# AI and Education: the Reality and the Potential

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UCL Institute of Education

European Union
European Regional Development Fund

EDUCATE
EDUCATION • RESEARCH • EDTECH

But what is this AI that empowers automation and revolution?


Technology capable of actions and behaviours *“requiring intelligence when done by humans”* (2018)


‘AI achieves its best ever mark on a set of English exam questions’
New Scientist April, 2019




# 63 years ago in September 1956

*"We propose that a two-month study of artificial intelligence be carried out during the summer of 1956 at Dartmouth College in Hanover, New Hampshire. The study is to proceed on the basis of the conjecture that* ***every aspect of learning or any other feature of intelligence can in principle be so precisely described that a machine can be made to simulate it.***

*An attempt will be made to find how to make machines use language, form abstractions and concepts, solve kinds of problems now reserved for humans, and improve themselves.* ***We think that a significant advance can be made in one or more of these problems if a carefully selected group of scientists work on it together for a summer".***

# Early breakthroughs in AI

**Rule Based Pattern Matching**

When words in the query **typed in are matched to a rule** in the rule base, then that rule would be processed to produce the resulting response.

AI that CANNOT Learn

# Game changing breakthroughs in AI


erfect Storm
A Perfect Storm
Data, plus **very sophisticated** AI,
plus computing Power and Memory
NOAA

Data is the ‘new oil’, and is the power behind AI

Like oil, data is crude and must be refined in order to derive its value.

It must be ‘cleaned’ before it can be used by AI.

# But, Machine Learning Ai is still just…


Pattern Matching

# Machine Learning cannot learn everything

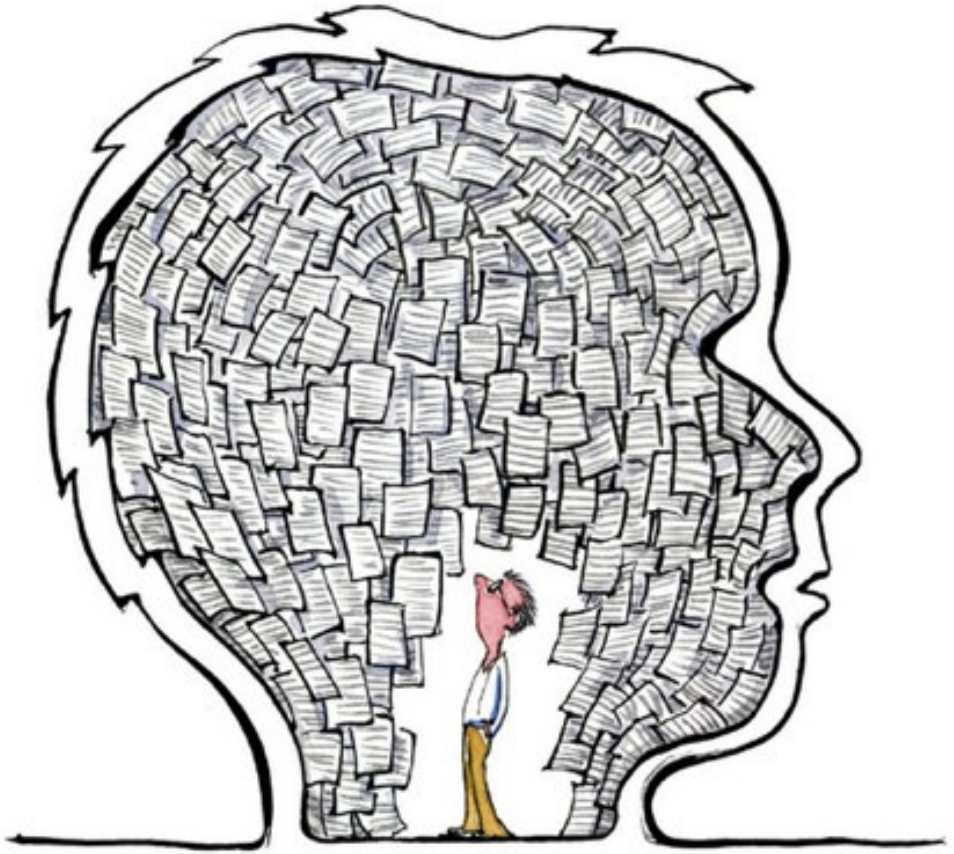
For example, it does not **understand itself and it has no common sense!**

Are you an empathetic friend?

How well do you understand Quantum Physics?

How are you feeling right now?

Can you meditate?



Artificial Intelligence (AI) is intelligent in a particular sort of way, Humans are intelligent in many ways. AI and HI are not the same and the differences are extremely important.

We want humans to complement the AI automation not repeat it!

# Implications for Education

1. Using AI in Education to tackle some of the big educational challenges

2. Educating People about AI so that they can use it safely and effectively

3. Changing Education so that we focus on human intelligence and prepare people for an AI world

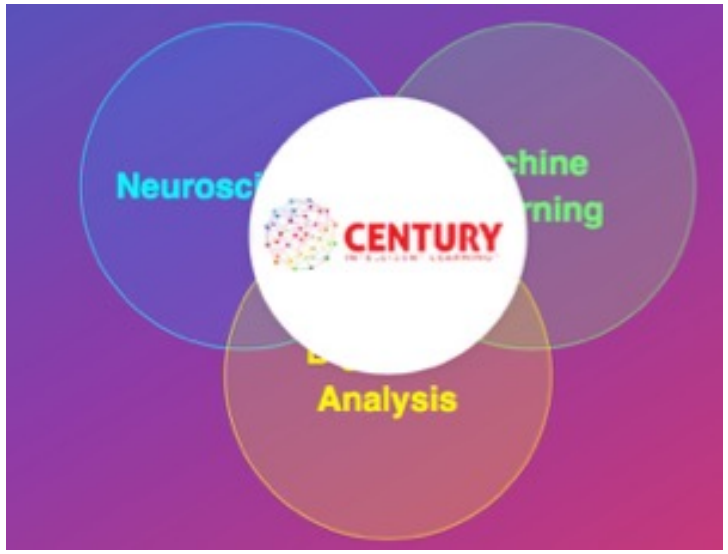
# Implications for Education

# Implications for Education

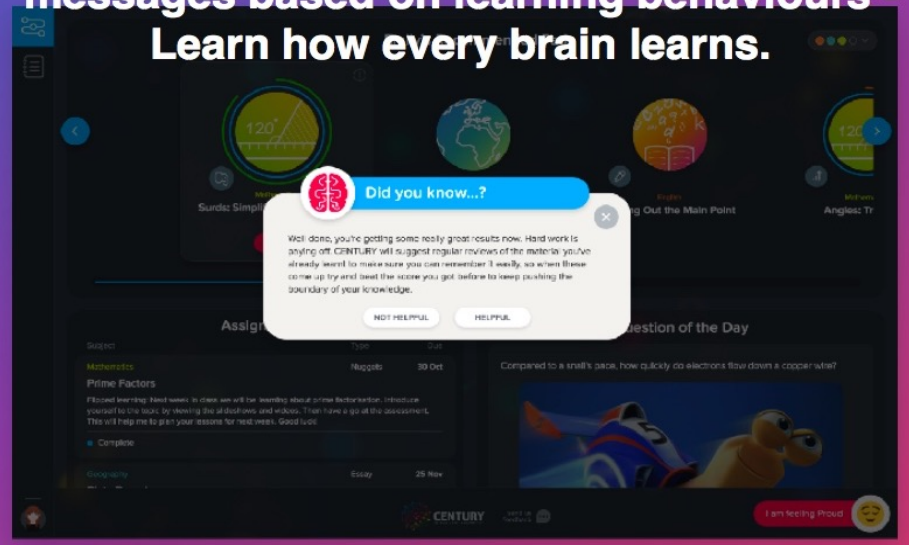
1.

Using AI in Education to tackle some of the big educational challenges

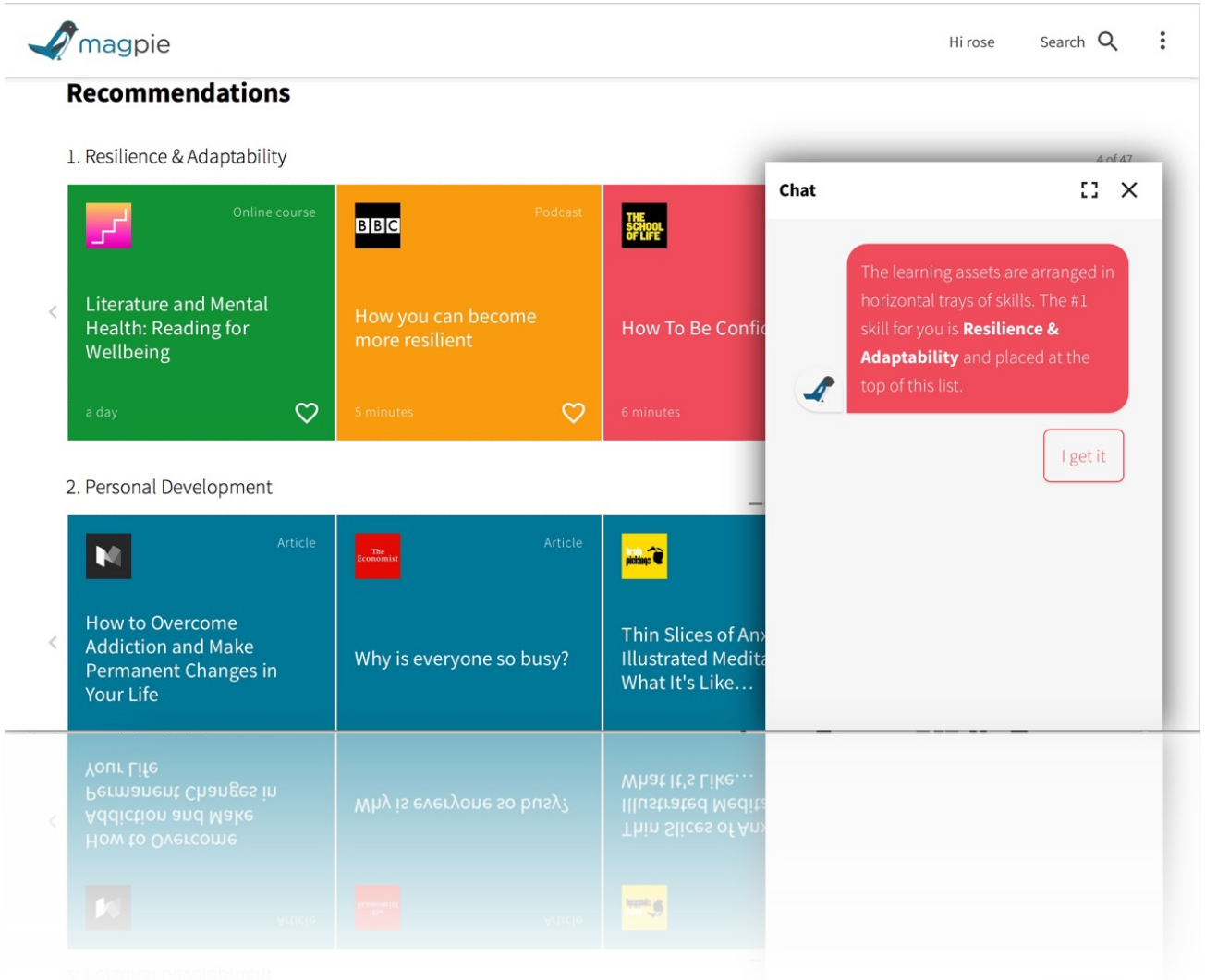
# The Reality




## AI and big data powers personalised learning pathways and personalised messages based on learning behaviours - Learn how every brain learns.



https://filtered.com/gamechanger/



MyCognition

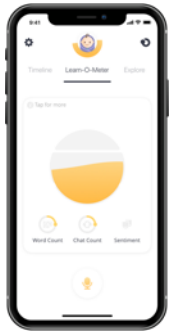
Algorithms automatically increase the number of training loops for the domains where you have the greatest need…

If attention is your greatest need you will receive more Attention loops → building resilience in Attention. As you progress the loops become more challenging.

**E.g. Attention**


oyalabs

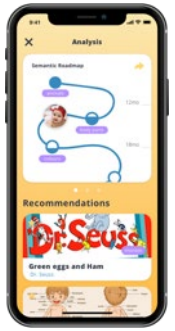
Evidence-based A.I. platform that monitors child's early development and generates personalised parenting and content recommendations



VISUAL PROGRESS

SHAREABLE REPORTS

GAMIFICATION




PERSONALISED:

Activity ideas
Books
Toys
Expert consultations

**01** MONITOR — **02** ANALYSE — **03** IMPROVE →

*Shaping positive parenting habits*

StartX SOSV Johnson&Johnson

# Implications for Education

1.

Using AI in Education to tackle some of the big educational challenges

# The Potential

Data is the ‘new oil’, and is the power behind AI

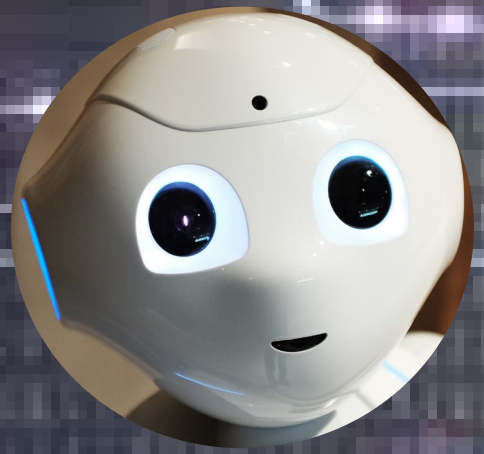
It can also be the power behind HI

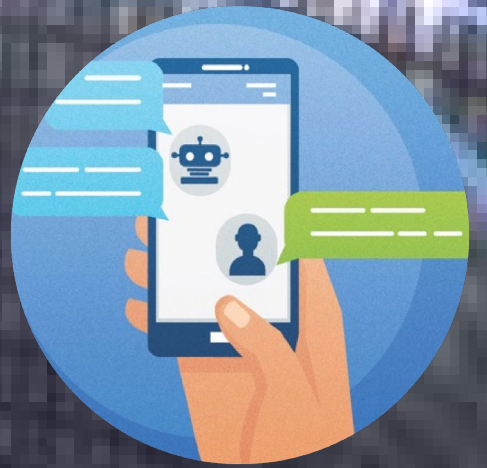

9:41
”Why did Apple make you”
tap to edit
For one reason only: to make your life easier, and more fun (I guess that’s two reasons, huh?)

Data is the new oil

We need to clean data to extract value

We need to apply what we know about human learning to the design of the algorithms that we use to process the data we collect about educational interactions



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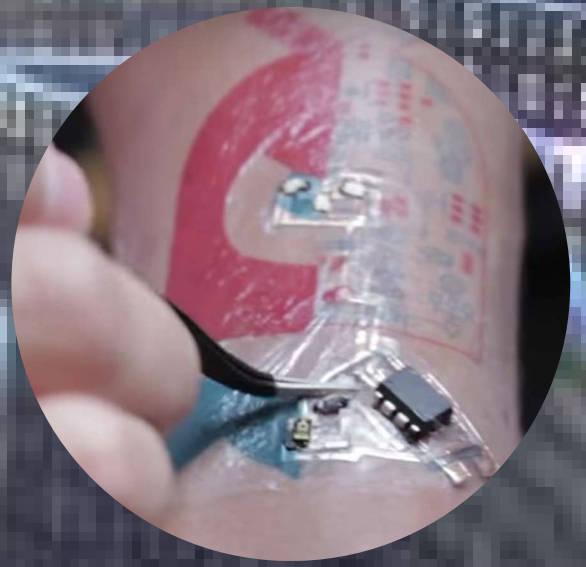


# Implications for Education

2.

Educating People about AI so that they can use it safely and effectively

EDUCATE people about AI to help them reap its benefits

AI understanding

Ethics: what is responsible AI?

Technical AI understanding

Teach people the skills they will need for their AI-enhanced work and life

AI augmented HI: teach people to work effectively with AI

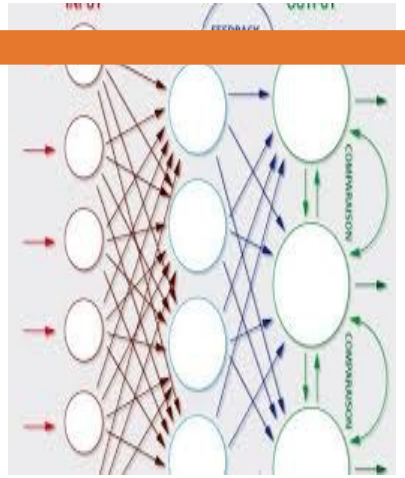
Teach people to build AI systems

# What is the worst that can happen?

Input

Processing: Machine Learning algorithms and training data

Output

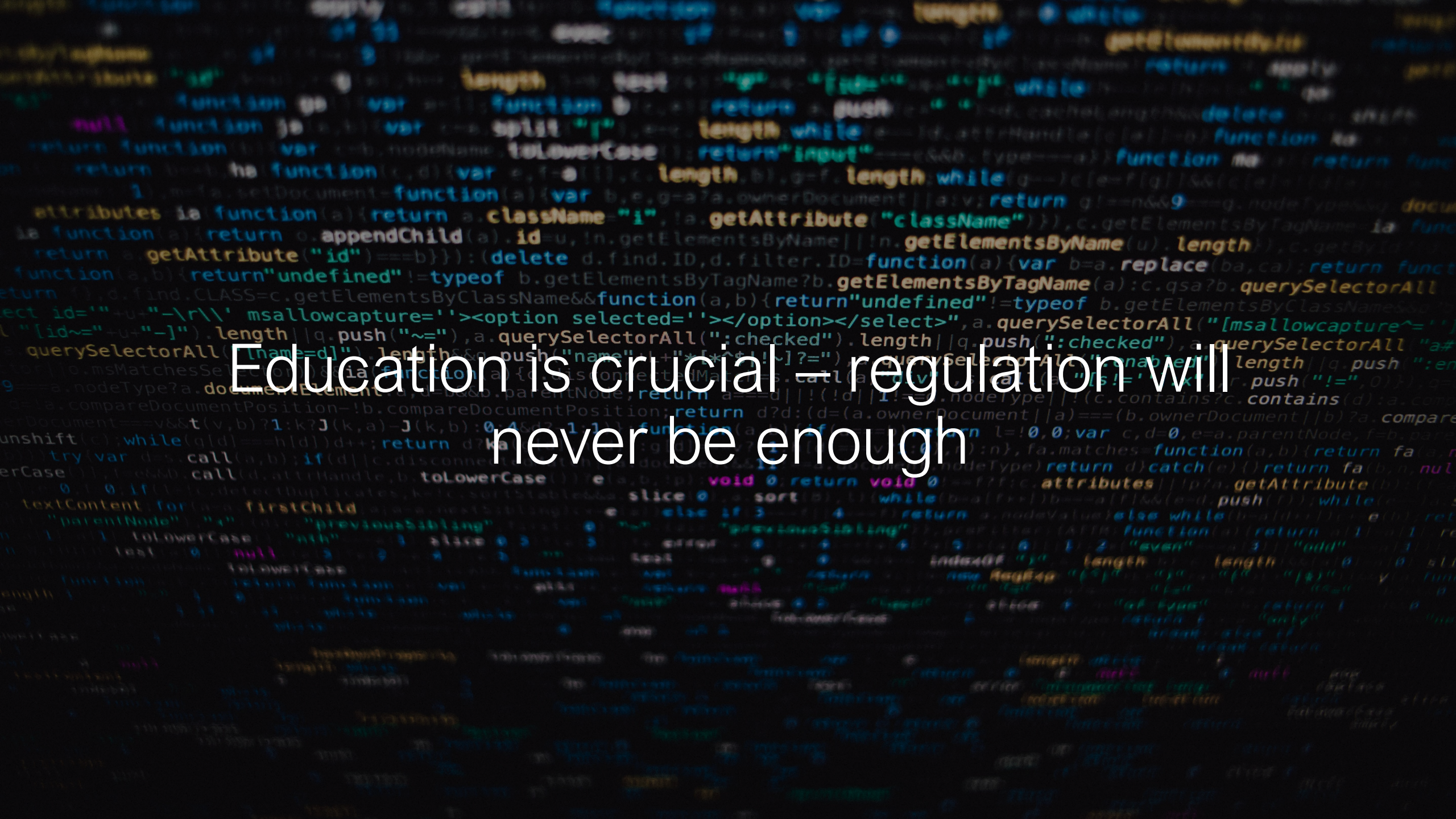


Who? Knowledge and Consent
Purpose and justification. We can say no.

PLUS: Bias and Bias Explanation and Validation Regulation

PLUS: Audience Honesty and truth Transparency Appropriateness

http://instituteforethicalaiineducation.org


Education is crucial – regulation will never be enough

3.
Changing Education so that we focus on human intelligence and prepare people for an AI world

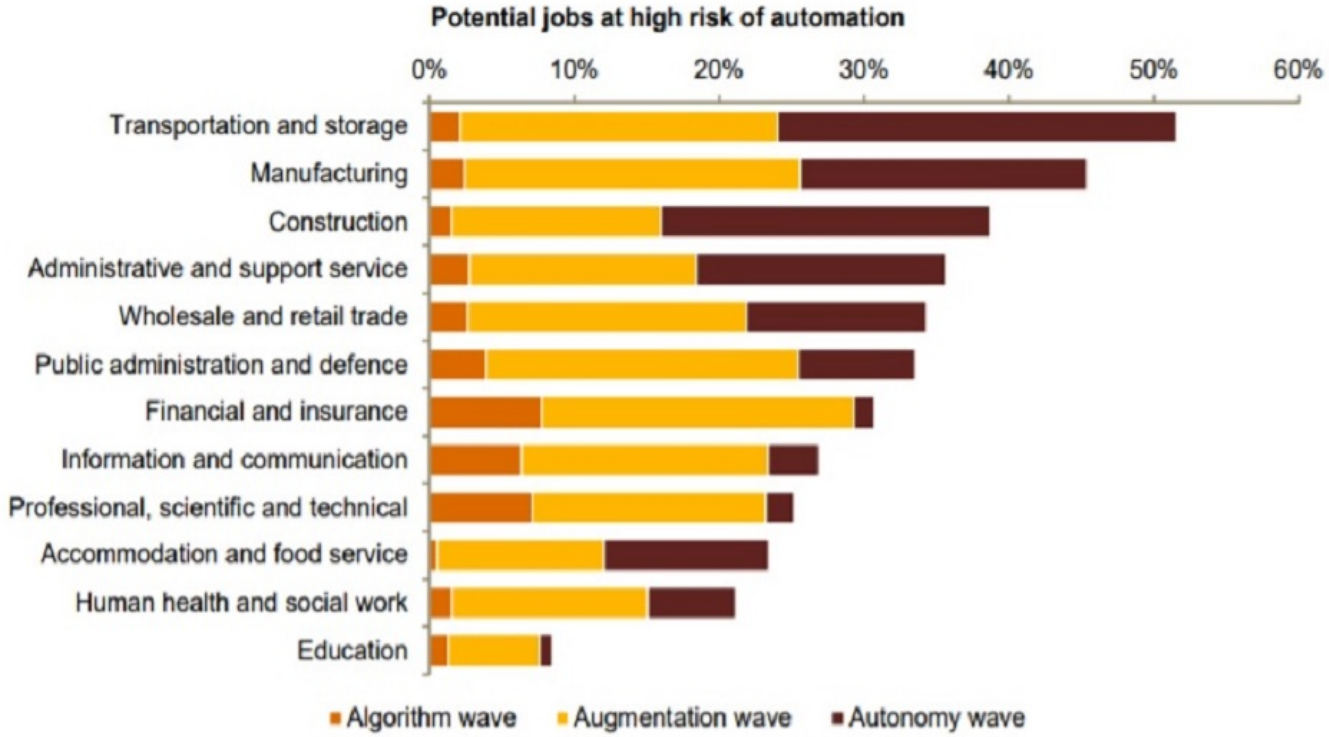

The Fourth Industrial Revolution | Full Version (Subtitled)
Watch later
Share
We are now in the early stages
of the Fourth Industrial Revolution,
MORE VIDEOS
Screenshot
SUBSCRIBE

# Media coverage and predictions about BIG changes


http://www.alphabeta.com/wp-content/uploads/2017/08/The-Automation-Advantage.pdf

# PwC 'Will Robots Really Steal our Jobs' report 2018

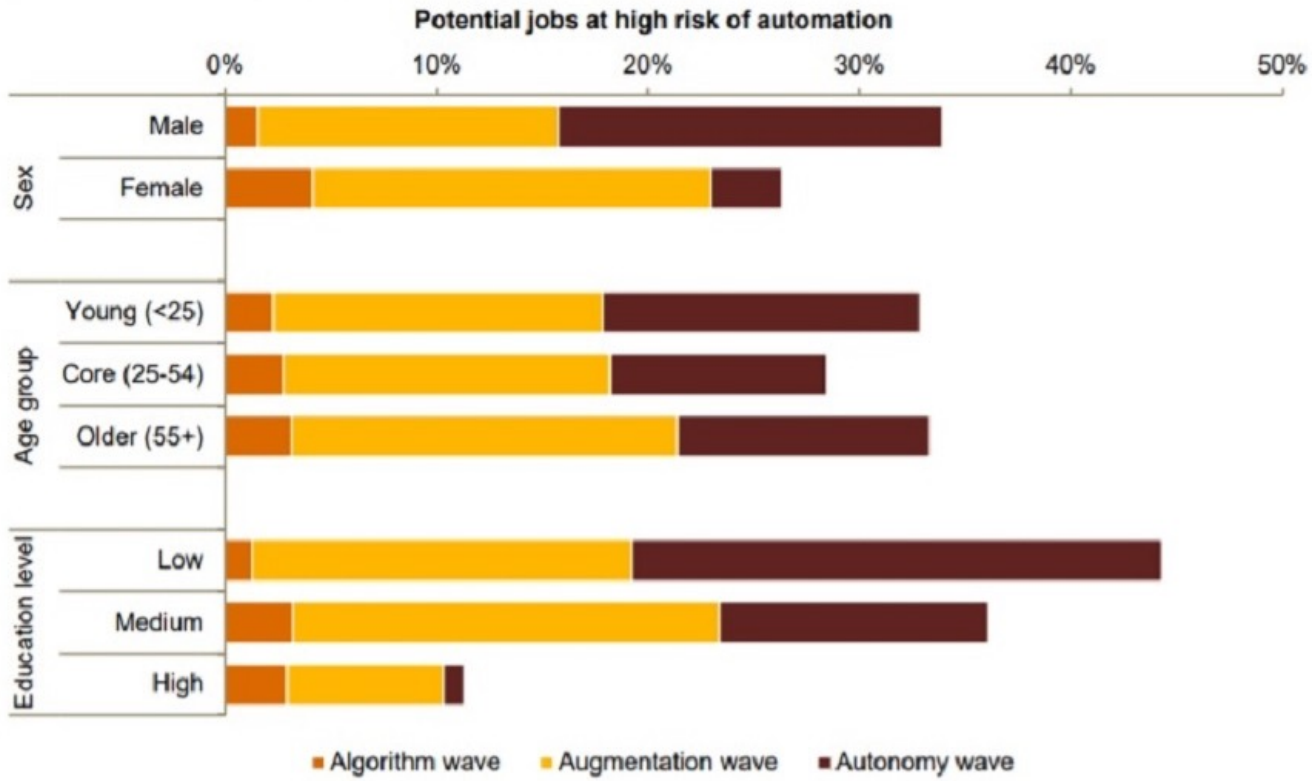
**Figure 1.2 – Potential rates of job automation by industry across waves**




*Source: PIAAC data, PwC analysis*

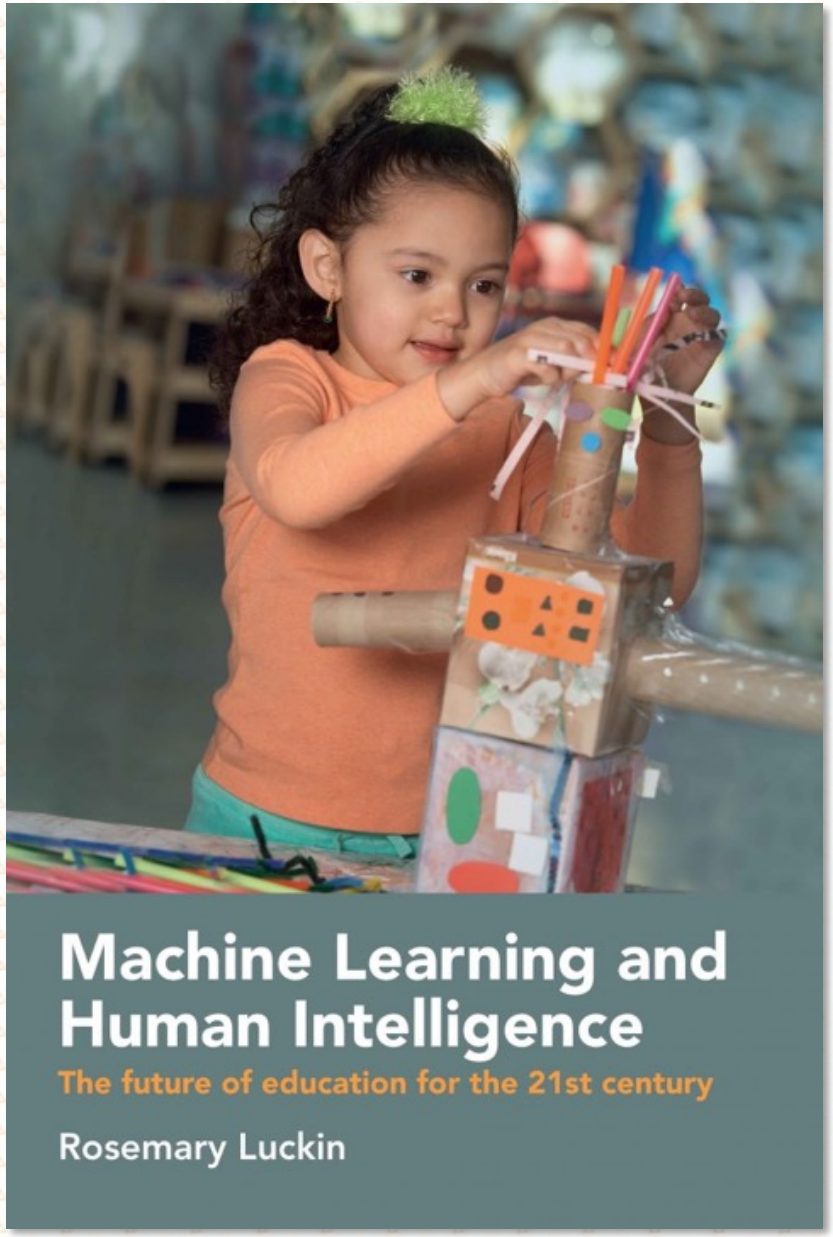
# PwC 'Will Robots Really Steal our Jobs' report 2018

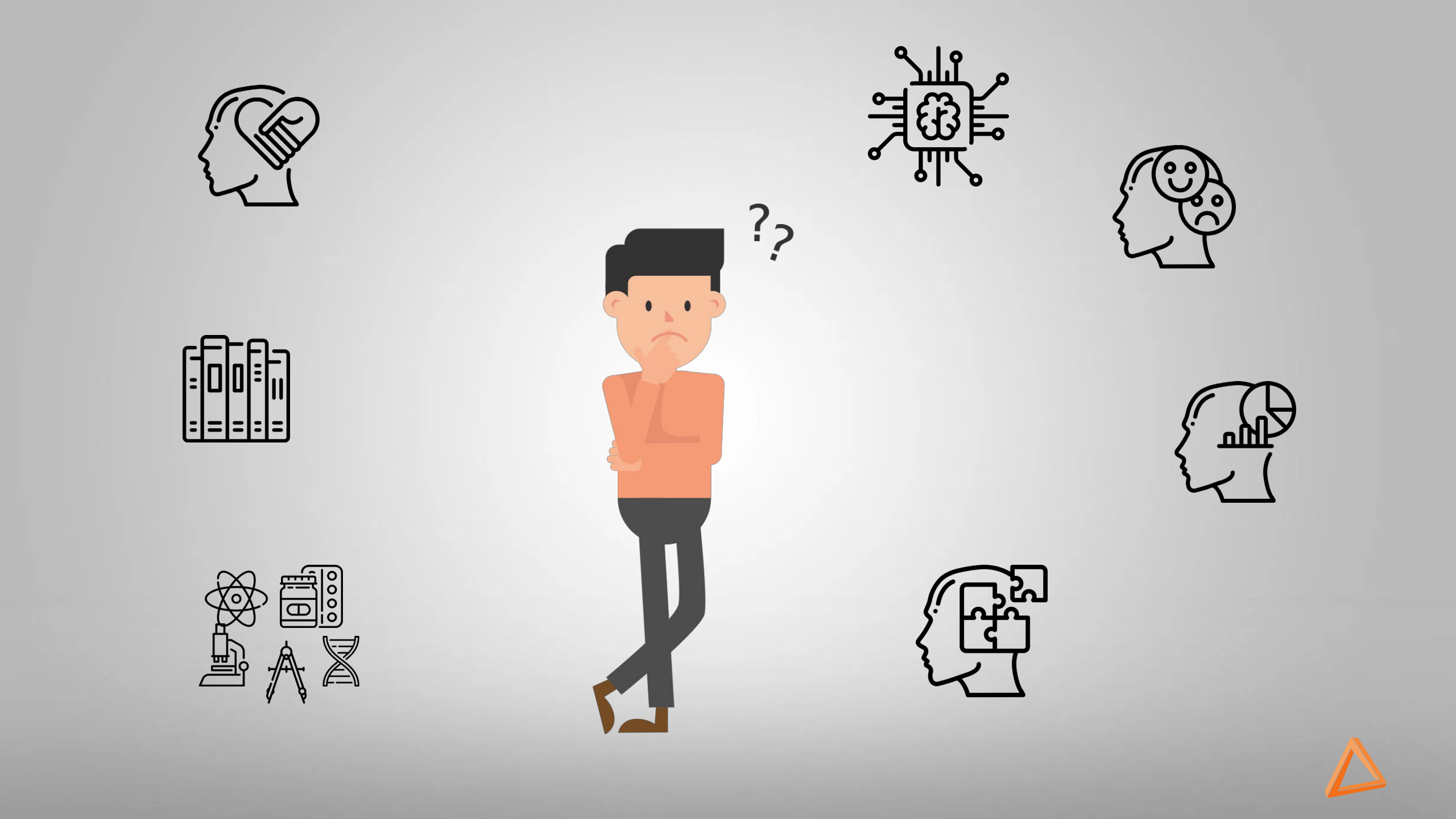
**Figure 1.3 – Potential job automation rates by type of worker across waves**




*Source: PIAAC data, PwC analysis*

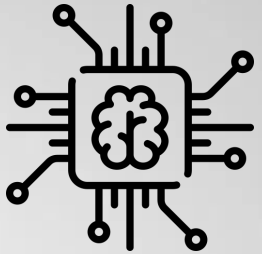

PHL
PHLCVB
Philadelphia Convention & Visitors Bureau
CENTER CITY MAP
Please Touch Museum
Eastern State Penitentiary
Temple University
Fairmount Park
Boathouse Row
Philadelphia Zoo
CENTENNIAL DISTRICT
Schuylkill River
Philadelphia Museum of Art
Eakins Oval
Northern Liberties
SugarHouse Casino
Benjamin Franklin Bridge (Toll)
Powelton Village
UNIVERSITY CITY DISTRICT
Drexel University
University of Pennsylvania
Bartram's Garden
30th Street Station
Franklin Institute
Logan Square
Academy of Natural Sciences
PARKWAY MUSEUMS DISTRICT
CONVENTION CENTER DISTRICT
Pennsylvania Convention Center
Chinatown
Chinese Friendship Gate
Franklin Square
National Constitution Center
Independence Visitor Center
Old City Cultural District
Elfreth's Alley
Penn's Landing
Camden New Jersey Waterfront
Ulysses Wiggins Waterfront Park
Delaware River
City Hall
JFK Plaza
Gayborhood/Midtown Village
Jewelers' Row
Antique Row
WASHINGTON SQUARE DISTRICT
Washington Square
HISTORIC WATERFRONT DISTRICT
Society Hill
Head House Square
South Street
Fabric Row
Italian Market
Sports Complex
RITTENHOUSE SQUARE DISTRICT
Rittenhouse Square
AIRPORT & SPORTS COMPLEX
Airport & Sports Complex Key
1. Clarion Hotel & Conference Center
2. Courtyard by Marriott Philadelphia South
3. Doubletree by Hilton Philadelphia Airport
4. Embassy Suites Philadelphia Airport
5. Hampton Inn Philadelphia Airport
6. Hawthorn Suites by Wyndham Phila. Airport
7. Holiday Inn Philadelphia Stadium
8. Philadelphia Airport Marriott
9. Renaissance Philadelphia Airport
10. Sheraton Suites Philadelphia Airport
Hotel
Building
Park
Parking Facility
Visitor Center
Hospital
Place of Worship
Transportation Routing:
SEPTA Transit Station
Airport Train
Market / Frankford Line
Broad Street Line
Subway / Surface Line
PATCO Line
HISTORIC AREA INDEX
MUSEUM
A. New Hall Military Museum
B. Free Quaker Meeting House Museum
C. National Liberty Museum
D. National Museum of American Jewish History
E. Chemical Heritage Foundation Museum
HISTORIC
1. Independence Hall
2. Congress Hall
3. Old City Hall
4. Philosophical Hall
5. Library Hall
6. Second Bank of the U.S.
7. Franklin Court
8. Carpenters' Hall
9. Todd House
10. First Bank of the U.S.
11. Bishop White House
12. Christ Church Burial Ground & Franklin's Grave


Machine Learning and Human Intelligence
The future of education for the 21st century
Rosemary Luckin



3. Social intelligence

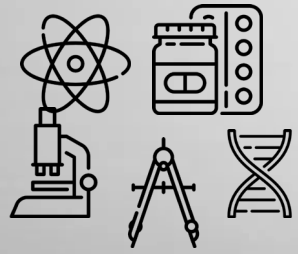
4. Meta-cognitive intelligence



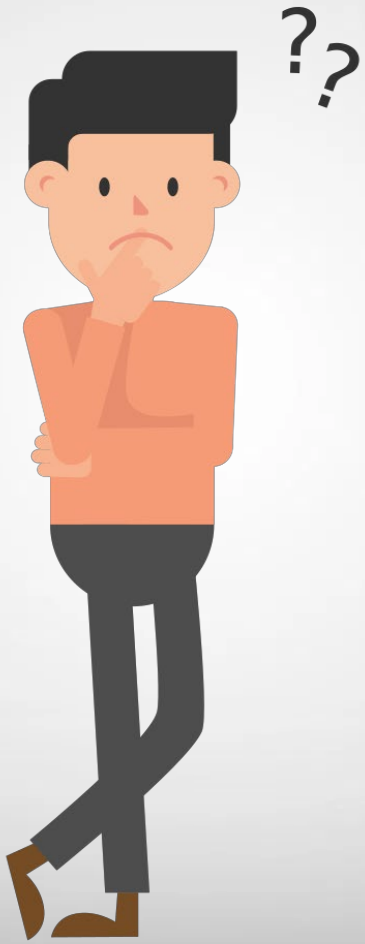
5. Meta-subjective intelligence

2. Meta-knowing intelligence

6. Meta-contextual intelligence



1. Interdisciplinary Academic intelligence



7. Perceived self-efficacy

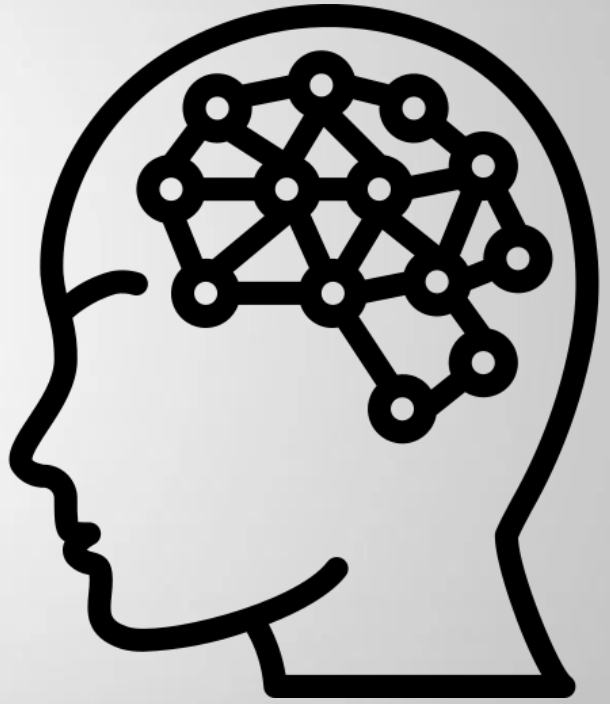
# Being Human is Fundamentally Important


SEEKING
HUMAN
KINDNESS

# What is Human Intelligence in an AI world?

**Interwoven Intelligence**

- 7 elements to human level intelligence: all elements are **essential**;
- 5 elements can be considered under the heading **meta intelligence;**



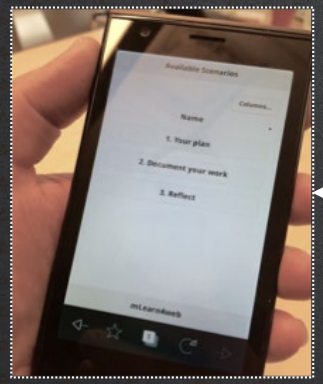
# AI can help

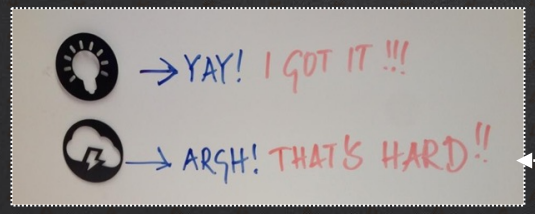
Data

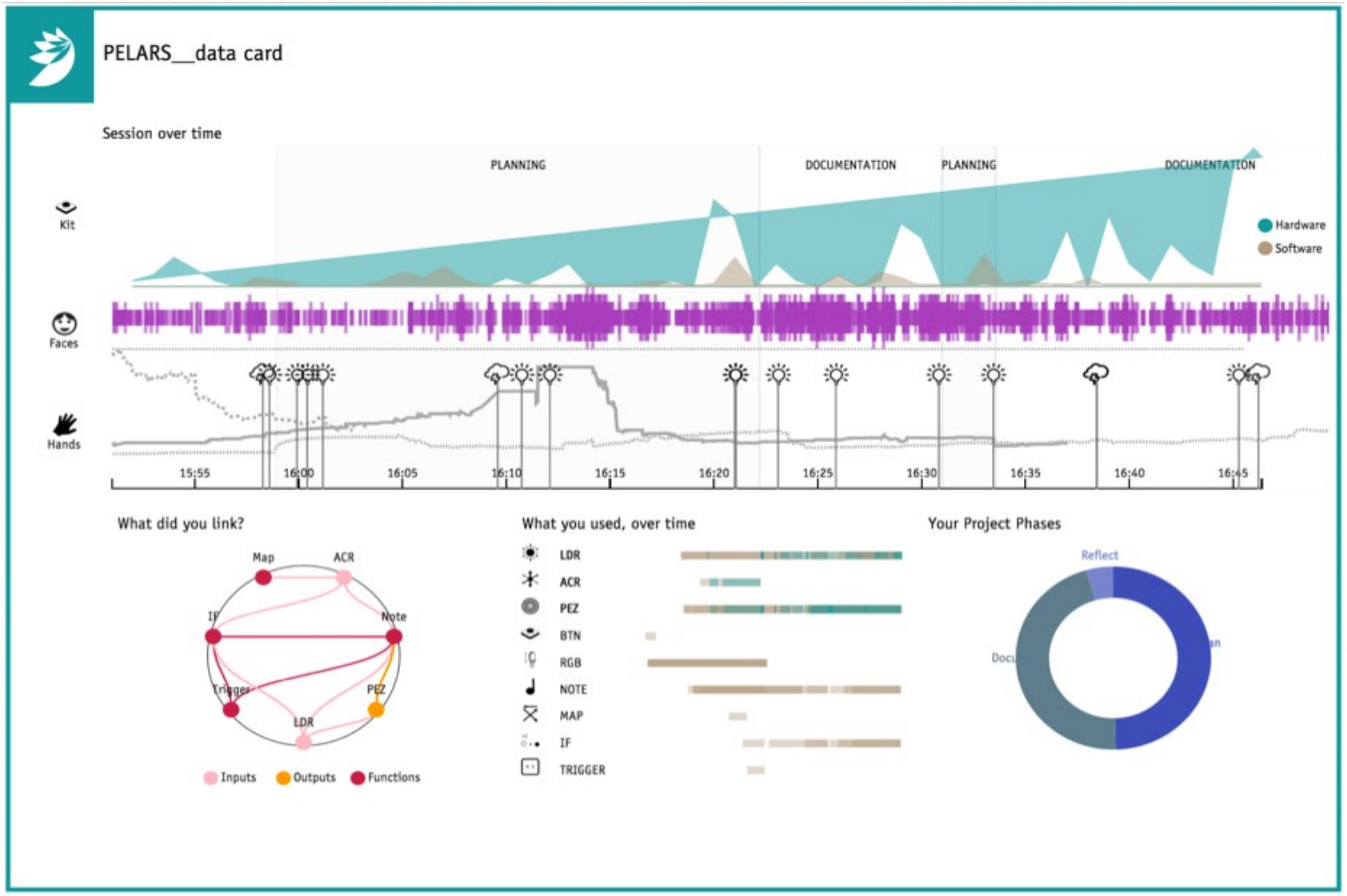
Cleaning

Applying what we know about human learning


9:41
”Why did Apple make you”
tap to edit
For one reason only: to make your life easier, and more fun (I guess that’s two reasons, huh?)

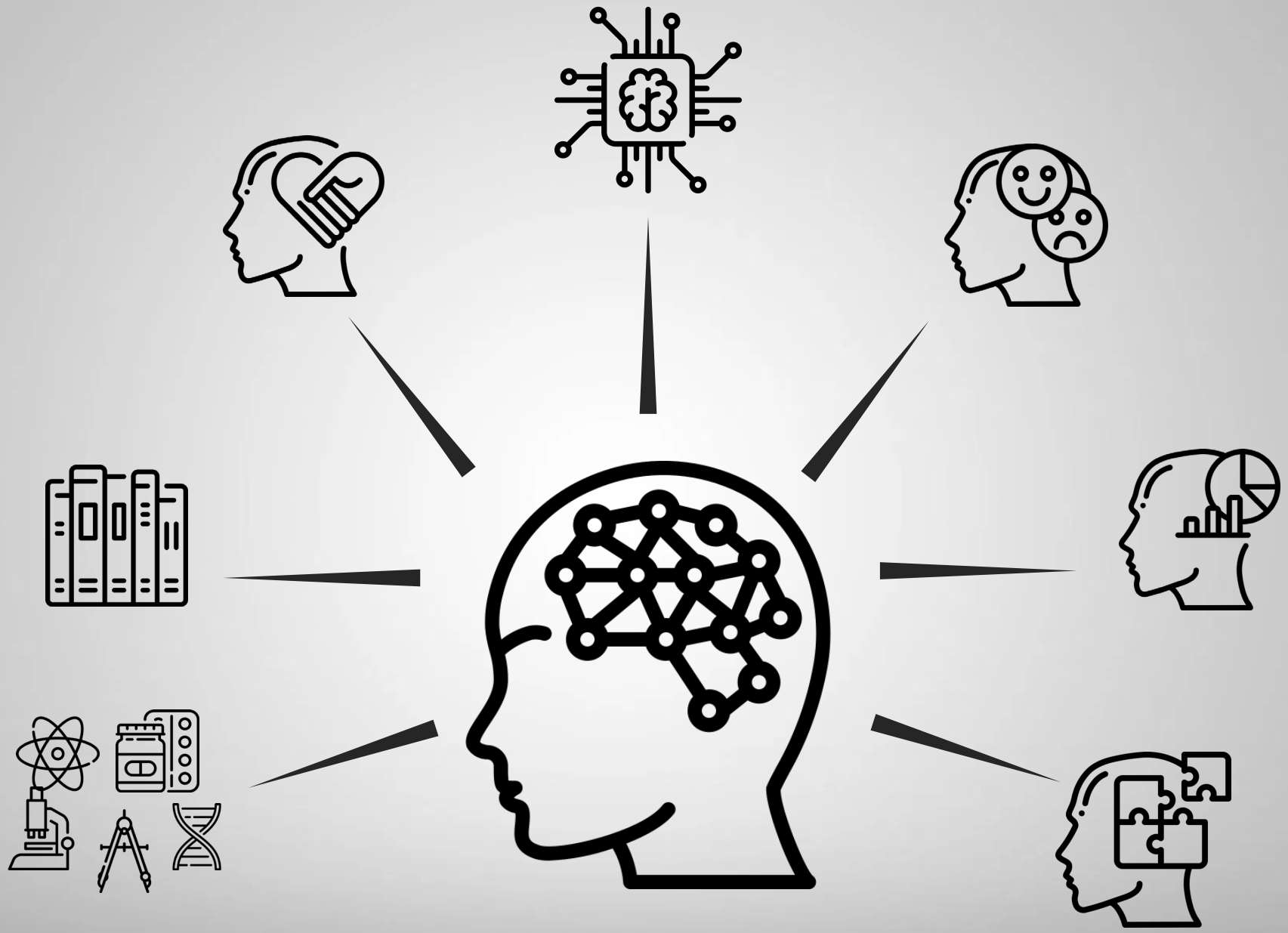

Available Scenarios
Name
1. Your plan
2. Document your work
3. Reflect


→YAY! I GOT IT !!!
→ARGH! THAT'S HARD!!


PELARS__data card
Session over time
PLANNING
DOCUMENTATION
PLANNING
DOCUMENTATION
Kit
Faces
Hands
Hardware
Software
15:55
16:00
16:05
16:10
16:15
16:20
16:25
16:30
16:35
16:40
16:45
What did you link?
Map
ACR
IF
Note
Trigger
PEZ
LDR
Inputs
Outputs
Functions
What you used, over time
LDR
ACR
PEZ
BTN
RGB
NOTE
MAP
IF
TRIGGER
Your Project Phases
Reflect

**Synchrony** – Schneider and Pea (2013) found that students' visual synchrony, measured with eye-trackers, positively correlated with students' learning gains. (NOT body synchronization though).

# Non-verbal signifiers of CPS?



# What does this mean for teaching?

**Numeracy and literacy,** including **data literacy**, will of course remain fundamental to all education, as will the **basics of AI**;

Emphasis for the remaining subject areas needs to be on **what** these subjects are, **how** they have arisen, **why** they exist and **how to learn** them;

Debate and Collaborative Problem Solving provide powerful ways to help students understand their relationships to knowledge and to hone their ability to challenge and question;

To ensure that teachers and trainers have the **time** to work with their students and trainees to develop these complex skills, **we can use AI to help.**

# AI can help

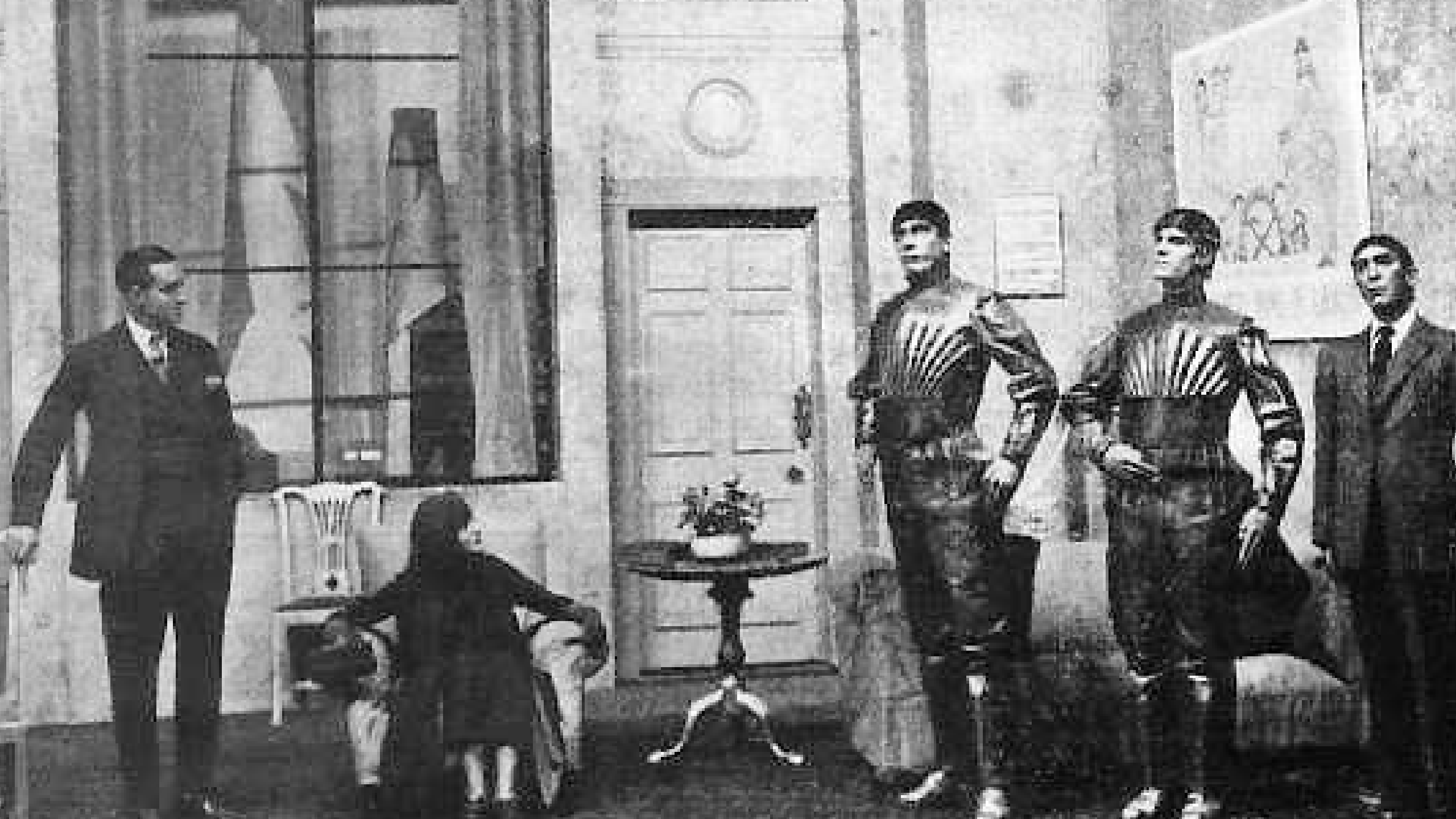
**AI – AI tutoring systems for numeracy**, **literacy (including data literacy)** and basic **subject** knowledge;

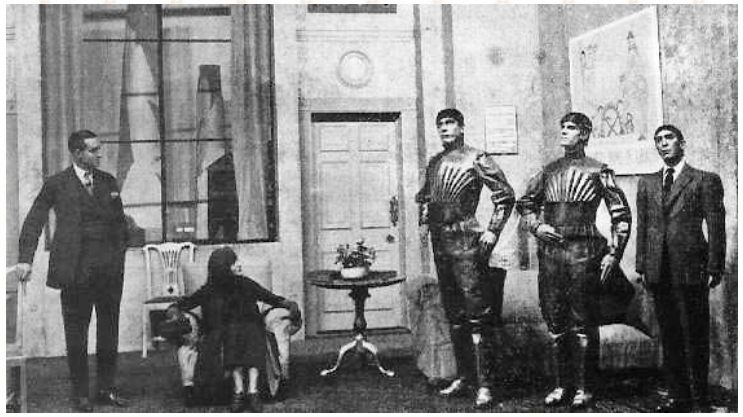
**HI – Refine this understanding** through activities such as debate and collaborative problem solving;

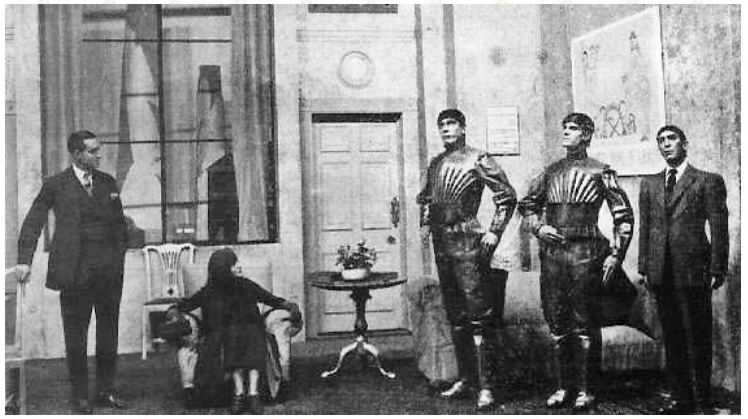
**HI – Develop learners' social and meta intelligence** (meta-cognitive, meta subjective, meta contextual and accurate perceived self-efficacy);

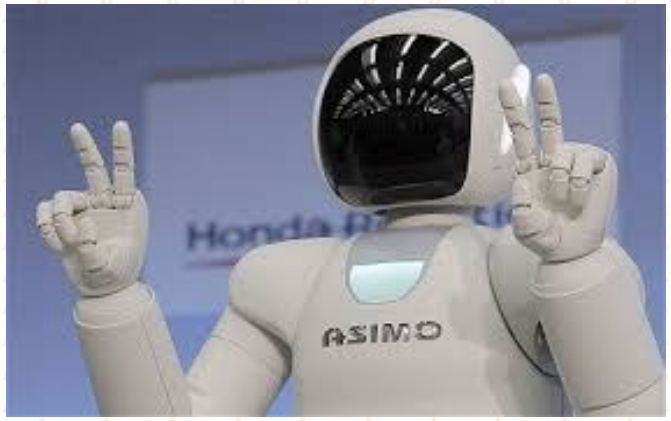
**AI – analyse learner and learning data** so that teachers know when to provide optimal support and learners get to know themselves more effectively.

*“The risk is that the education system will be churning out humans who are no more than second-rate computers, so if the focus of education continues to be on transferring explicit knowledge across the generations, we will be in trouble.” (Financial Times 2017)*

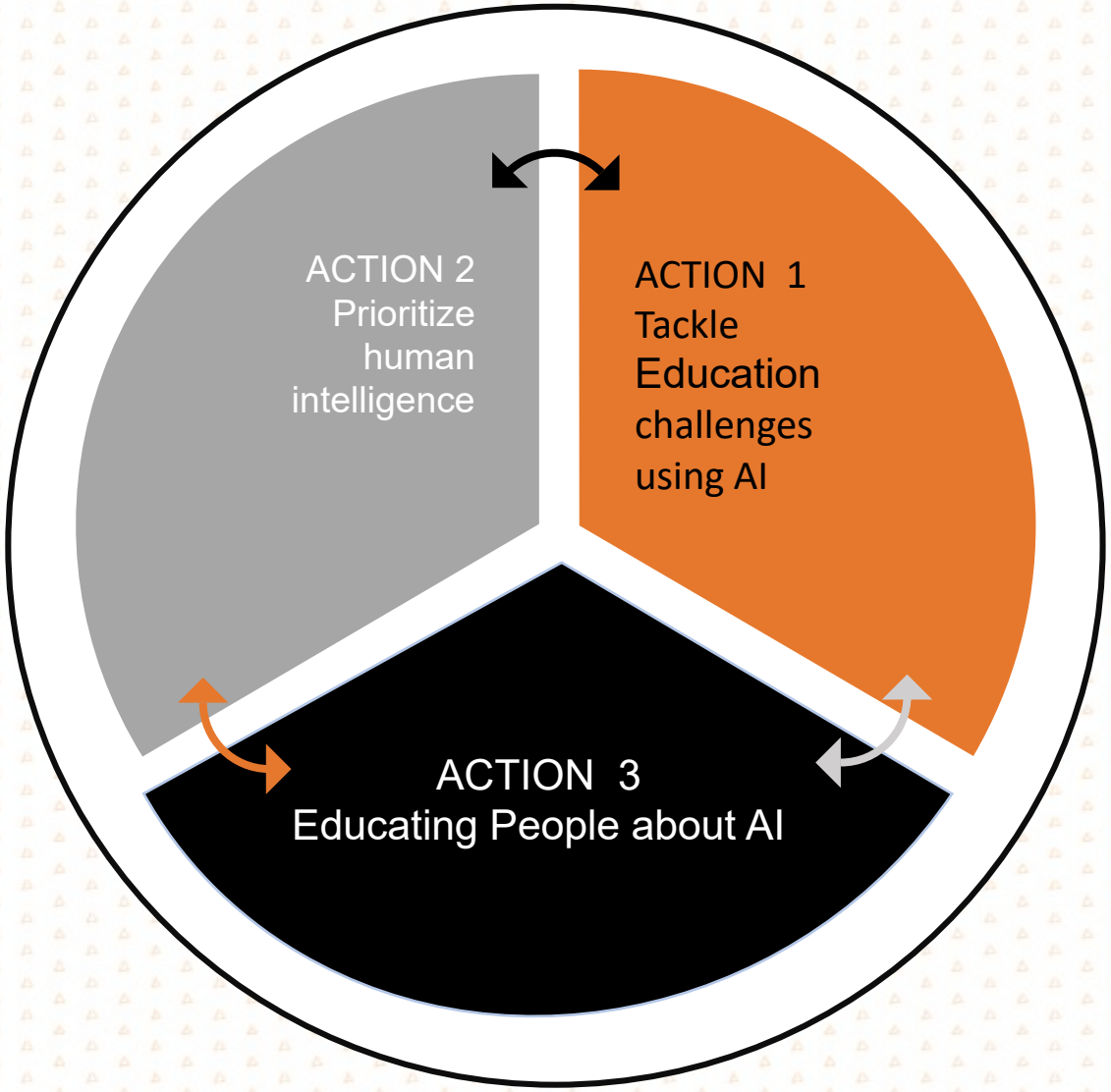







ASIMO

# But how do we make this happen?



Partnership between educational stakeholders is essential to build capacity

# UCL EDUCATE

Understanding and improving the London EdTech ecosystem


European Union
European Regional Development Fund

UCL Institute of Education

EDUCATE
EDUCATION • RESEARCH • EDTECH

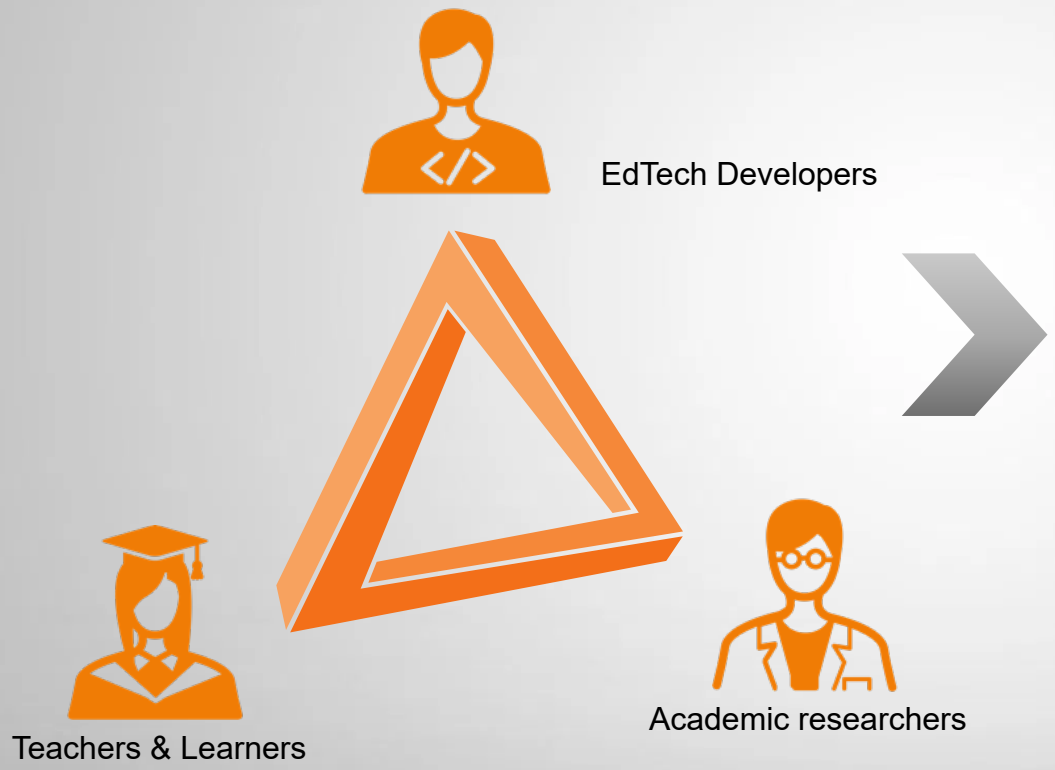
# The Golden Triangle

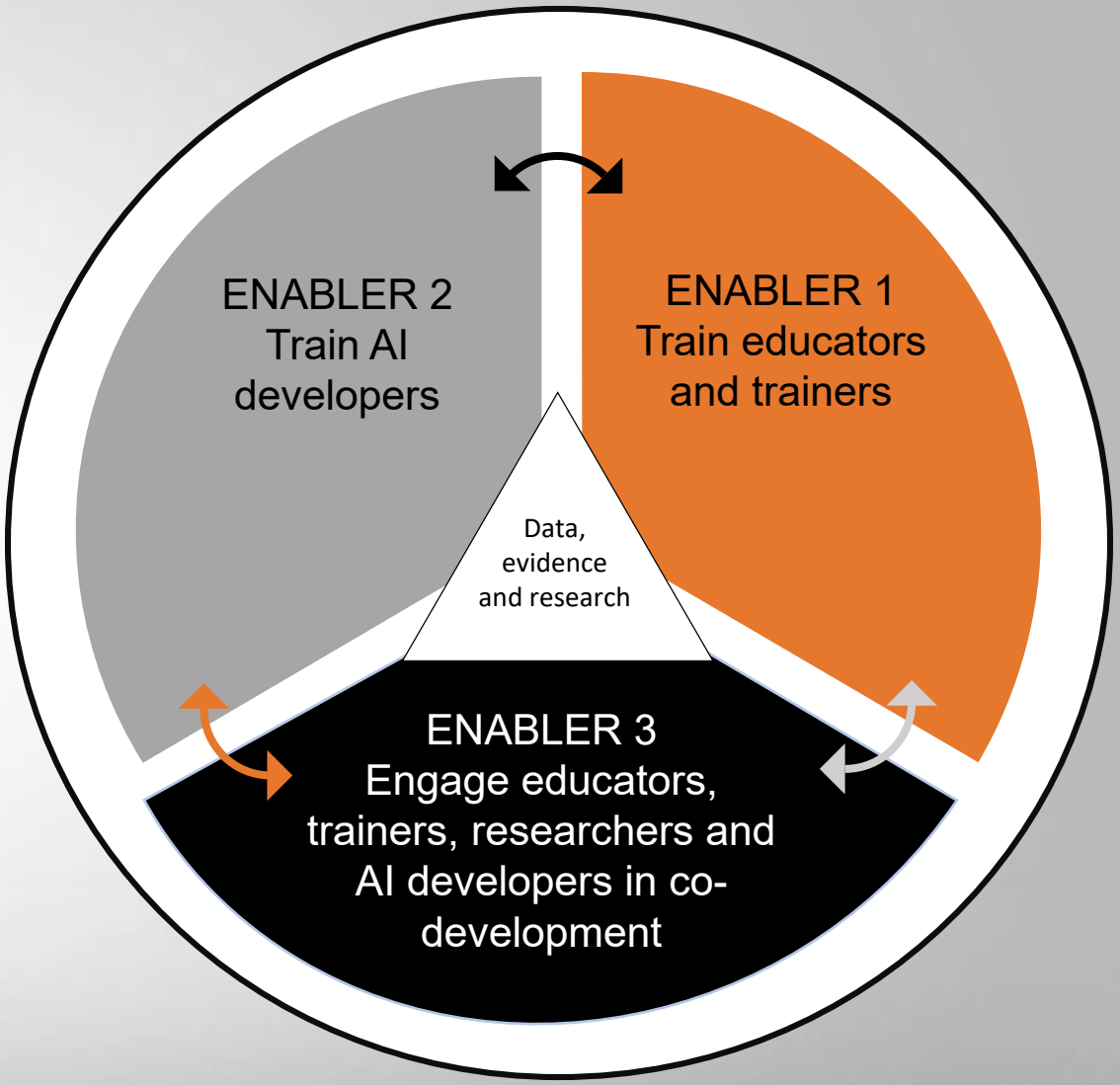
EdTech Developers

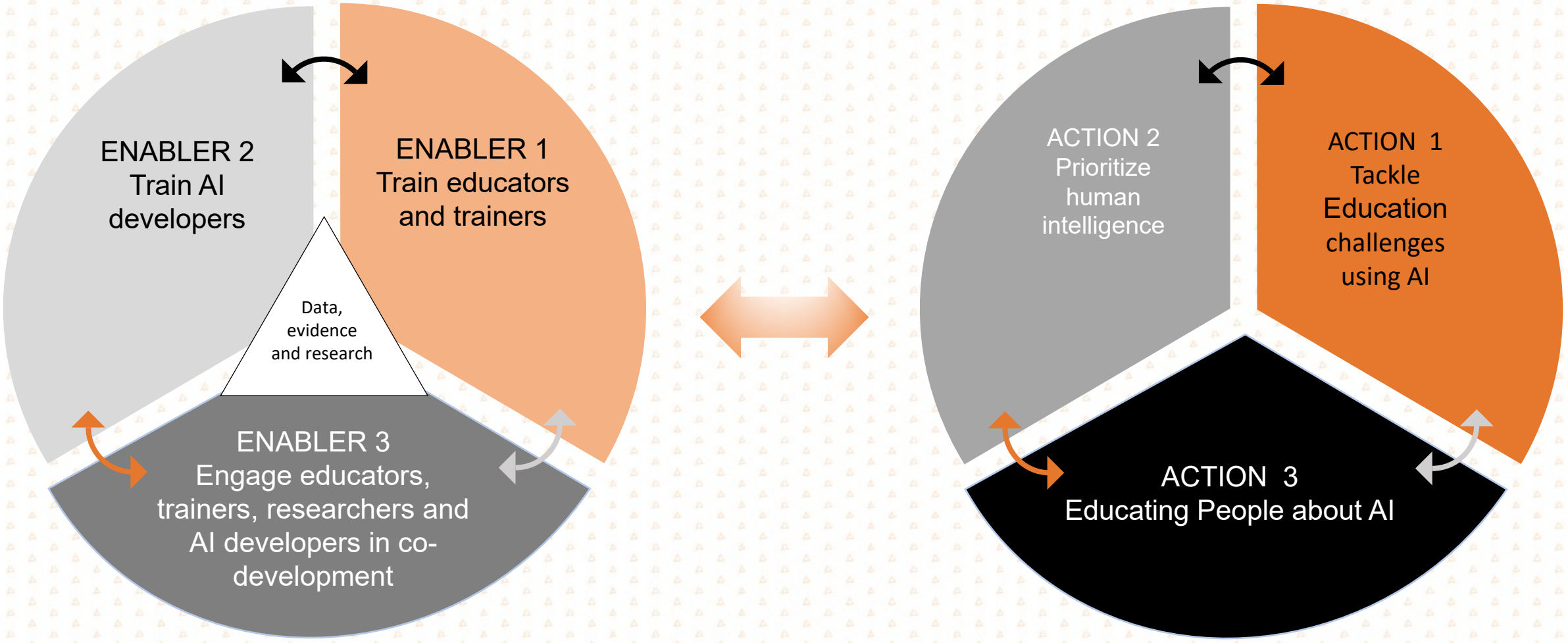
Teachers & Learners

Academic researchers

# The Golden Triangle




ENABLER 2
Train AI developers
ENABLER 1
Train educators and trainers
Data, evidence and research
ENABLER 3
Engage educators, trainers, researchers and AI developers in co-development
ACTION 2
Prioritize human intelligence
ACTION 1
Tackle Education challenges using AI
ACTION 3
Educating People about AI

# AI and Education: the Reality and the Potential

- AI is smart, but humans are and can be way smarter

- 3 ways AI can enhance Learning and Teaching

  - Tackle Educational Challenges using AI
  - Prioritize Human Intelligence
  - Educate people about AI: Attention to Ethical AI for Education is essential

- Partnerships are the only way we can achieve this


# Thank you