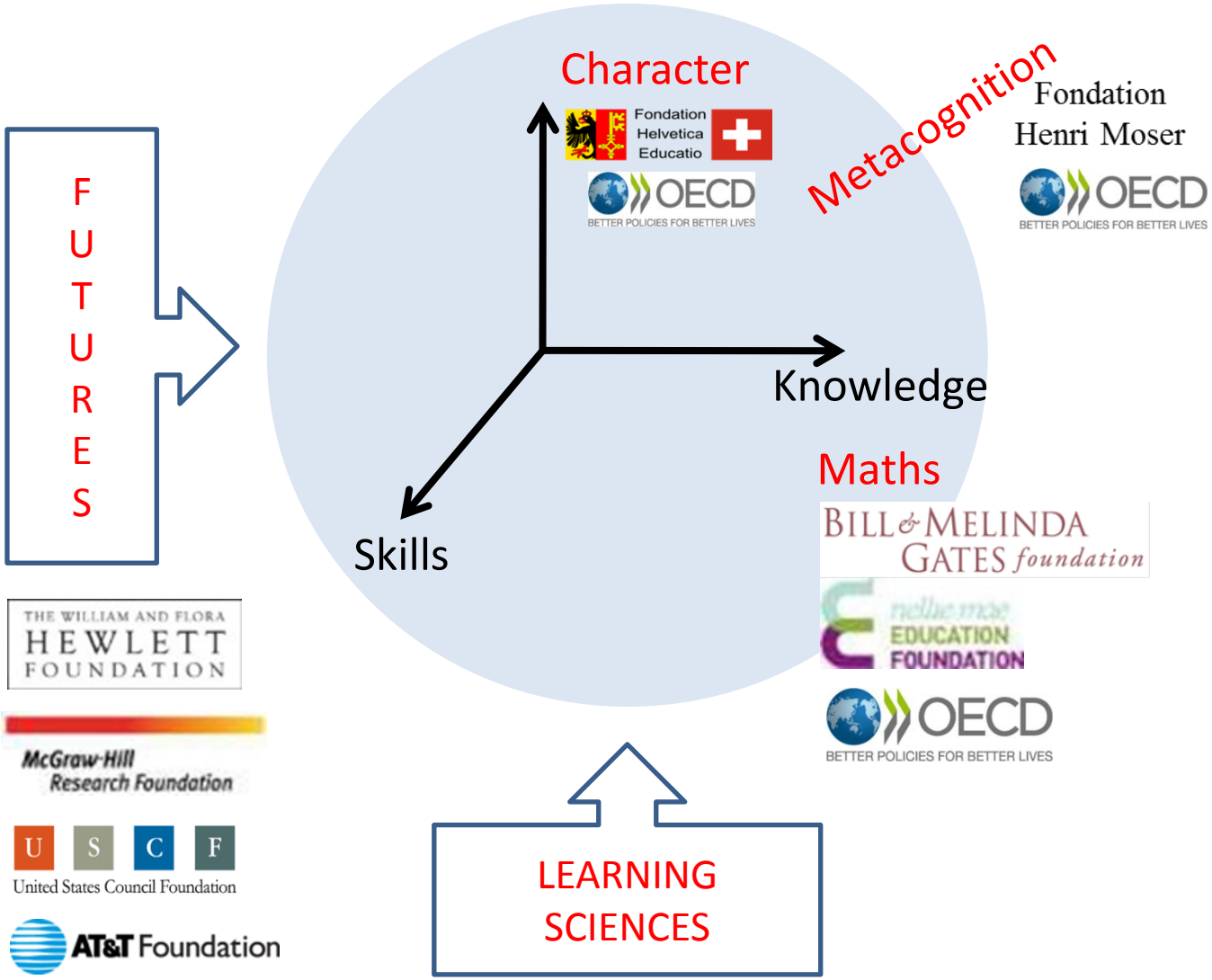
Fondation Henri Moser

WHAT

Fondation Helvetica Educatio



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“Event Horizon”: What if formal education cannot catch up ?

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Protocol

Deep, candid, respectful debates

Keeping in mind our personal biases (psychological and occupational)

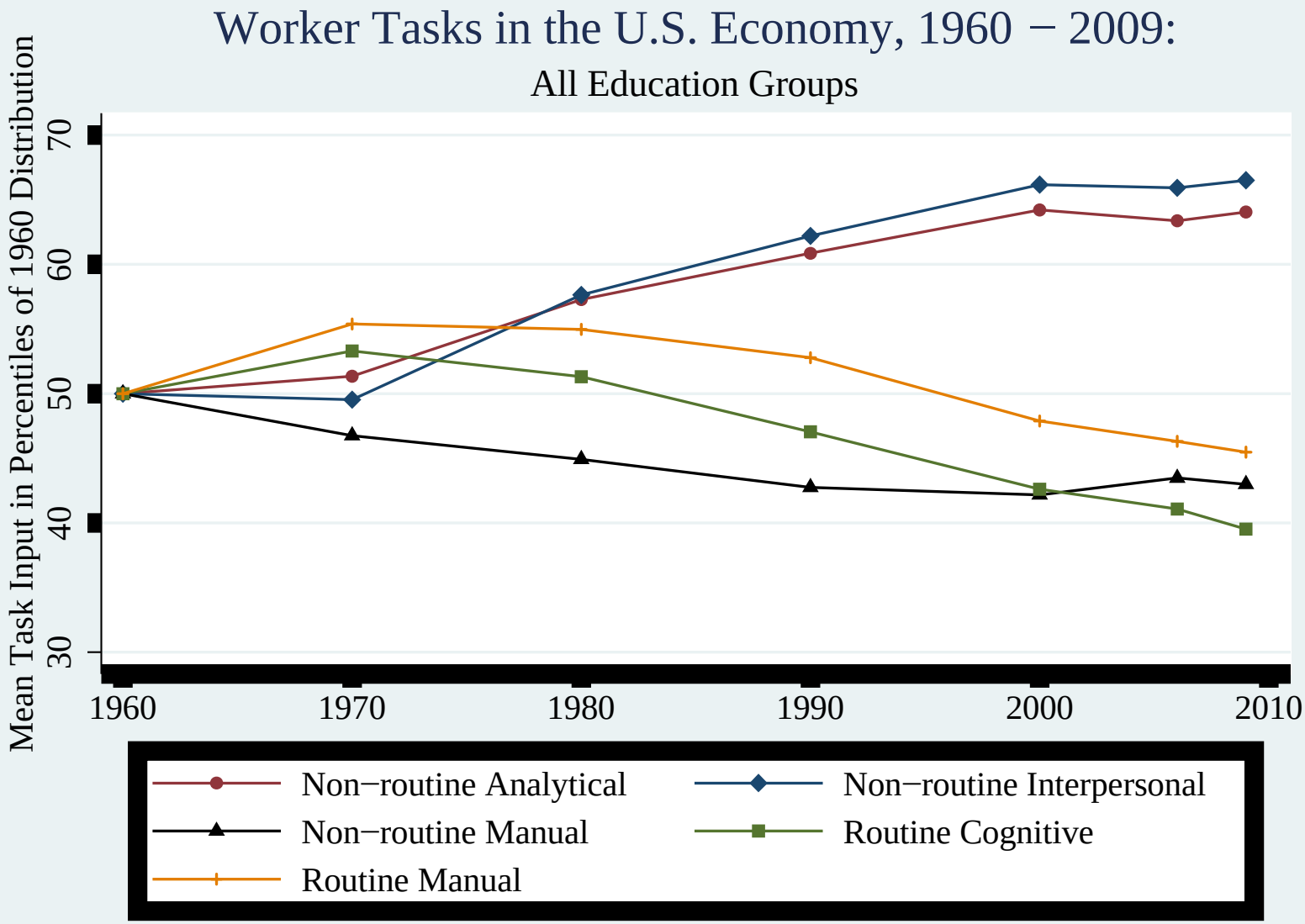
Succinct interventions

Off-the-record

Avoiding jargon and acronyms

Q&A from Observers at specific intervals

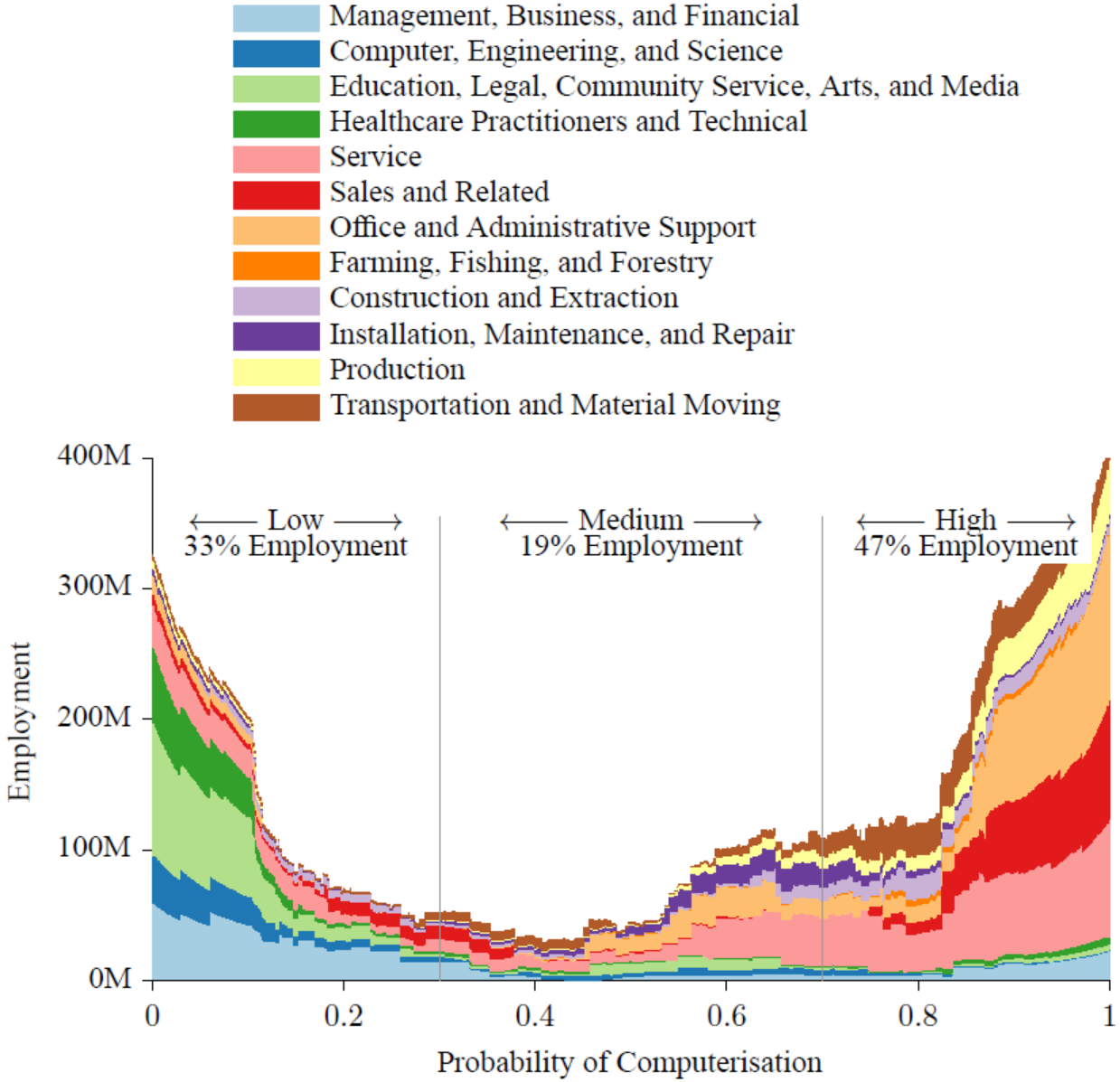
Autor, Levy and Murnane '03 Figure 1 Update: Economy Wide Changes in Job Task Content 1960 - 1998



Alarmism ?

Yet… alarmism can be good to make policymakers and the public take notice and stave off the problems…

Science or Pseudoscience ?



Source: Oxford Martin School: The Future of Employment; September 2013

"All those in favour of accepting more robots?"

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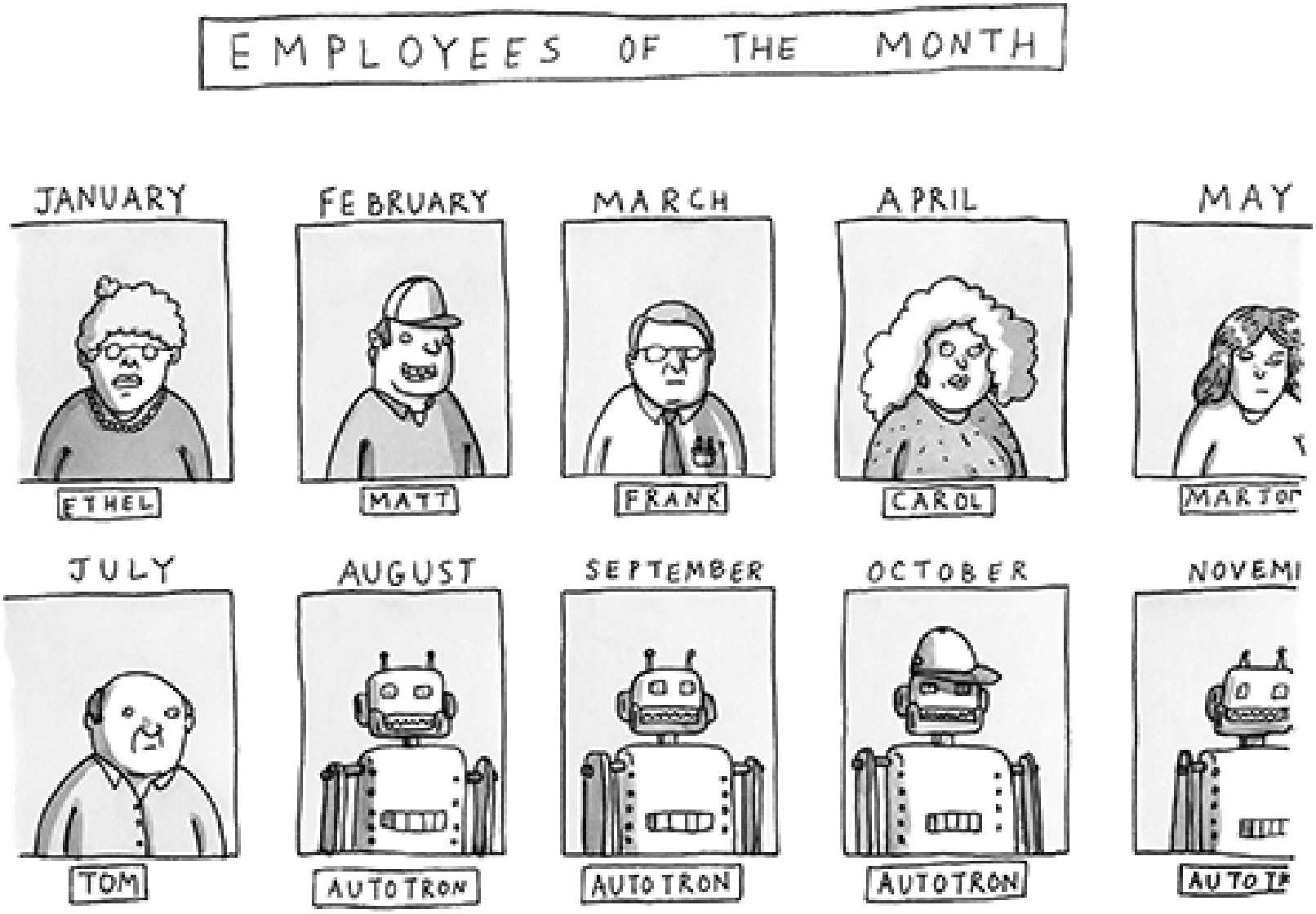

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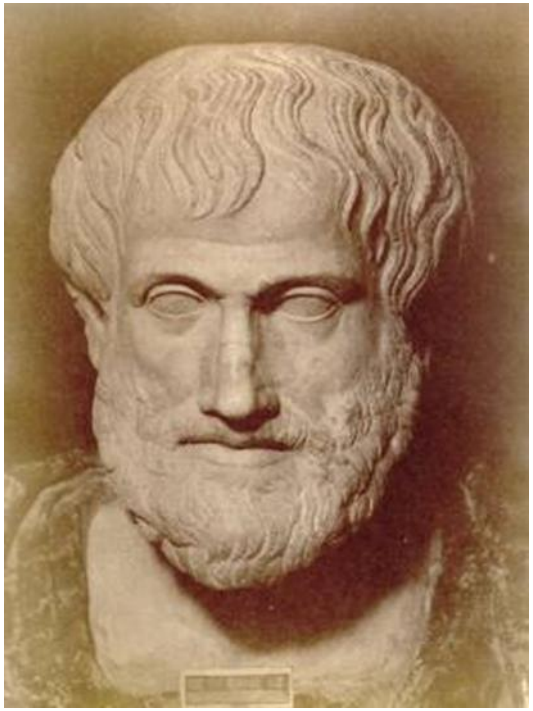
The Predictions Are Not Recent

"If every tool, when ordered, or even of its own accord, could do the work that befits it… then there would be no need either of apprentices for the master workers or of slaves for the lords."

Aristotle, 322 BC



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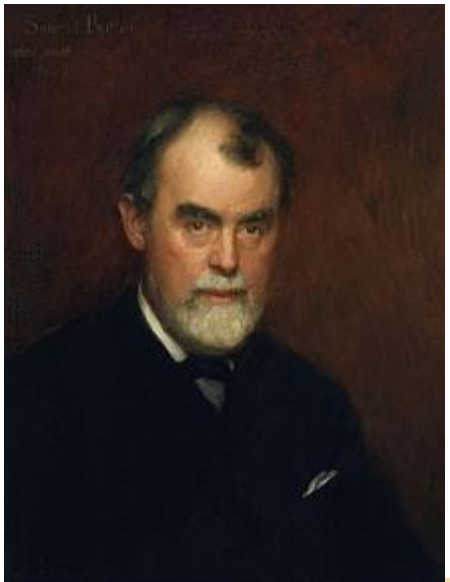
“Darwin among the Machines”

“That the time will come when the machines will hold the real supremacy over the world and its inhabitants is what no person of a truly philosophic mind can for a moment question.”

Samuel Butler, 1863



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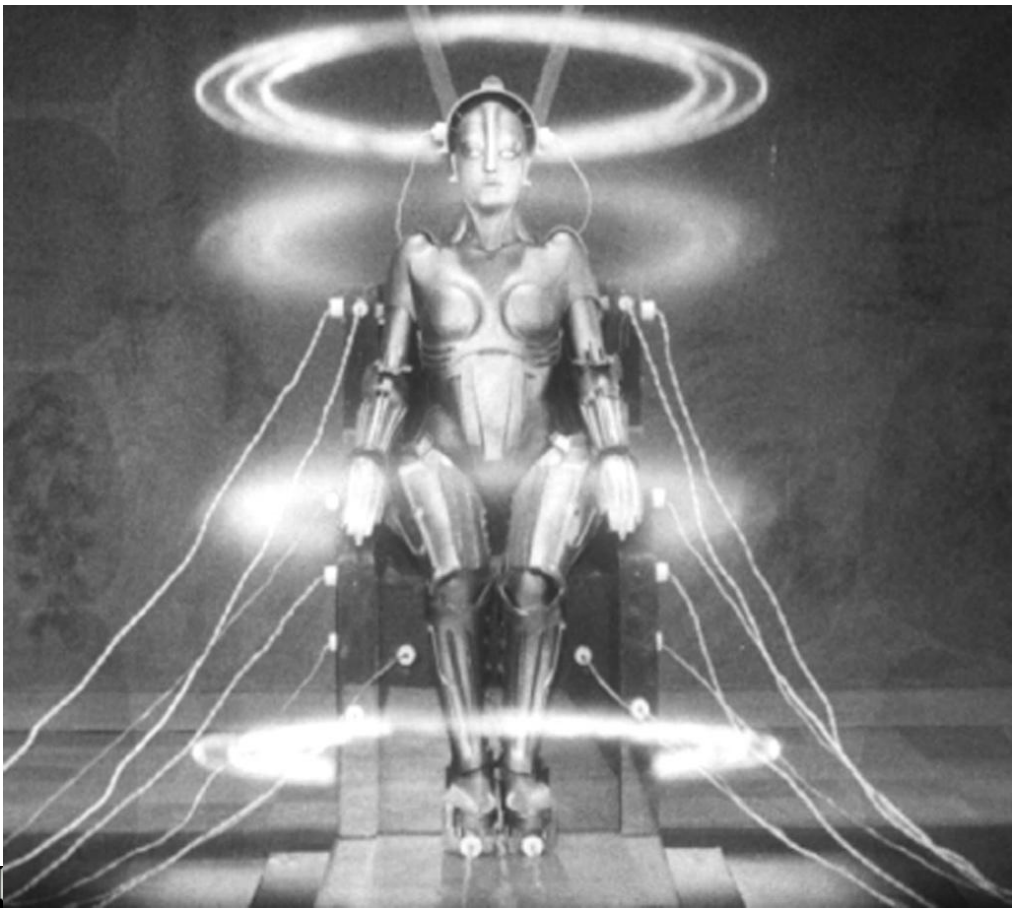
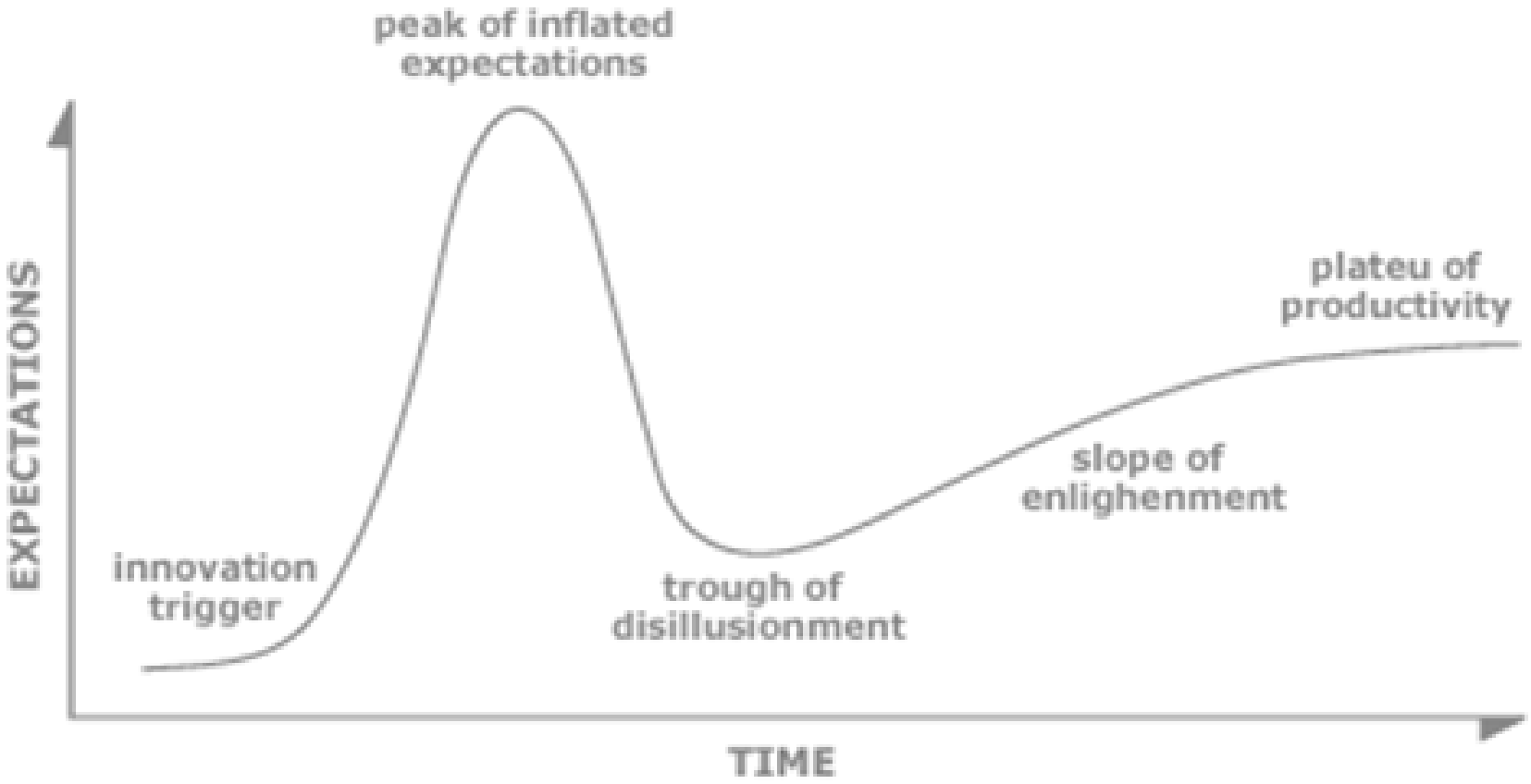
Recurring Theme

"I have created a machine in the image of a man, that never tires or makes a mistake. Now we have no further use for living workers."



Fritz Lang's *Metropolis, 1926*

Hype Cycle



Source: Gartner Group

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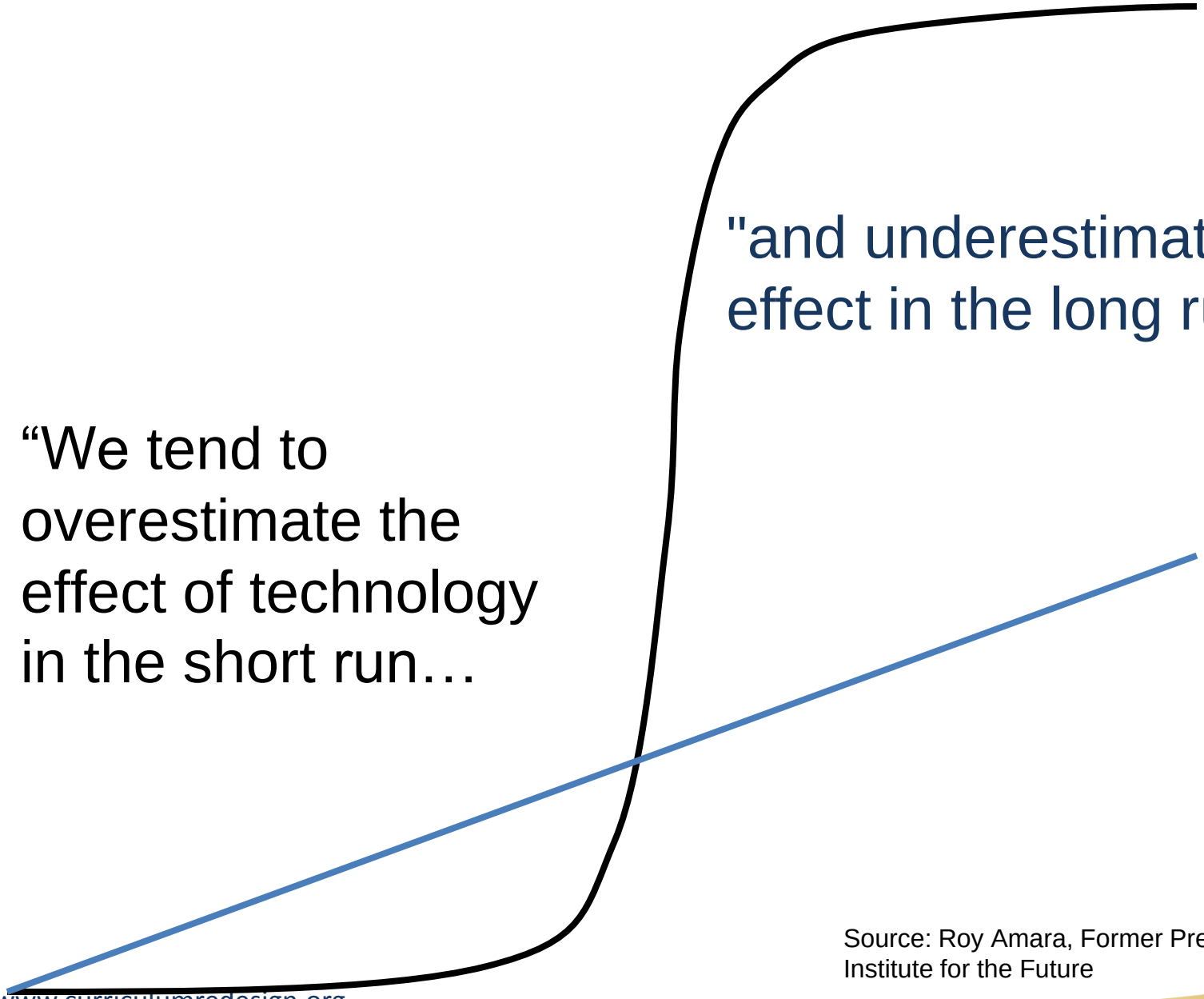
Reality Check

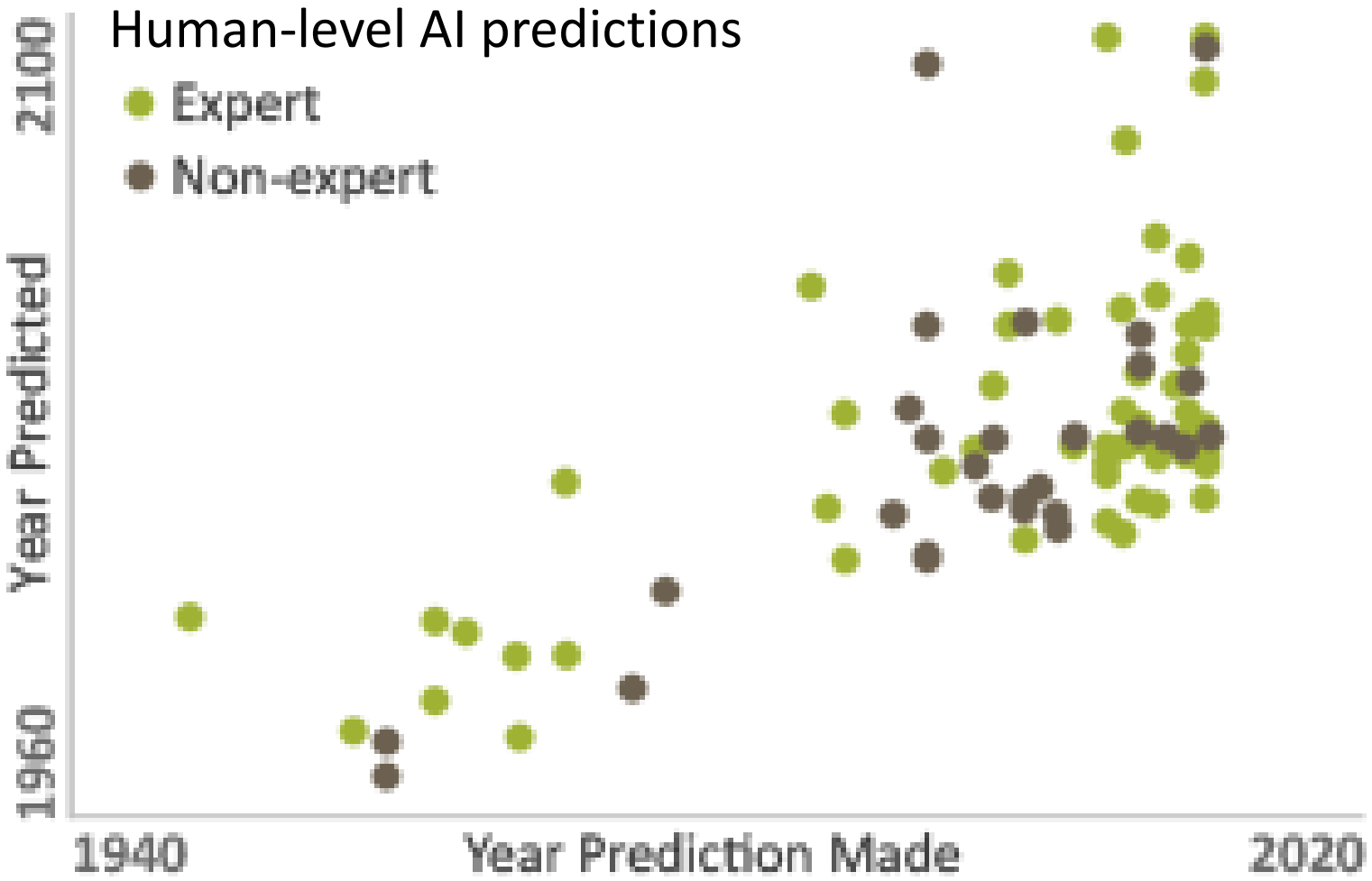


"and underestimate the effect in the long run.“

“We tend to overestimate the effect of technology in the short run…

Source: Roy Amara, Former President, Institute for the Future

Should we bother ?



Source: MIRI, “Predicting AI”

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The difficulty in forecasting technology

1995 TECHNOLOGY FORECAST

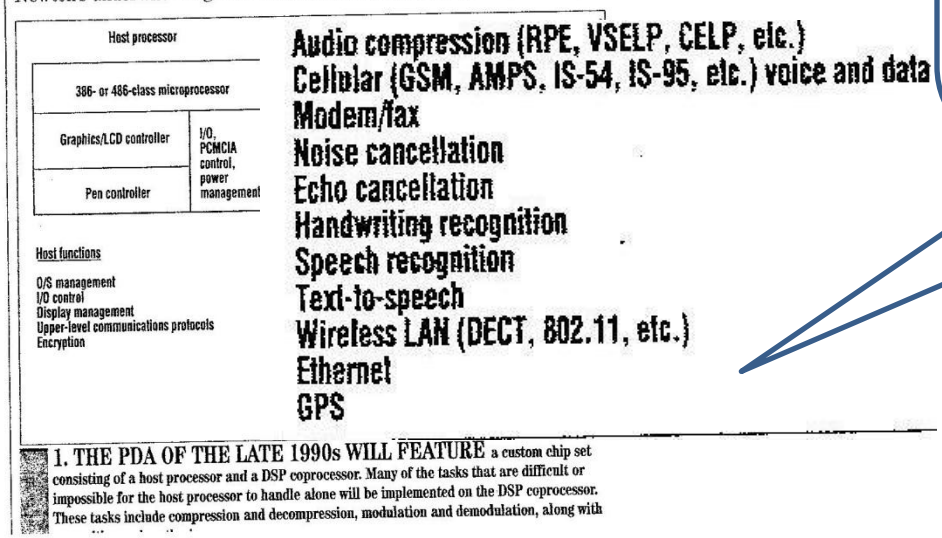
TOMORROW'S PDAs

PDAs Will Come Of Age In The Nineties

Despite An Embarrassing Debut, PDAs May Still Become The Road Warrior's Weapon Of Choice, As Advanced DSPs Enhance Their Connectivity.

CHARLES FADEL
Analog Devices Inc., One Technology Way, Norwood, MA 02062 (617) 937-1113.

Let's face it folks, the first PDA generation is the functional equivalent of the "luggable" Kaypro of the early 1980s—not quite "there" yet. They've been derided by industry observers as "organizers on steroids," yet for all of the snickering and jibes (see the Doonesbury cartoons), there's a potent new idea taking shape. Truly, the Newton is a discontinuity in a previously linear evolutionary path. It is a new class of machine, which hasn't yet emerged from its infancy. Remember, it took at least five years for the laptop, then notebook computer, to emerge as a reasonable alternative (and supplement) to desktop computers. It would be a mistake to conclude from the demise of the EO pen-based computer and Newton's underwhelming sales that the PDA concept is dead. PDAs aren't



1. THE PDA OF THE LATE 1990s WILL FEATURE a custom chip set consisting of a host processor and a DSP coprocessor. Many of the tasks that are difficult or impossible for the host processor to handle alone will be implemented on the DSP coprocessor. These tasks include compression and decompression, modulation and demodulation, along with

It took an extra decade !

- Techie part mostly correct
- Second-order effects were missed:
  - Music
  - Cameras
- No forecast of third-order effects (shopping etc)
- No forecast of confluence of technologies (Internet, etc)

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Projection Occupational Employment Trends: *Bank Tellers*

1968

- "Important clerical occupations such as secretaries, stenographers, typists, cashiers, bank tellers, mail carriers, postal clerks, and telephone operators are not expected to be heavily affected by the use of computers…"

1980

- "Technological innovations will not affect many types of clerical workers whose jobs involve a high degree of personal contact."

1992

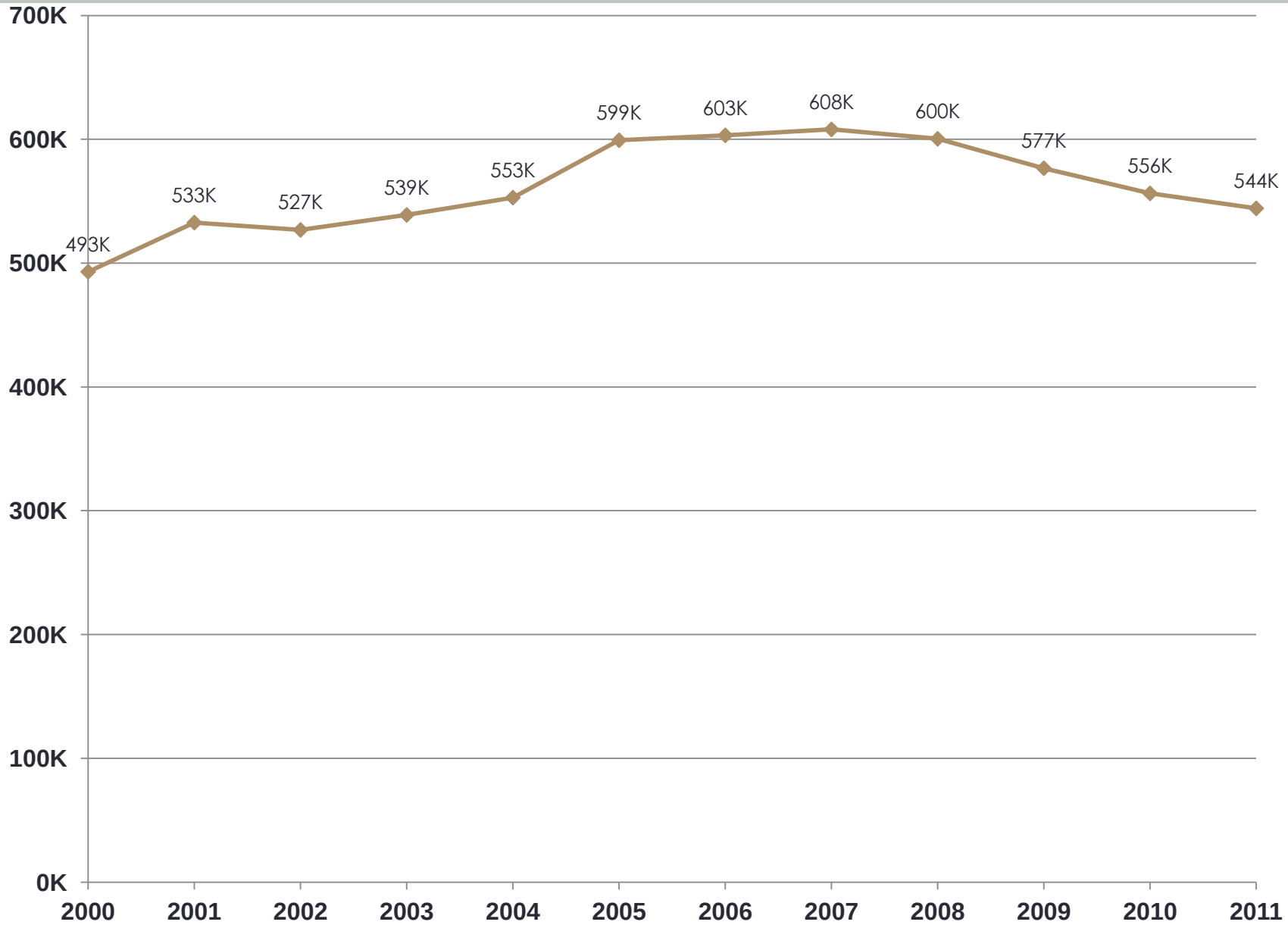
- "… Employment of bank tellers is not expected to keep pace with overall employment growth in banks and other savings and credit institutions because of the increasing use of automatic teller machines…"

2000

- "… The increased use of ATM machines and Internet banking will reduce the number of tellers."

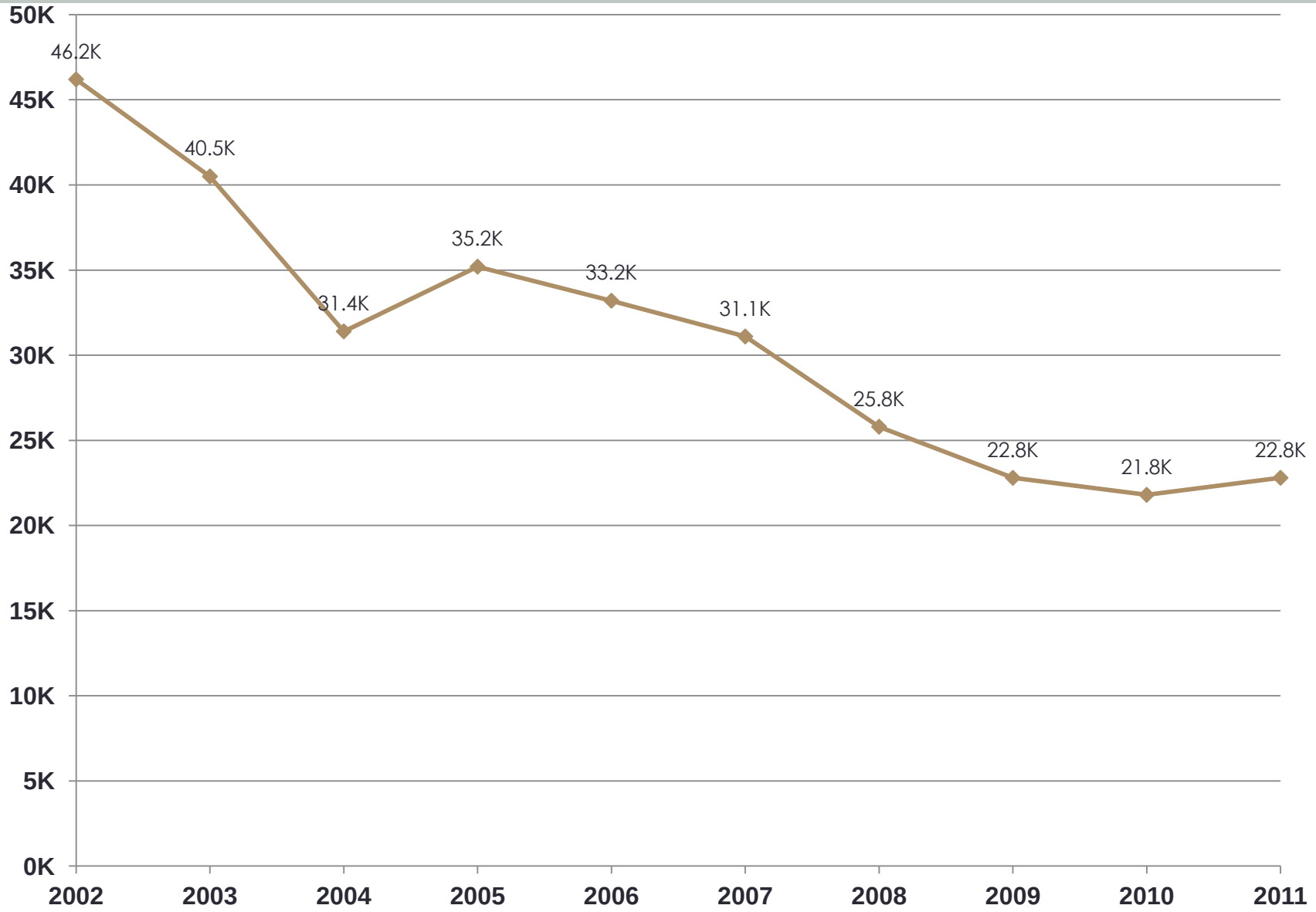
Source: David Autor, MIT

Bank Tellers in the U.S. 2000 - 2011



Source: David Autor, MIT

Gas Station Attendants in the U.S. 2000 - 2011



Source: David Autor, MIT

Goals

Via the questions list and agenda, answer: ***Is it possible*** *to reasonably predict the impact of AI/Robotics on employment ?*

- This conversation is an assessment of the possibility to reach a reasonably robust prediction, not the prediction itself.
- Boundary condition: 5-15 years → NO generalized AI

Thank you !

"What should students learn <u>for</u> the 21st century™?"

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