



2016 IDEAFACTORY

The Digital World and the Future of Work

OECD FORUM
31 MAY 2016, PARIS

about the OECD_IDEAFACtORY

The OECD_IdeaFactory invites global experts and Forum participants to work together to explore significant social phenomena, combine their perspectives, and discuss the potential of new approaches and solutions.

Inside the IdeaFactory, everyone is part of the process, everyone's experience counts, and ideas can be combined, tested, prototyped and formed into potential new solutions.



This report contains a summary of all the content captured by the facilitation team through writing and visual dialogue mapping. It is not a complete transcript and does not claim to be precise; we hope it captures the main ideas and concepts that emerged and were discussed during the session.

The opinions expressed and arguments employed in this report are those of the participants in the OECD_IdeaFactory and do not necessarily reflect the official views of the OECD or the governments of its member countries.



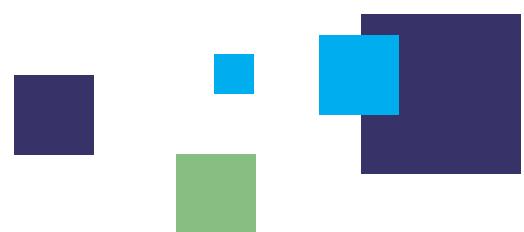


THE DIGITAL WORLD AND THE FUTURE OF WORK

“**Disruption**” is an over-used term, but it’s not inappropriate when referring to the evolution of ways of working, and to the development of new skills for new jobs in new domains. People are no longer just preparing for jobs, but for multiple careers over the course of their lives.

The aim of this IdeaFactory was to discuss the different strategies that may be pursued to adapt the skills taught in education and training systems to the changing needs of today’s and tomorrow’s employees and employers. **How can these disruptions be leveraged to reduce inequality and stimulate productivity? How can different societal actors – policymakers, organisations, individuals – make a dent in this evolving context?**

The following pages capture some of the key ideas that came up during the session, some of which were shared by an IdeaFactory Rapporteur with Ministers at the Ministerial Council Meeting on 1 June.





GERGELY BÖSZÖRMÉNYI NAGY

General Director, Design Terminal, Hungary

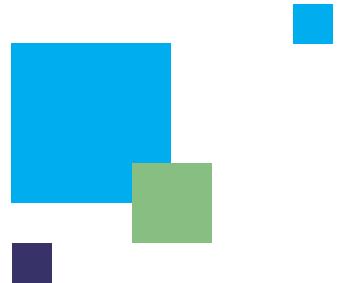
“My insight is about **complexity**. There is a very strange myth about STEM education – science, technology, engineering, and mathematics. Politicians, leaders, and presidents in the Western world believe that focussing on STEM and related domains is the key to building a developed workforce for our future labour market.

My perspective is different: I believe that **humanities and liberal arts are as important as the natural sciences for developing a strong labour market**. Why? The top jobs of 2025 will be 50% based on humanities and 50% based on natural science. For this reason we have to refocus and reshape the education industries in the next few years.”



VALERIE MOCKER

Principal Researcher,
Startups and Entrepreneurship, NESTA



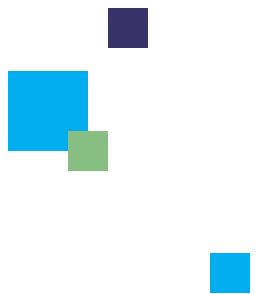
"The workers of the future will always be more immersed in digitalisation. Virtual reality (VR) glasses and other digital innovations will be fully embedded in our workplaces in the near future. These technologies will be very useful: for example VR will allow an architect to show a flat that does not yet exist, or will be introduced in hospitals to help with cardiopulmonary resuscitation (CPR) training, or will be inserted into a car in an early design phase. Behind all these technologies lies the smartphone. Nowadays, companies from many different domains are hiring digital experts to develop new smartphone applications, digital products and services.

However, the use of digital devices is also associated with reduction in work productivity. Evidence shows that the average smartphone user checks his phone 150 times a day, about every 6 minutes. **The more we check our phone, the less productive we are.** As a result, we make more mistakes and our attention span becomes shorter - recent studies have demonstrated that the average attention span in the Western world has fallen to 8 seconds. A goldfish has an average attention span of 9 seconds."



KIRSTEN SEHNBRUCH

Director, Institute for Public Policy,
Faculty of Economics, Universidad Diego Portales, Chile



“Technological progress will have a hugely positive impact on developing countries, improving the living conditions of many people. However, a large portion of the labour market of these countries is informal and disconnected from innovation and technological progress. As a result, **there is a risk that labour markets will become more segmented and that many workers will be left behind.**

Our challenge is to **design public policies** that facilitate the access of these technologies to people who are normally not connected with formal labour markets - using smartphone applications to connect them to services and structures, to increase their productivity, to train them in a different way.”



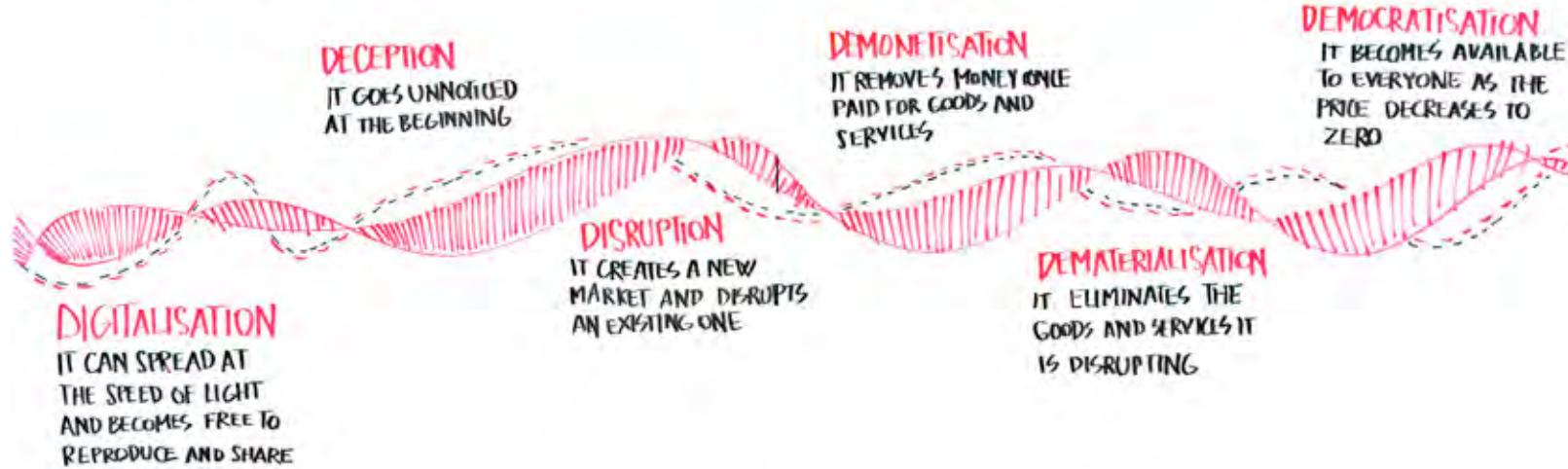
MAURIZIO TRAVAGLINI

Founder, Architects Of Group Genius,
IdeaFactory Designer and Facilitator

“The purpose of this IdeaFactory, focussed on the Digital World and the Future of Work, is to explore and discuss **how the next waves of changes in digitalisation and virtualisation may impact the way we will work and live, and how our current roles will evolve, be redesigned and reinvented.**

The ambition of the IdeaFactory sessions is not to provide answers – but to trigger new doubts and provoke new questions. The six dimensions of Peter Diamandis’s “Exponential Innovation” framework might be useful to better understand and interpret the possible implications of the new reality we are discussing.

"6Ps," EXPONENTIAL FRAMEWORK



Digitalisation: Anything that can be digitised can be distributed at the speed of light and its growth can be exponential. This is the case for products and services shared on the Internet and through digital devices.

Deception: When a new technology emerges, its early growth rate is so minimal, that nobody cares about it. It goes unnoticed for an initial period of time.

Disruption: When this growth rate creates a new niche, a new market is created and an older market disappears - for example digital music replacing CDs.

Demonetisation: This happens when money vanishes from the equation - as for Skype, Napster, and the WIFI connection inside Starbucks.

Dematerialisation: This is about goods and services vanishing. The most powerful example of this phenomenon is the mobile phone. It contains devices, once separate physical objects that are now fully embedded in it: a torch, a GPS, a camera, a clock, a cardio application to measure our heart rate.

Democratisation: When physical objects are turned into "bits" and then hosted on a digital platform in such high volume that their price approaches zero. As a result of dematerialisation and democratisation they can be used by everyone."

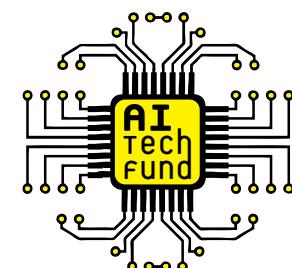
2030: LOOKING BACK AT EVOLUTION

Participants were asked to explore and understand how the next waves of change in digitalisation and virtualisation may affect relevant categories, roles and professions that are now considered as “Potentially Partially Replaceable” by Artificial Intelligence (AI):

Soldiers, Police Officers, Private Security,
Health Care Operators and Nurses, Educators and Teachers.

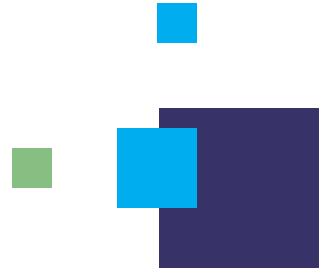
Participants worked on different future scenarios from two perspectives:

- > The Pro-Human Alliance: a not-for-profit organisation that wants to preserve the role of humans in any work-related activity
- > The AI Tech Fund: a not-for-profit organisation that promotes Artificial Intelligence in all aspects of life and work.





PRO-HUMAN ALLIANCE



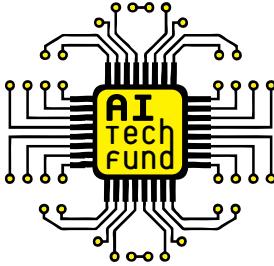
2030: Looking Back At Evolution

- > What “exponential innovations” have unfolded in the last 15 years?
- > How has the human side of this profession evolved?
- > What do the best representatives of this profession have in common?
- > What are the most interesting examples of “Development & Learning Strategies,” which have most improved the impact and the productivity of this profession?
- > What have been the most effective ways that technology has successfully enhanced and augmented the human side of the work?

Mapping the Key Elements

- > What should be the boundary beyond which AI interventions would not be acceptable?
- > What is the unique value that a human can bring to this profession?
- > What makes you believe that AI won’t be able, or shouldn’t be allowed, to perform this aspect of the role?





AI TECH FUND

2030: Looking Back At Evolution

- > What “exponential innovations” have unfolded in the last 15 years?
- > How has the technology side of this profession evolved?
- > What do the best-case scenarios of this profession have in common?
- > What are the most interesting examples of technology-based “Replacement & Improvement Possibilities,” which have most improved the impact and the productivity of this profession?

Mapping the Key Elements

- > What will be the next boundary beyond which AI intervention should be expanded?
- > What is the unique value that AI can bring to this profession?
- > What makes you believe that a human won’t be able to perform this aspect of the role, or might find it undesirable?

2030: SNAPSHOT FROM PPR PROFESSION CASES

Health Care Operators & Nurses

Pro-Human Alliance

"AI can be used as a tool in the health professional's toolbox, a useful service product able to increase access to information and data. However, in health care **the judgement and the contact of a human being is needed** to understand the subtle nuances of another human being. We can trust a doctor, not a machine."

"If you replace people's jobs and judgements with machines, people will not be happy; they will be rebellious. We need to take into account this **social aspect.**"

"In the health care domain the rate of knowledge generation and technological innovation unfolds much more quickly than in other sectors. At the end of knowledge accumulation, a human brain is needed not only to make sense of what has been developed and learned, but also to understand **the right treatment for the physiological and emotional conditions of the different patients.** Health is not an exact science."

PAN A.1. → DECISIONS A.1.
USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE
HUMANS ESSENTIAL: YES → HUMAN CHOICE
- EMOTIONAL ASPECT (VULNERABLE, WEAK)
- COGNITIVE / INTERACTIVE → COOPER. RIGHT
- PATIENT'S CHOICE → SUPPORT DECISIONS
- ETHICAL JUDGEMENTS
+ LIFE / DEATH
+ CHILDREN
+ SEX THERAPY / CLINICS
- ECONOMIC TRADE OFFS PUBLIC FINANCIAL
+ BENEFITS < RISKS
- COST TREATMENT < RISKS
RESPONSIBILITY
ACCURACY

USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE
- HUMAN CONTACT, PERS. TOUCH
- ANOTHER SERVICE PRODUCT
- DO WE TRUST AI?
- POLITICAL IMPLICATIONS
- MAY INCREASE GLOBAL INEQUALITIES
- SOCIAL COHESION DAMAGE
- STAKEHOLDER OWNERSHIP

"The **emotional support and the ethical judgement of a doctor matters.** They are needed to explain and evaluate the consequences of the patient's choices and treatments, regarding, for example, life expectancy, cultural or religious constraints, or physical pain."

"**Accountability** is a crucial aspect. If humans were replaced by machines and machines made mistakes, who would be responsible for them?"

Health "Care" → Humans is it? ?

USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE.

Progress in the last 15 yrs → cost / accessibility

- Virtual/universal access
- Big data accumulated/analyzed
- Replication of tasks/roles

2. Next frontier

- Research and conquest of incurable disease → Faster / cheaper / accurate
- Humans are humans (biological, physical, emotional)
- Champion challenger / Risk environment

USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE.

- 1. STORY**
- 2. FOR THE PATIENTS/PEOPLE**
 - diagnosis → chips in first aid humans
- 3. Doctors' investment in workers**
 - job quality, high skilled jobs, salaries

→ **QUALITY, SAFETY, HAPPINESS**

AI Tech Fund

"Think about digital innovations in car accidents: a chip embedded in our arm, combined with a system to help with first aid, can allow every patient to be saved quickly. These are important **AI life-saving products.**"

"Machines offer many services to improve the life conditions of patients: **better safety, more happiness, and higher quality.** Furthermore, this phenomenon does not have a negative impact on the labour market. Statistics show that today's health care workers have highly skilled jobs and higher incomes. So, AI has improved both the quality of life and the quality of work."

"The technological progress of the last 15 years has resulted in a **drastic decrease in the cost and a drastic increase in the accessibility** of health care. Virtual and universal access has dramatically reduced the geographical and economic barriers to health care services."

"AI and big data are useful for developing **algorithms** able to help doctors in pattern recognition. They are able to better identify which are the most effective treatments for patients."

"The next boundary beyond which AI intervention should be expanded is **health care research.** This will enable us to find solutions to incurable diseases, such as the Ebola virus or Alzheimer's disease."



Soldiers

Pro-Human Alliance

"If machines were dedicated to warfare, the immediate consequence would be **detachment and lack of empathy and compassion** for individuals. Moreover, there would be the risk of a power shift toward individuals who have access to money and technology."

"Cyber-security is an important issue. Until the architectural structure of digital cyber-security platforms is re-thought, which would require enormous investment, we run the risk of serious damages. For this reason human decision-making is needed."

"Humans bring immense value in terms of **ethics, compassion, judgement and discernment**. Moreover, human beings are able to negotiate more effectively than machines."

"In the last few decades we have invested massively in trying to **engineer our own human soldiers as robots** - in order to reduce the risks of mistakes. However, we have taken ethics completely out of the equation. We have not trained the general public on morality, on negotiation skills, proportionality and compromise. In the future, ethics must stand at the heart of every military training and academy, to make sure that ethical and fully grown independent human beings can make judgements working alongside and operating the machines."

"In 2030 the role of the soldier will be to **manage a team of robots**, to make sure that everything gets deployed at the right time in the right way, and to make decisions."



USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE

- Huge progress on dual use tech operating independently leading to more exposed civilians + nations
- Unique human values are not replaceable
Ethics, Empathy, Compromise, Negotiation, Proportionality
- Human soldiers and strategists should pro-actively focus and develop their ethical and moral viewpoint, alongside tech to perform dangerous + heavy lifting

USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE

Given Cyber Security research and capabilities and need for human sympathy, compassion, lived experience (a sense of connection), we do not want autonomous A.I. Warfar or imperialist tech hegemonies reducing world democracy and the spread of warfare; we oppose a moratorium on A.I.-led soldiers, preferring transparent communications and negotiation and use of humans and all use of A.I. should ultimately be dependent on human decisions as led by an international council.

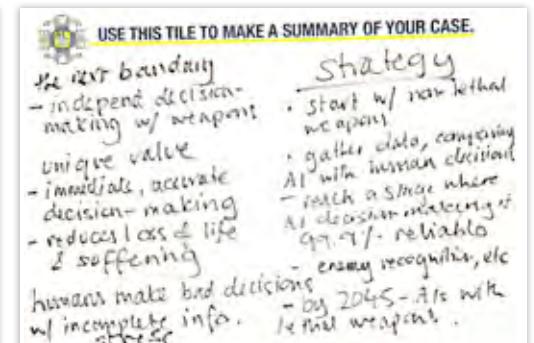
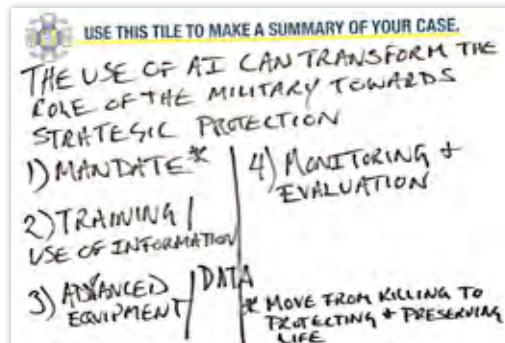
AI Tech Fund

"In the last 15 years, nearly **50% of ground troop routine tasks have been replaced by robots**. In 2025 a terrorist attack on a nuclear installation in France was foiled by an AI device working in intelligence gathering. The next boundary to cross is AI's independent decision-making."



"Given the transformative power of AI, **the military will have new roles in the future**, enlarging the army's tasks and helping distressed communities in cases of floods or natural crisis. To reach this objective, a shift is needed in the mandate of the army, transforming them **from “killing machines” to “protecting and life preserving machines.”** AI will help with training and staffing in the army in order to develop these new skills. Machines and virtual reality will be used, for example, to replace the need for humans to enter a nuclear site, avoiding the risk of being harmed by radiation. Advanced AI equipment will also help with protecting borders and populations from enemies and attacks."

"Human soldiers are hugely expensive - training, wages, health care, pension, etc. AI technology costs are significant at the beginning, but the longer you use it, the higher the returns are, so in the end it becomes cheaper."



Private Security and Police Officers*

Pro-Human Alliance

USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE.

- incredible tech progress aiding work
eg. biometrics, drones, intelligence
AI is human progress

- there is a boundary and at a certain moment technologies are not ready to make final decisions: accountability

- we suggest introducing flexible period of transition while we work out ethical societal
transition while we work out ethical societal

- need humans who are accountable to other humans (they are the customer)

USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE.

Acceptance of cooperation between man & technologies

What does distinguish a well behaved? What has changed consequences?

① Traffic
② Security
③ Criminal
④ Customer and assistance

① Traffic
② Security
③ Criminal
④ Customer and assistance

① Traffic
② Security
③ Criminal
④ Customer and assistance

We accept responsibility to CTC for the human rights violations but not for the consequences.
We can't negotiate handling but don't necessarily do it.

Overall, we accept that human police officers make mistakes but our behavior that the rest of these factors and conduct the human rights against people.

USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE.

Complex Environment
(People are free)

- Interpretation
- Judgment

- 1) Situations that are Not Predicted
- 2) Risk of external control
- 3) Physical interaction // limits to personal contact

developing developed
USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE

② Kidnapping / Runaway - Scenario
Lagos fiance where
+ Location + +
Human Rights H.I

Hurt or Reaction comfort
Lethal - Emotion -> Interaction

!! Private !! Negotiation Human comfort
Security = Intimidation / Protection people

*The above visuals are an example of other groups' work conducted during the session which were not debated due to time constraints.



USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE.

PROGRESSIVE REPLACEMENT OF POLICE OFFICERS BY ROBOTS

WHY? PUBLIC SAFETY BETTER GUARANTEED

ROBOT: NON-EMOTION; NO FEAR; NON-DISCRIMINATION;
NO LOSS OF HUMAN OFFICERS; BIG DATA ANALYTIC
CAPACITY; NO LANGUAGE BARRIER; SENSORS

HUMANS: CRIME PREVENTION AT THE ROOTS;
CONSULTANTS FOR ROBOTS

STARTING WITH: TRAFFIC OFFICERS



USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE.

Datakeeping (Premium)

Data analysis (Platform)

Emergency Response (Directed Robotics)

(Public, Private, Safety, Freedom, Privacy, Security)

"AI is the only safe way to
better lives for all"



USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE.

Pros	Cons	Response to Cons	Strategy 2016-2030
• 24/7 service	• Social intelligence	• behavioral adjustment of the public - takes vs. detection	① Pilot case on fields of social robots → creating confidence by 2020
• less corruption	• hacking/technical failure	• more transparent & matter-proof system - no corruption	② Pilot case when there are serious risks of conflict between human + robot species (and species)
• less human casualties	• negative human employment effect	• Police will be more involved from the beginning of transition	③ Developing till 2020 - Education of public - Order the government to ban AI weapons
• No bias			
• No human failure,			
• Smaller crowd			
Cities will grow, Cost effective!			



USE THIS TILE TO MAKE A SUMMARY OF YOUR CASE.

Last 15y:

Radical improvements in Surveillance + Prevention
(non oppressive, neutral, objective)

Boundary: Intervention (value: neutrality)

⇒ Protocol driven (non emotional)

⇒ time efficient, buy that crucial time to ...

Signal to Police

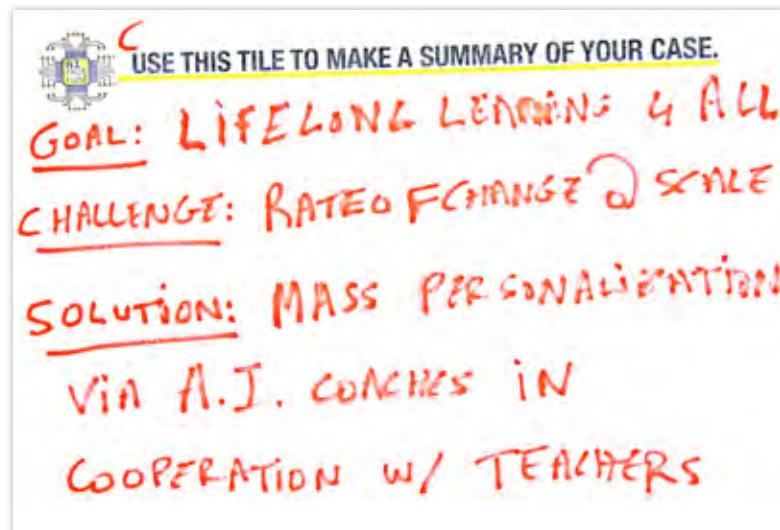
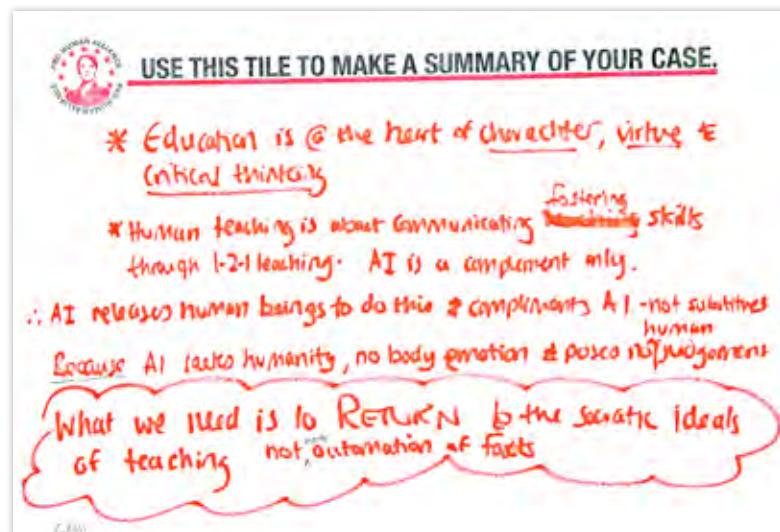
⇒ can be scaled up and down

⇒ ↑ Quality of Life ↓ Risk of infiltration

Strategy: Trial / test case (no size at risk)

e.g.) IKEA security with and without AI (insurance)

Educators and Teachers*



*The above visuals are an example of other groups' work conducted during the session which were not debated due to time constraints.

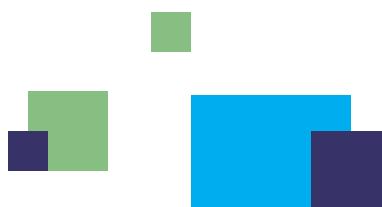
OTHER INSIGHTS

"From our perspective **the replacement of 100% of human beings by AI is not realistic**. There would be a large-scale displacement of labour, and technology would radically alter the role of humans in any particular economic process, but never replace it completely."

"There are different perspectives in the US about the world. The West Coast tends to think of expanding the pie, and the key word is innovation. The East Coast thinks of a fixed pie, so the key word is litigation: use the law to sue people and stop them from developing ideas that might threaten you. The question we should be asking as we develop AI solutions is: how can we increase the pie, **how can we build a larger market by making services cheaper so that more people can have access to high-quality education?**"

"We have to keep in mind the reason we want to use technology. It must be **at the service of human beings** to build a better future. This is the focus point."

"Technology is advancing, no matter what you do. Every new technological advancement is closing down two jobs but creating five new ones at the same time."



LOOKING BACK AT EVOLUTION – SNAPSHOTS





STEFANO SCARPETTA

Director, Employment,
Labour and Social Affairs, OECD

“Looking at how digitalisation may impact the future of work, first we should recognise that there is a significant degree of uncertainty as to the depth and nature of the changes in the way the labour market will be re-shaped; on the type of jobs needed; how, where and by whom they will be carried out.

Compared to previous technological revolutions, the speed at which technology and progress is advancing is significantly higher. And for the first time, technology is really challenging workers, not on manual, but intellectual tasks and activities.

However, there are a few themes I would like to mention:

One theme is “**Social Intelligence.**” Social intelligence is difficult to engineer. I think that, despite future AI improvements, humans will remain more capable than robots in handling complex, unstructured, and unstable contexts and environments. This, however, requires not only foundation skills but also the so called socio-emotional skills.

Another theme is “**Trust.**” In our discussion about the pros and cons of digitalisation and transfer of tasks to robots, many have stressed that for many activities, even if robots can perform as well, if not better than, humans, we still trust humans more. It is more natural for us to accept a human error, than one made by a machine. I think it will be very difficult to adjust this kind of judgement that is embedded in us.

The next theme is “**Choice.**” We still believe in the power of choice. For instance, if you are in a hospital and you are facing different options, it is very human to want to discuss those with a doctor. We are not naturally inclined to believe that there is only one way to fix the problem. This is true in the health care domain, but also in others.

There is a growing concern also about “**Inequality**”. The concern is about the fact that access to some of the new technologies will not be distributed equally across people. We know that digitalisation will probably polarise the demand for labour with more high-skilled and well paid jobs as well as more low-skilled, non-routine jobs with relatively low pay; and this risks further widening the earnings distribution. At the same time, technology has brought a lot of benefits, significantly improving our lives, as consumers and users. Machines are able to perform tasks that humans cannot. The access to big data could, for example, allow for better research, better judgement and better decisions.

Overall, the possible future is one of **complementarity** between more sophisticated machines and workers; we are talking about improved services provided by machines working together with humans. But this future may be associated with widening inequality.



Finally, I believe that we should avoid the idea of **technological determinism**. Technology will come and will be used. Policy and decision-making will always be the responsibility of human beings. We can decide what to use, how to use it and how to regulate the way in which machines and human beings co-operate and work together. But I think that we have to change some of the paradigms of policy making. We should put in place policies that can anticipate the coming changes and not simply react to them.

We will become even more adaptable than before. So will we learn “how to learn”? How will we do this beyond school? How will we allow people and workers in general to continuously adapt and learn?

These are some of the questions that I think that we at the OECD will need to worry about in the near future....”







MAURIZIO TRAVAGLINE

Founder, Architects Of Group Genius,
IdeaFactory Designer and Facilitator

"I would like to conclude this collective conversation with an excerpt from Robert Kegan's book "Immunity to Change":

We now live in a global economy characterised by rapid change, accelerating scientific and technological breakthroughs, and an unprecedented level of competitiveness. These developments create demand for higher levels of education and training than were required of previous generations.

Everyone acquainted with business culture knows this. What is not understood is that these developments also create new demands on our psychological resources. Specifically, these developments ask for a greater capacity for innovation, self-management, personal responsibility, and self-direction. This is not just asked at the top, it is asked at every level of a business enterprise, from senior management to first-line supervisors and even to entry-level personnel. Today, organisations need not only an unprecedently higher level of knowledge and skill among all those who participate but also a higher level of independence, self-reliance, self-trust, and the capacity to exercise initiative. In effect, we are calling upon all workers to understand themselves and their world at a higher level of mental complexity.

Nathaniel Branden, Psychotherapist

We should not only be worried about how machines will change the way we work and live, but also **about growing our mental resources, developing our psychological capacities, and increasing our ability to understand ourselves and the world around us**. This is my personal conclusion."



Discussion Leaders

Anders Folkestad, Former President, Unio

Charles Fadel, Chair, Education Policy Committee, BIAC

Colm Harmon, Head, School of Economics, The University of Sydney

Damon Silvers, Director of Policy and Special Counsel, AFL-CIO

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Rapporteur to the OECD Ministerial Council Meeting

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