

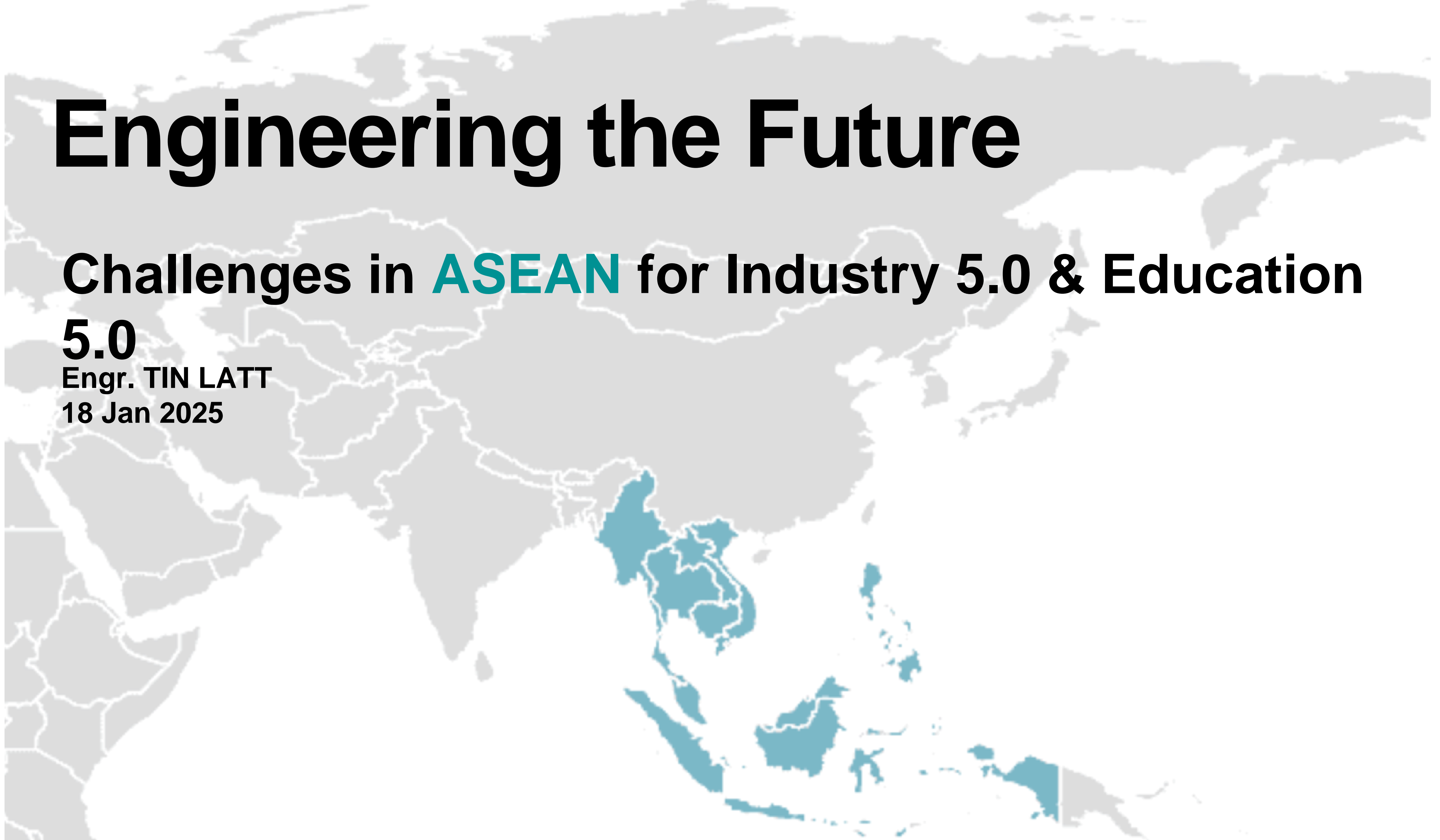
# Engineering the Future

## Challenges in **ASEAN** for Industry 5.0 & Education

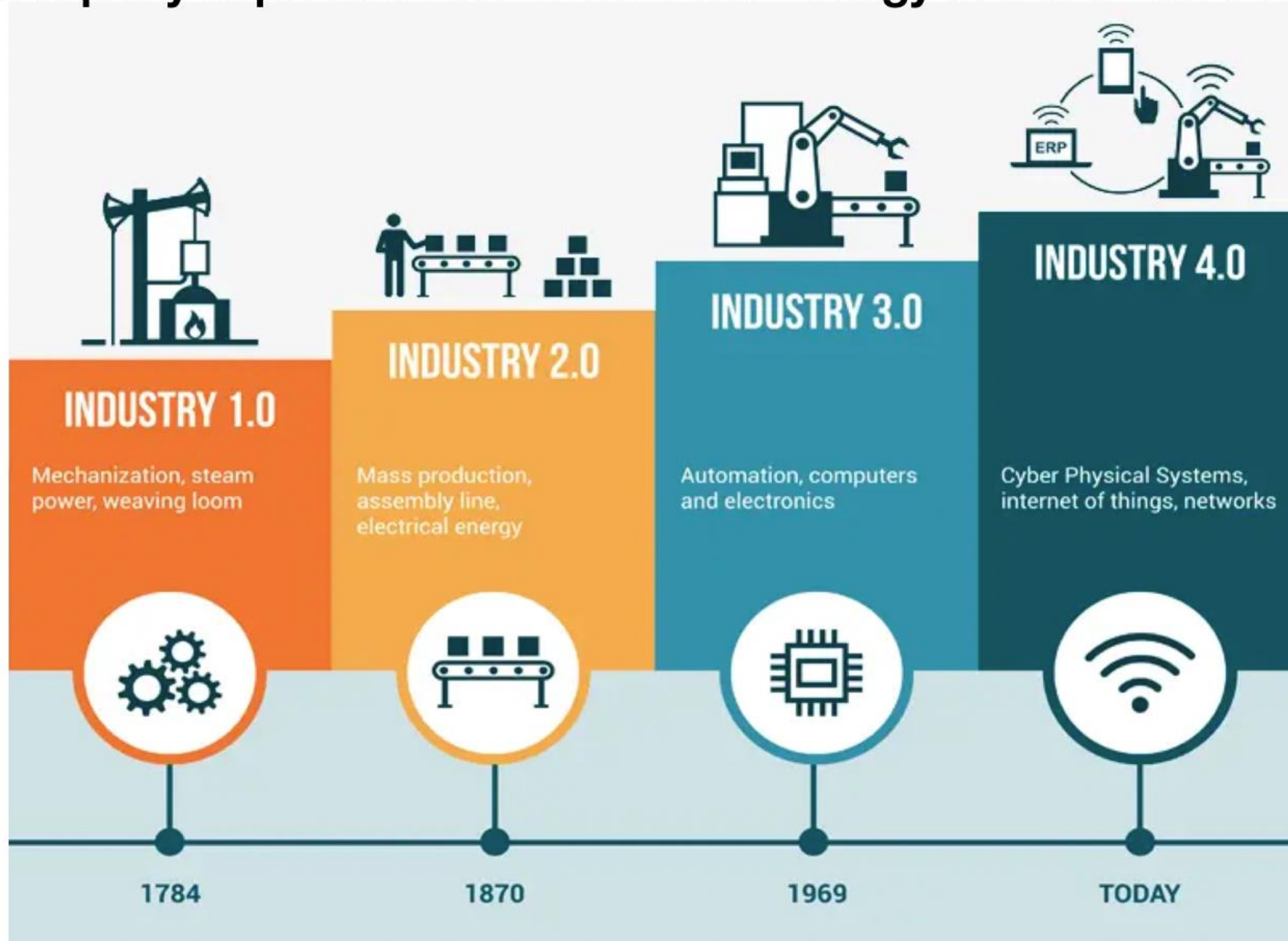
**5.0**

Engr. TIN LATT

18 Jan 2025

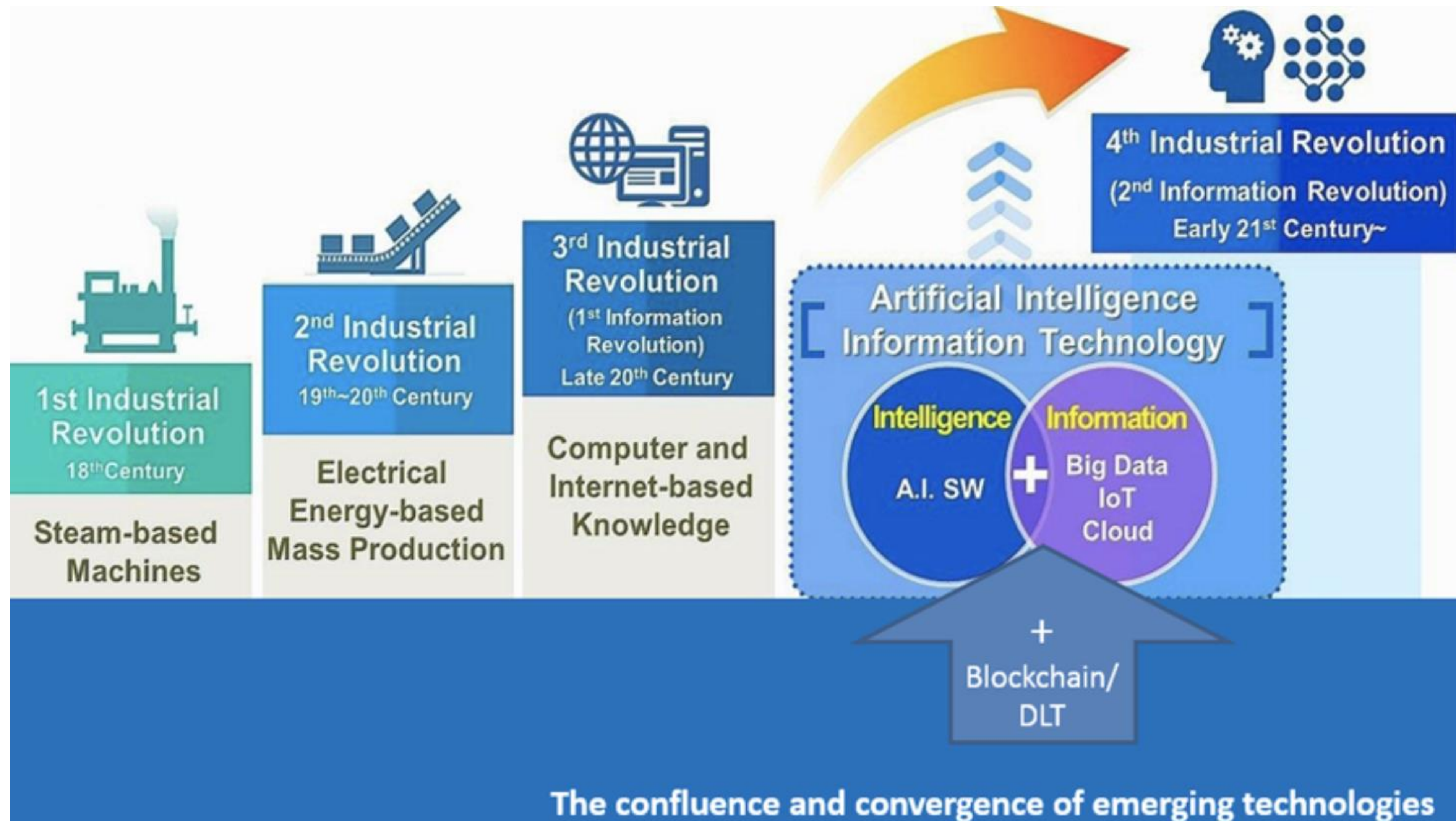


The key feature of the **fourth** industrial revolution is **cyber-physical** systems. Whereas the prior revolutions mainly focused on economic changes, this time, **political and cultural changes** played equally important roles in how technology transformed the world.



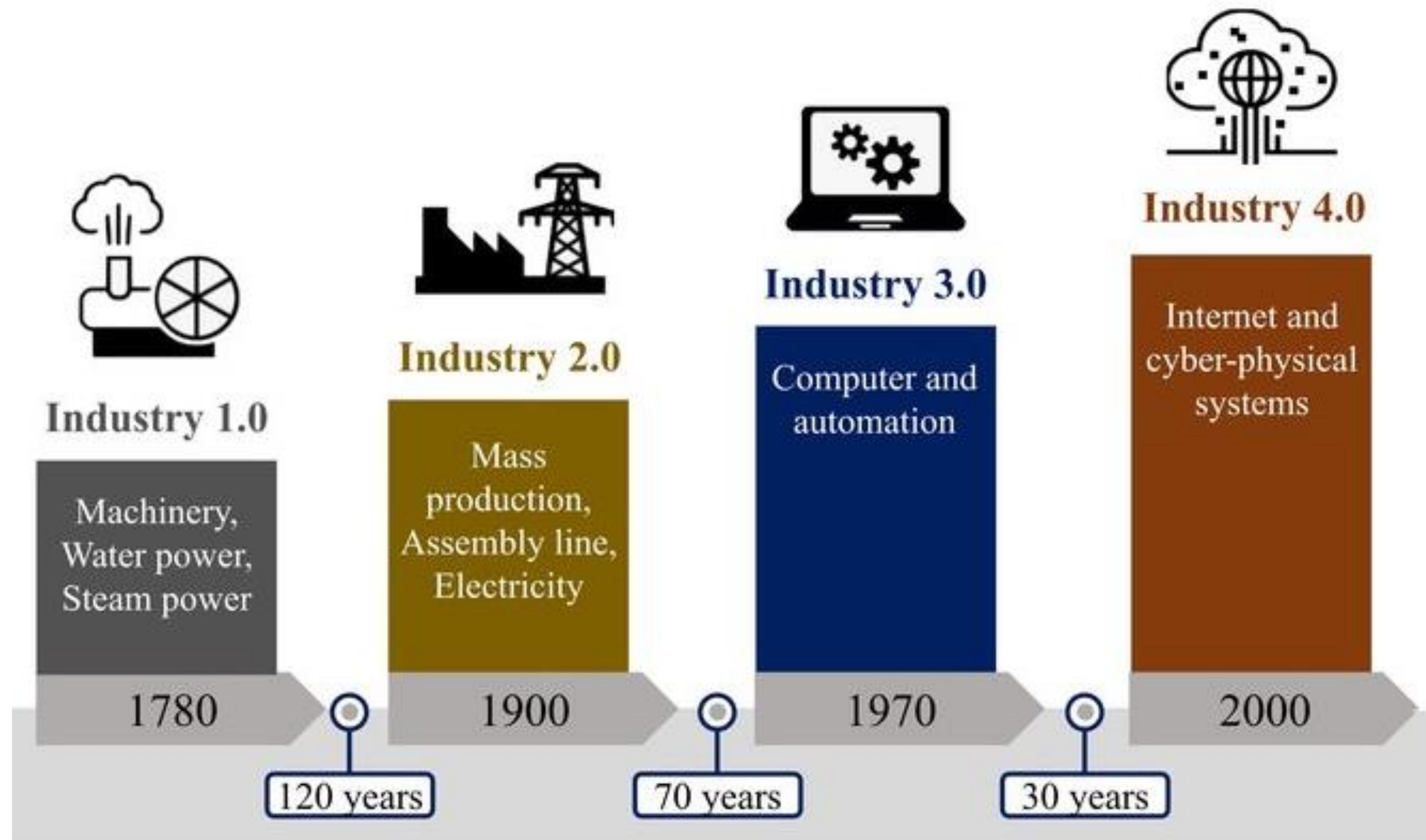


For all its social implications, Industry 4.0 is still primarily based on the changes to manufacturing. The current manufacturing process is more holistic, creating **interlinks between the physical and the digital**. This is what creates the **cyber-physical ecosystem** that characterizes this phase of the ongoing industrial revolution.



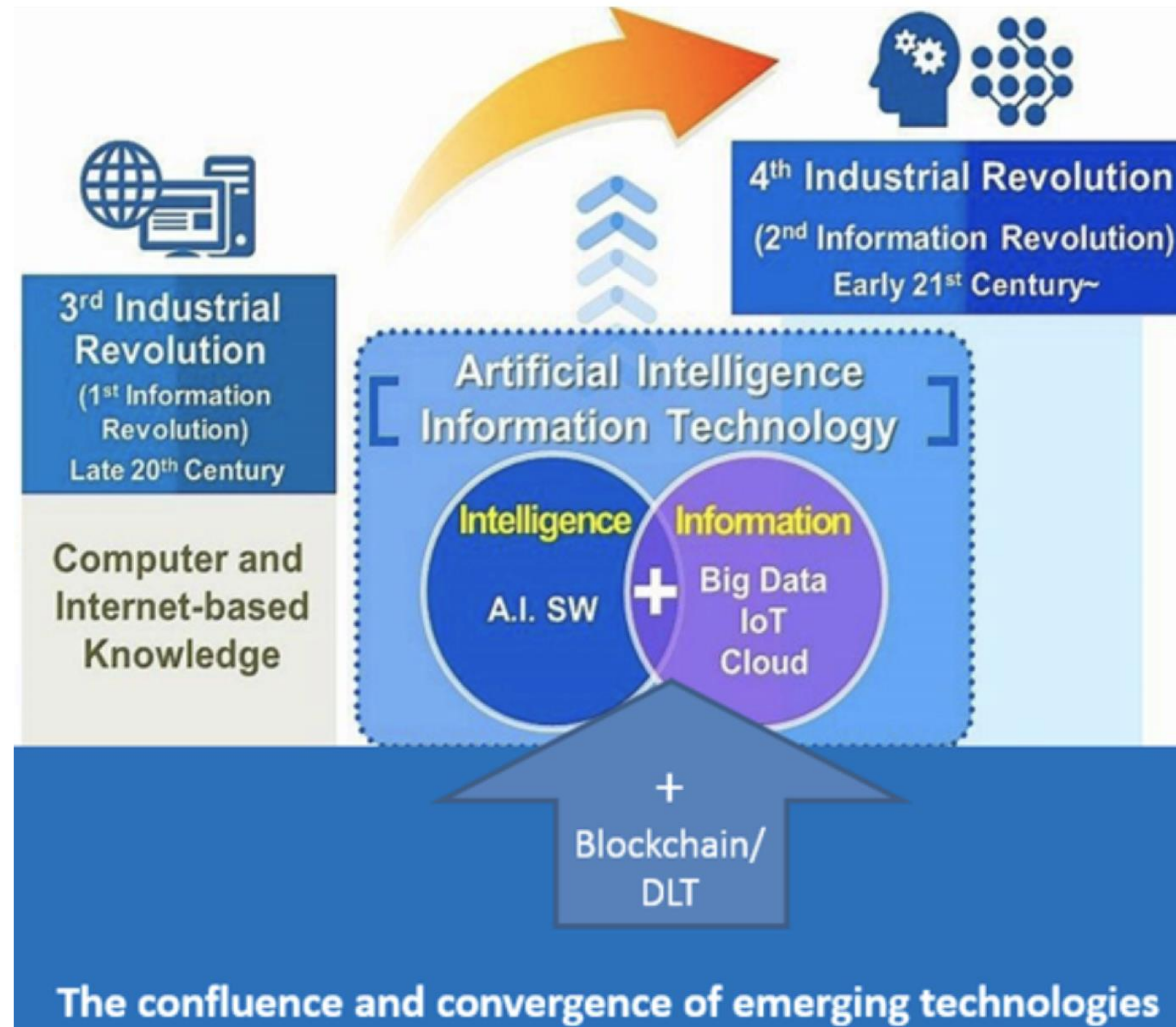


Mechanization to electrification took 120 years. Electrification to automation took 70 years. However, automation to digitization took only 30 years



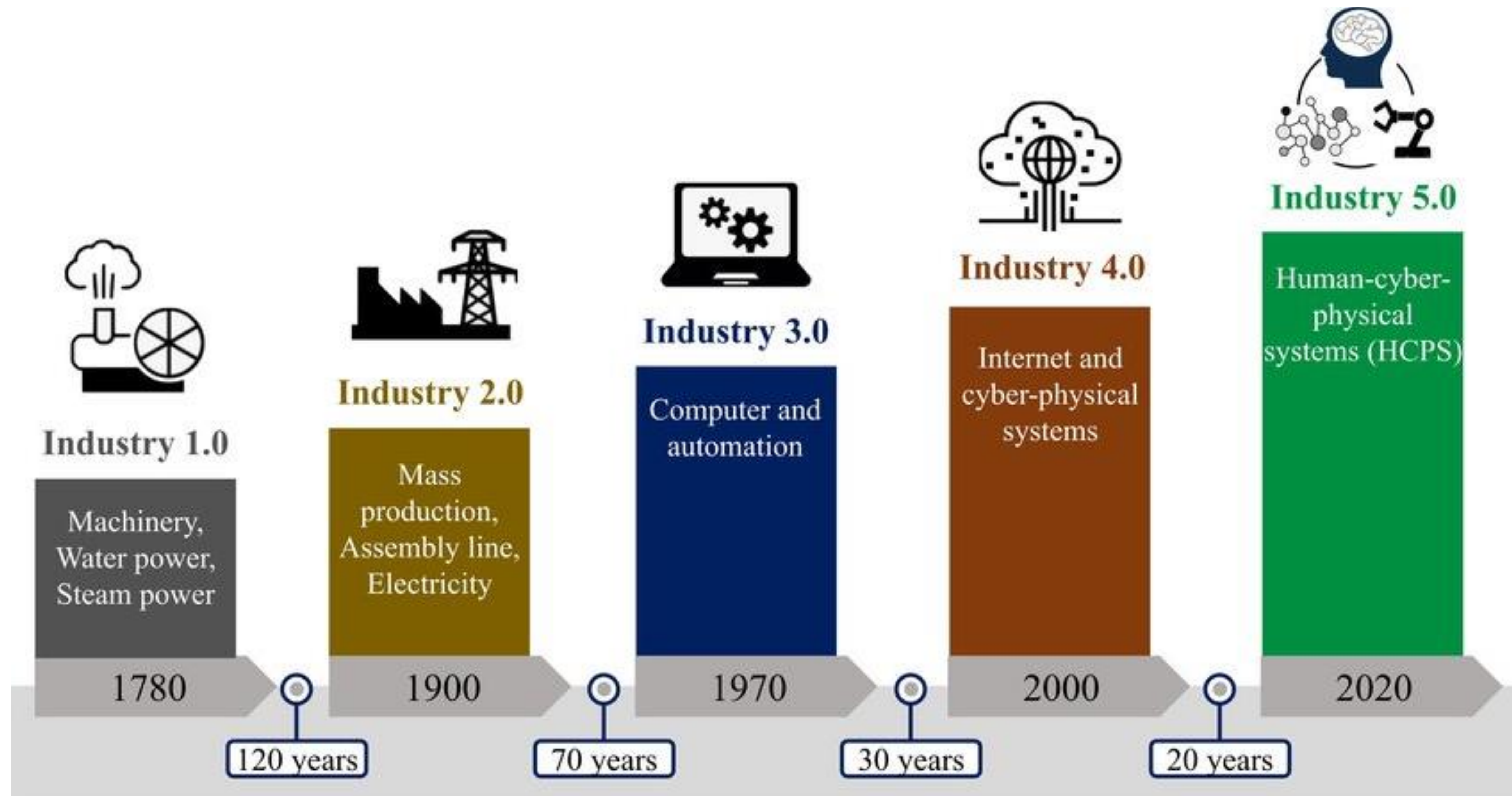


The Fourth Industrial Revolution is **Digital** Revolution. The **gap** between the **digital, physical and biological** worlds is **shrinking**, and technology is changing **faster** than ever.



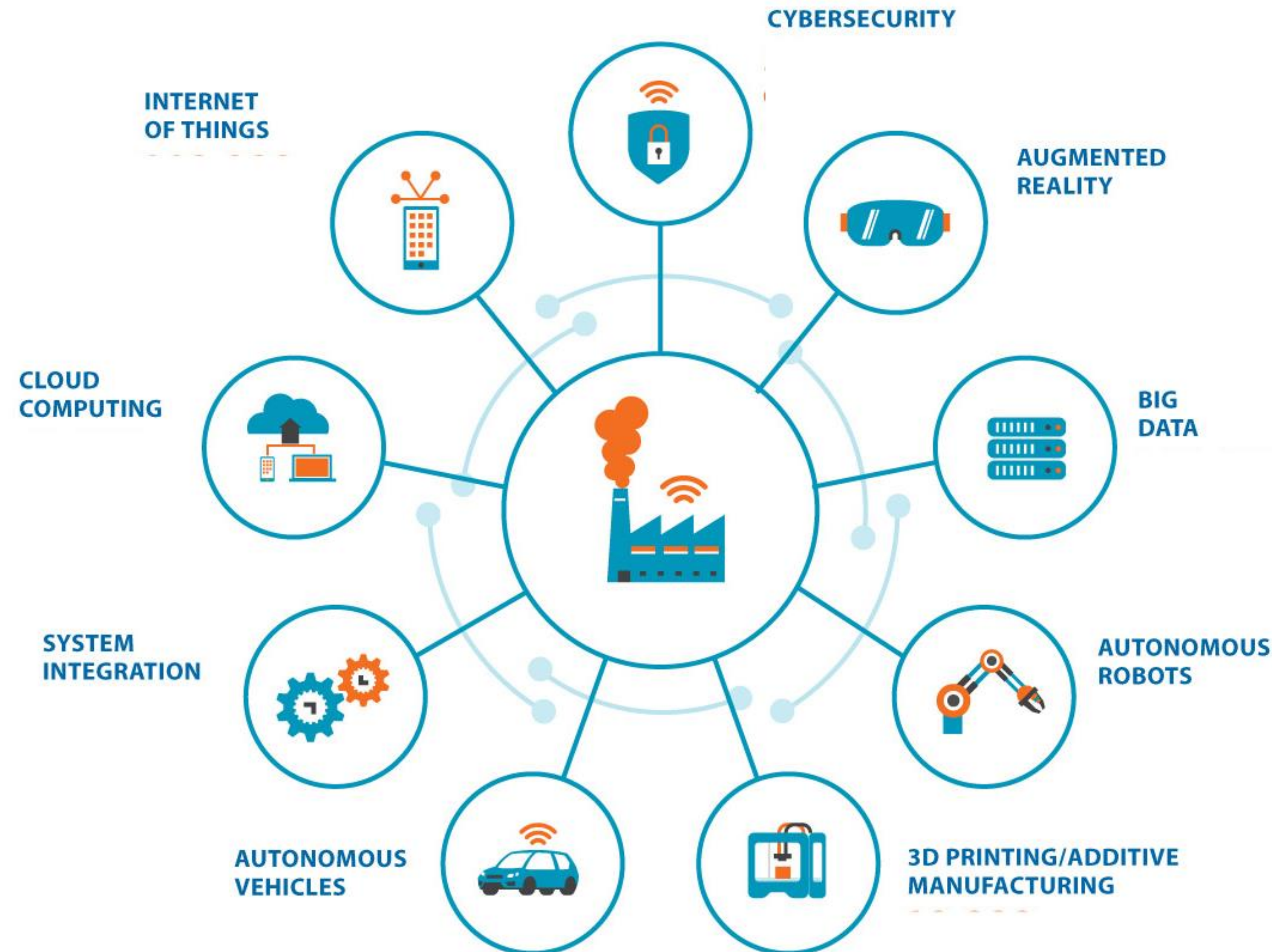


It is predicted that the **fifth** revolution would come faster and some are even claiming that it is **already started**.

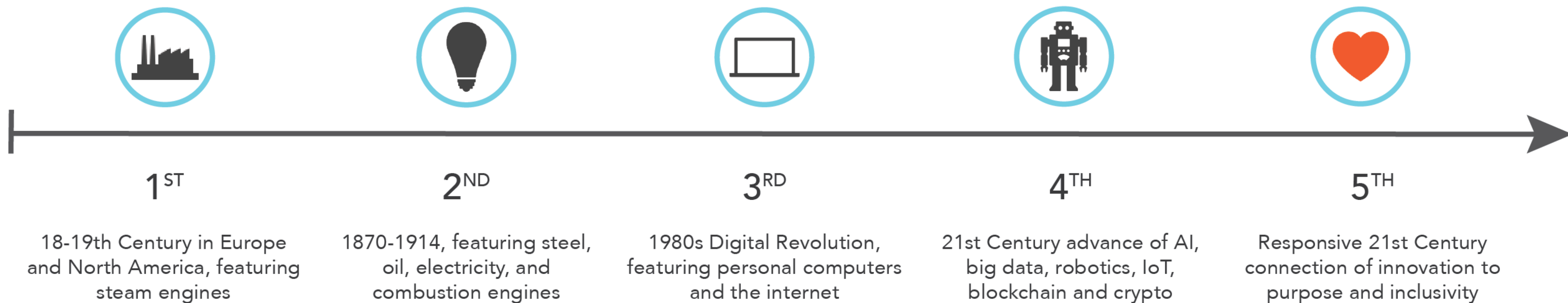




The **fifth** industrial revolution is **dawning** upon the world in **unforeseeable ways** as we increasingly rely **on Industry 4.0 technologies** including Artificial Intelligence (**AI**), **Big Data** (BD), the Internet of Things (**IoT**), digital platforms, augmented reality (**AR**), virtual reality (**VR**), and 3D printing.

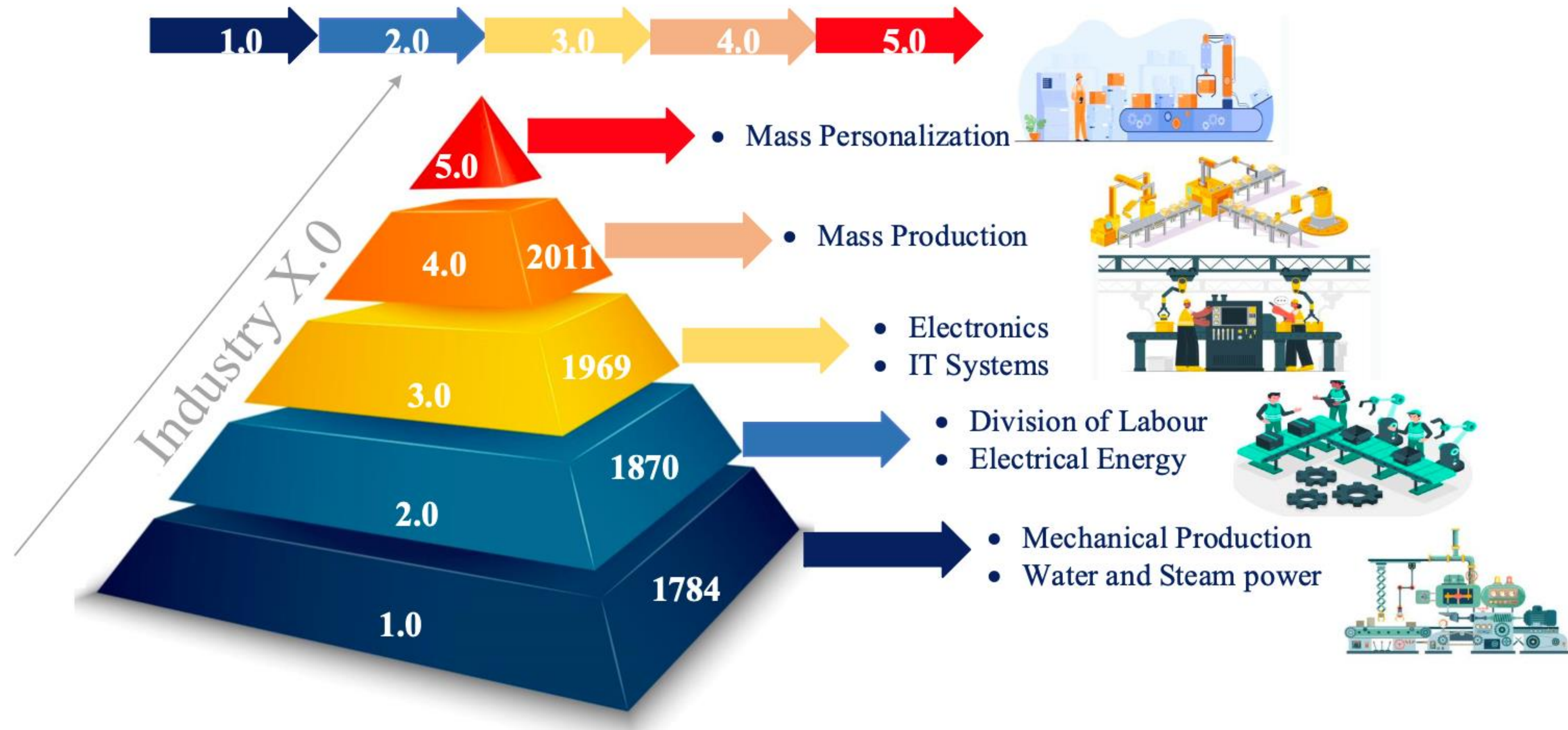


The **fifth** industrial revolution recognizes **the power of industry to achieve societal goals beyond jobs and growth** to become a resilient provider of prosperity, by making production respect the boundaries of our planet and placing the **wellbeing of the industry worker at the center of the production** process.





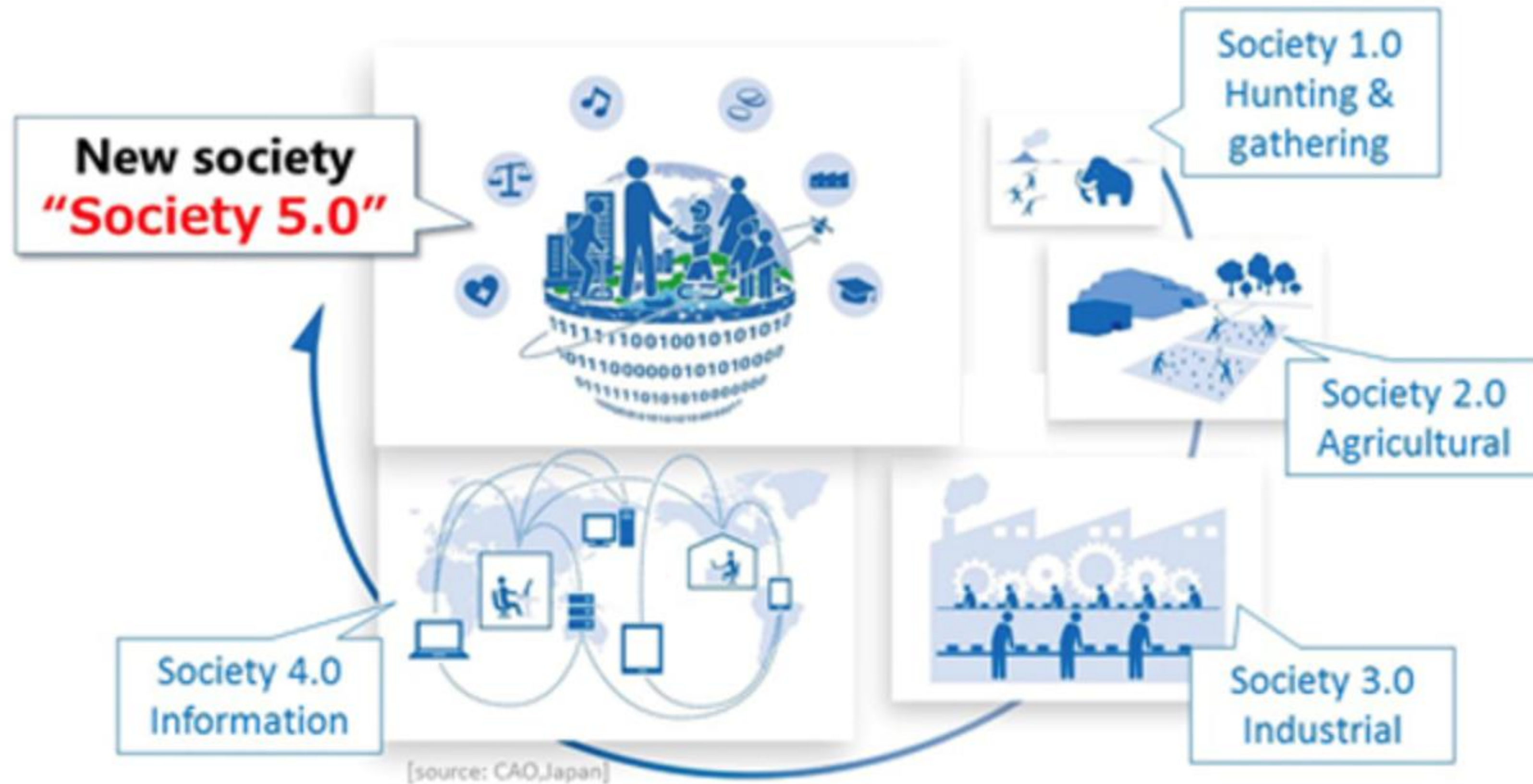
Previous generations had to **adapt** their lifestyle to **what the machines could do**. The **Fifth Industrial Revolution** is different. Human beings are now front and **centre in the production process**. The key feature of the fifth industrial revolution is **mass personalization** and it will lead to **Society 5.0**





# Society 5.0

A human-centered society that balances economic advancement with the resolution of social problems by **a system that highly integrates cyberspace and physical space.**



Ref: [https://www8.cao.go.jp/cstp/english/society5\\_0/index.html](https://www8.cao.go.jp/cstp/english/society5_0/index.html)



# Japan has envisioned Society 5.0 since 2015

## Japan's vision of societal progression



### **SOCIETY 1.0**

Hunter-gatherer society



### **SOCIETY 2.0**

Agrarian society



### **SOCIETY 3.0**

Industrial society



### **SOCIETY 4.0**

Information society



### **SOCIETY 5.0**

Super-smart society

Source: The Government of Japan





## On how to adjust education to better prepare students for society 5.0

“In the era of Google, **people no longer need to memorize every single fact**. Many tasks today are best carried out by computers. Therefore, the **emphasis** must be on **human skills** such as communication, leadership and endurance, as well as curiosity, comprehension and reading skills.





## On how to adjust education to better prepare students for society 5.0

Key shifts as we move towards society 5.0 are allowing grade progression to be more flexible, **leaving behind the traditional age-grade-progression** approach, and also requiring a more cross-disciplinary approach to subjects, improving liberal arts education. Computers can deal with computerized information far better than humans can — but what we excel at is **self-expression in our humanness.**”



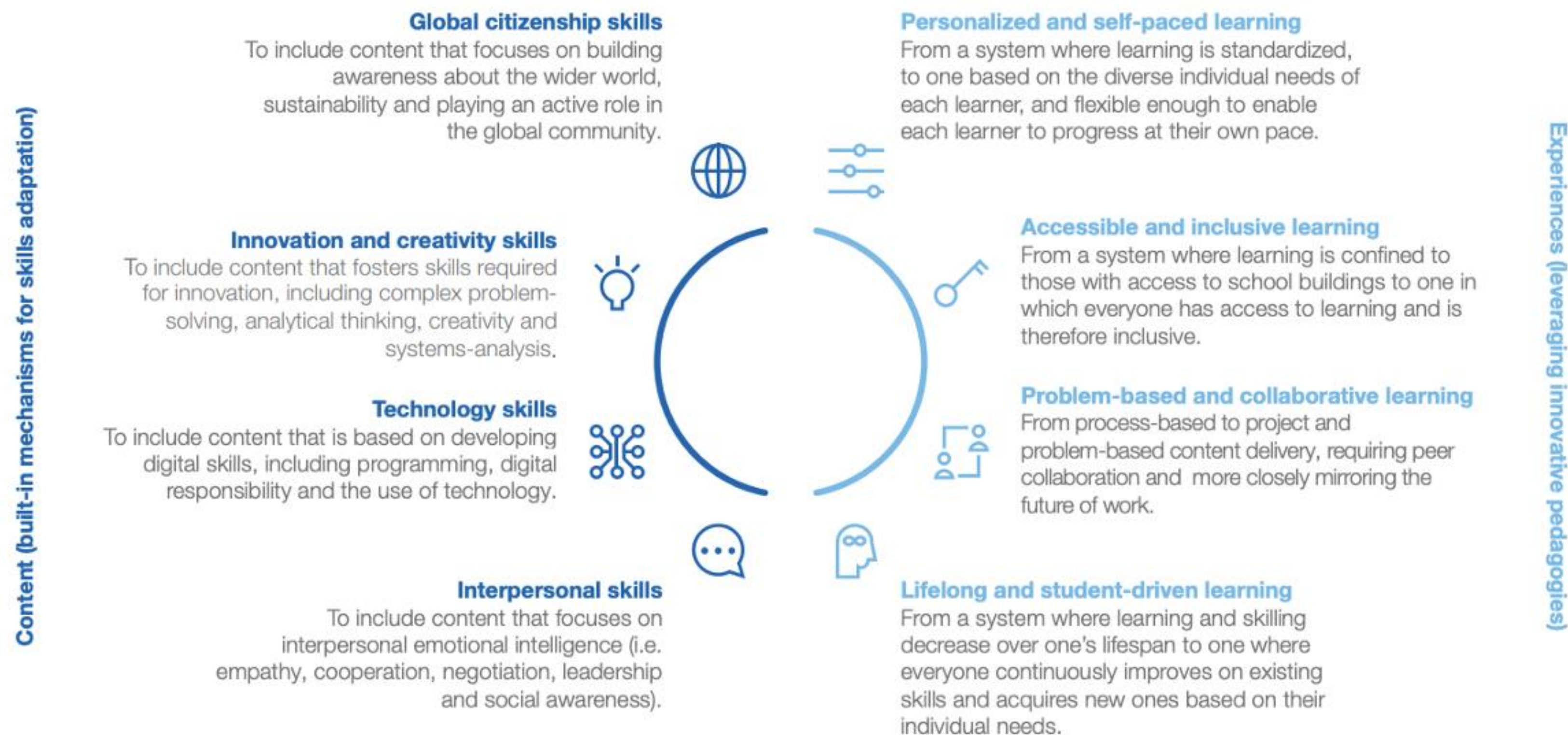
UN laid out the Sustainable Development Goals in 2015, agreed by 193 countries around the world. The framework of the Sustainable Development Goals (SDG) provides measurable and meaningful milestones that we can track our actions against in order to change the trajectory of humans on this planet. And [how to prepare our children for the challenges of the future.](#)





The [World Economic Forum 2020](#) put together a white paper highlighting 16 innovative schools around the world that are [effectively preparing the students for the next 'Industrial Revolution'](#). The report highlights [8 critical areas of learning content and experiences](#) that schools will need to leverage in order to best prepare their students.

### The World Economic Forum Education 4.0 Framework





# The World Economic Forum Education 4.0 Framework

Content (built-in mechanisms for skills adaptation)



## Personalized and self-paced learning

From a system where learning is standardized, to one based on the diverse individual needs of each learner, and flexible enough to enable each learner to progress at their own pace.

## Accessible and inclusive learning

From a system where learning is confined to those with access to school buildings to one in which everyone has access to learning and is therefore inclusive.

## Problem-based and collaborative learning

From process-based to project and problem-based content delivery, requiring peer collaboration and more closely mirroring the future of work.

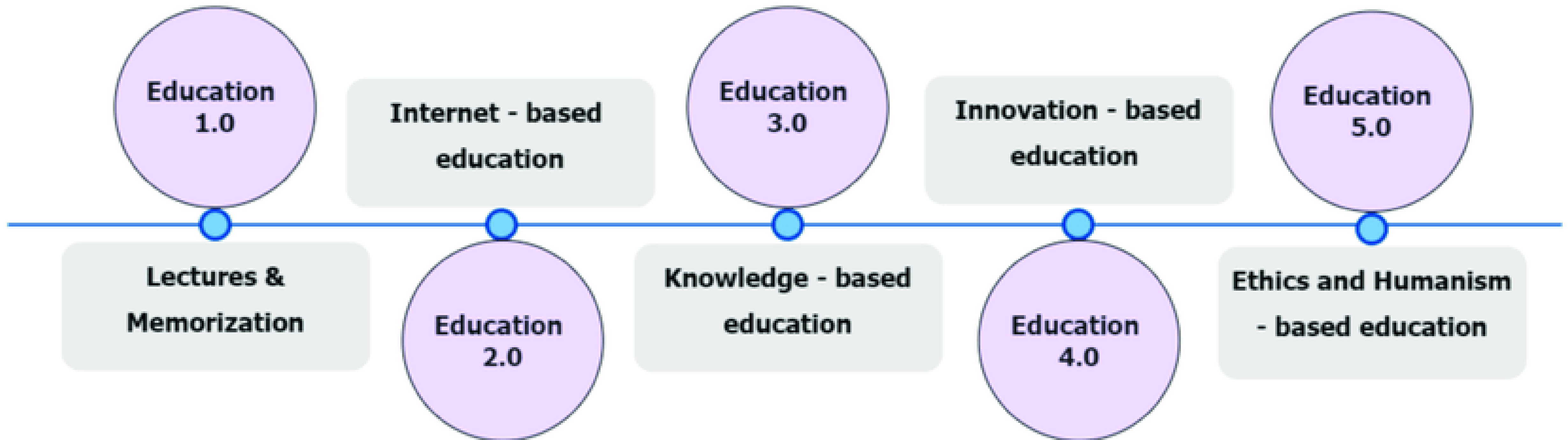
## Lifelong and student-driven learning

From a system where learning and skilling decrease over one's lifespan to one where everyone continuously improves on existing skills and acquires new ones based on their individual needs.

Experiences (leveraging innovative pedagogies)



# Education 1.0 to Education 5.0



Ref:MOOC 5.0: A Roadmap to the Future of Learning, Sustainability Aug 2022



## Education 4.0

A Innovation-Based Education is a new pedagogy where students are motivated, educated, and **graduated** while **developing** or honing all important and **high demand people-soft skills** (PSS) such as critical thinking, collaboration, communication, problem solving and leadership. As the protocol's thrust is on early research-based education, it helps **develop entrepreneurial skills** amongst students at a very young age. Even students dropping out in the middle of the course will have assimilated job-related skills.



# Education 4.0

The role of technology in education is to promote speed, accuracy, and knowledge in instruction. The main idea is **to insert Industry 4.0 technologies** – the Internet of Things (IoT), artificial intelligence, machine learning, gamification, and others – **into learning and educational institutions.**

The goal is **to bring education closer to technological advances already in use by society and companies, as well as to create more direct communication with new generations,** who no longer can live without technology.



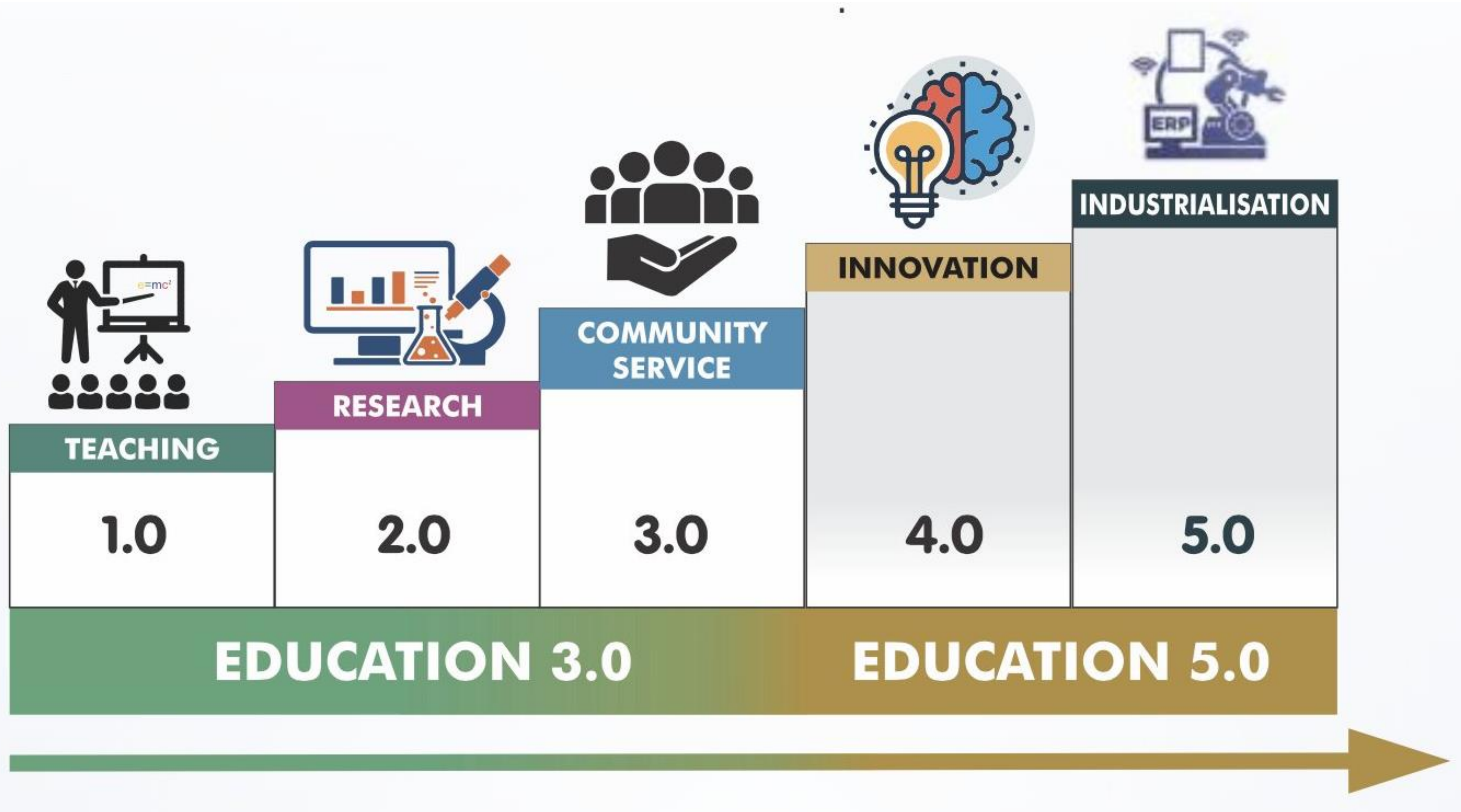
# Education 5.0

Education 5.0 is the outgrowth of this idea. It doesn't discard the proposals of Education 4.0, but it **adds a more human perspective to learning**, including social and emotional abilities in order **to promote lesser environmental impact with greater health and safety.**

Education 5.0 is the use of new technologies to provide more humanized teaching, **with a focus on students' social and emotional development and solutions that improve life in society.**



Countries that have already started digitization would be gradually upgrade themselves to Education 4.0 and then Education 5.0. However, it would be a great challenge for countries still struggling in Education 2.0 or 3.0.





# GDP per Capita for ASEAN in 2024



Data : April 2024 by IMF



(.....) = changing from 2023 data

By #ProgressiveThailand

The **capacity** to engineer ASEAN future may differ country to country due to the respective GDP per capita and population.



SG 5.8 million population with \$ 88,447  
Brunei 0.46 million population with \$ 35,111  
Myanmar 54 million population with \$ 1248





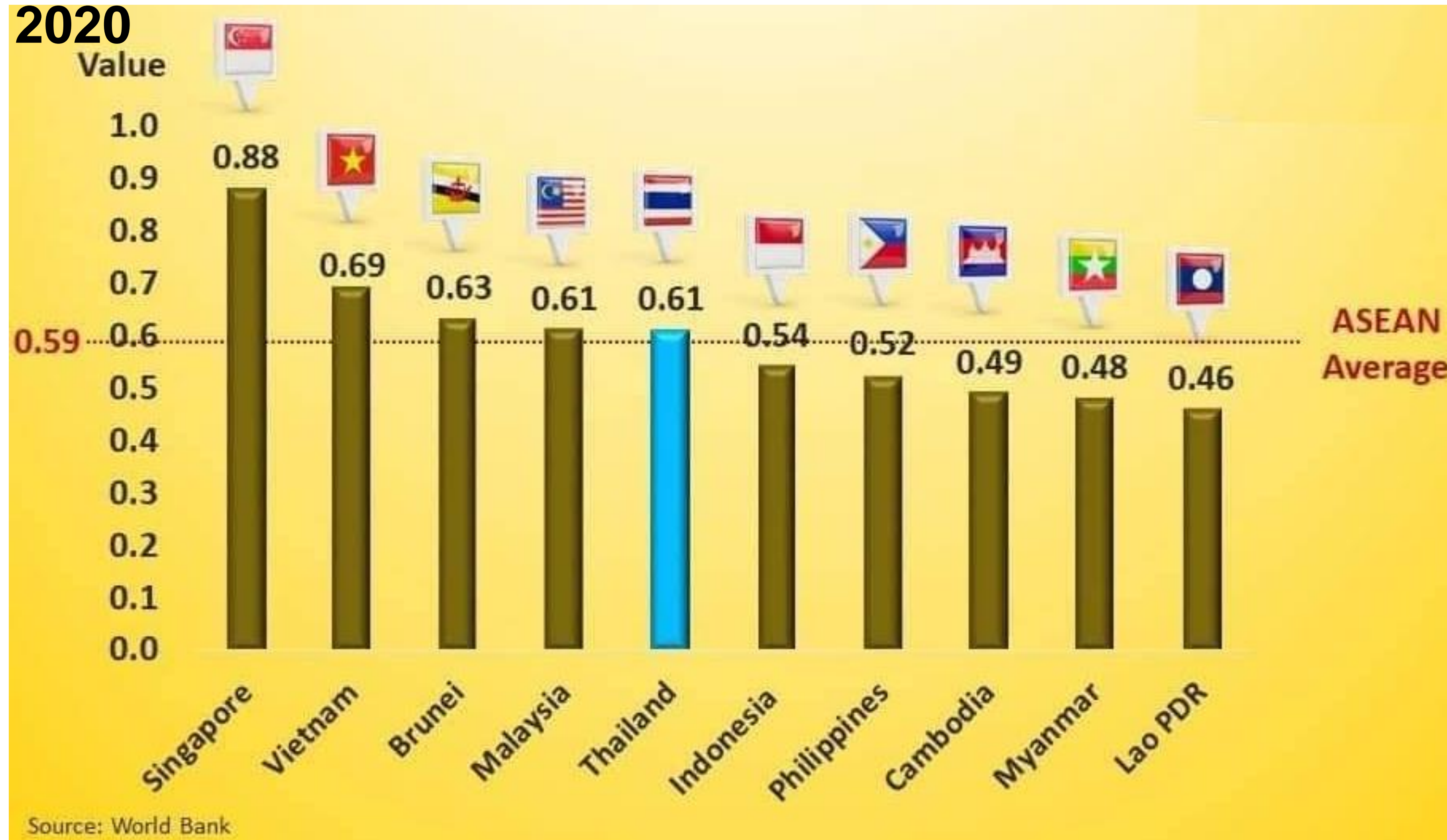


The Index measures which countries are best in [mobilizing the economic and professional potential of its citizens](#) - how much capital each country loses through lack of education and health.



# ASEAN HCI

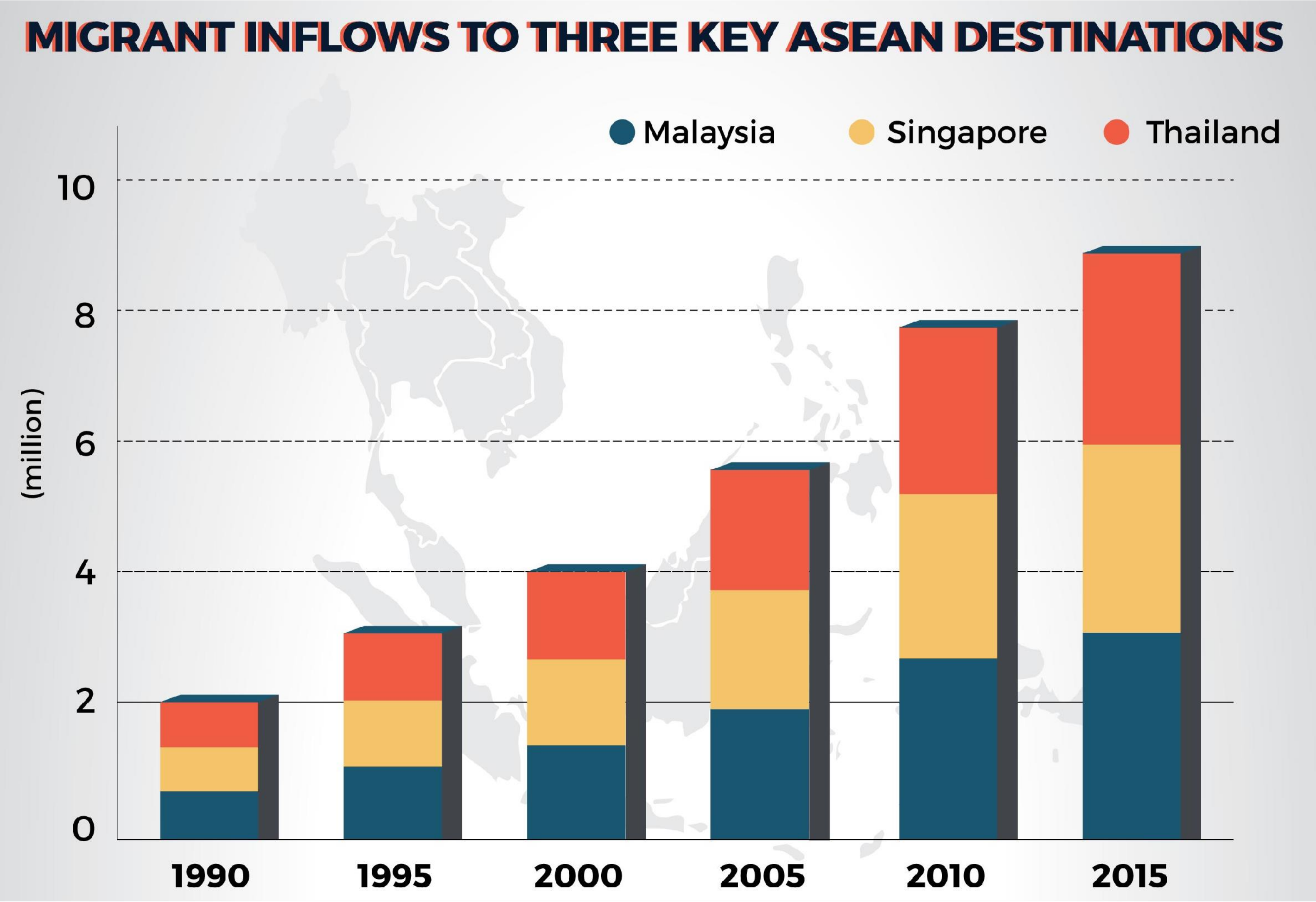
2020



ASEAN average is 0.59 - Singapore tops it with 0.88.  
On the other end of the scale would be Cambodia, Myanmar and Lao.



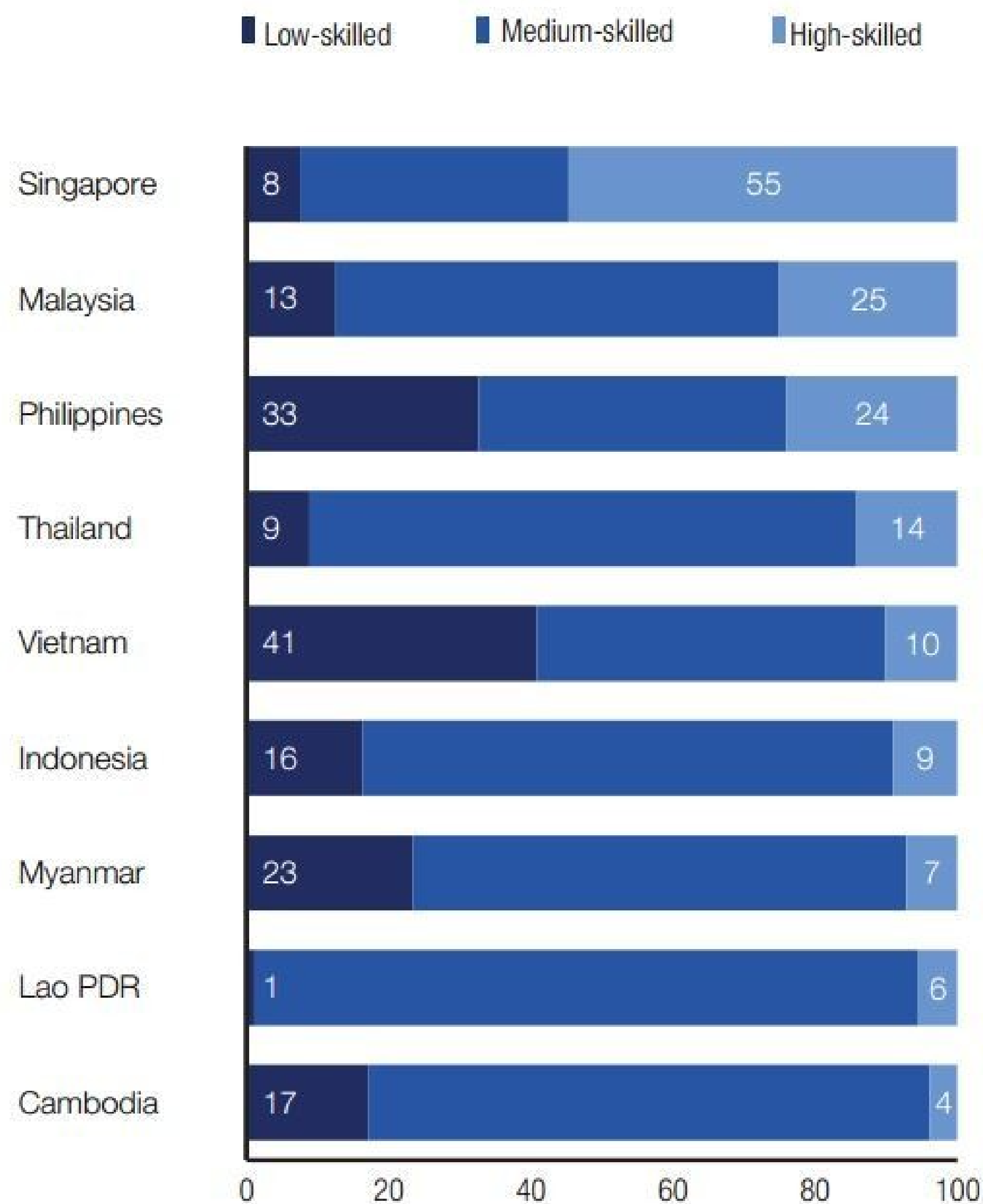
Myanmar migrant workers:  
2 million in Thailand, around 1 million in Malaysia & more than half a million in Singapore



Ref: <https://theaseanpost.com/article/asean-migrant-workers-deserve-better>



## Employment share

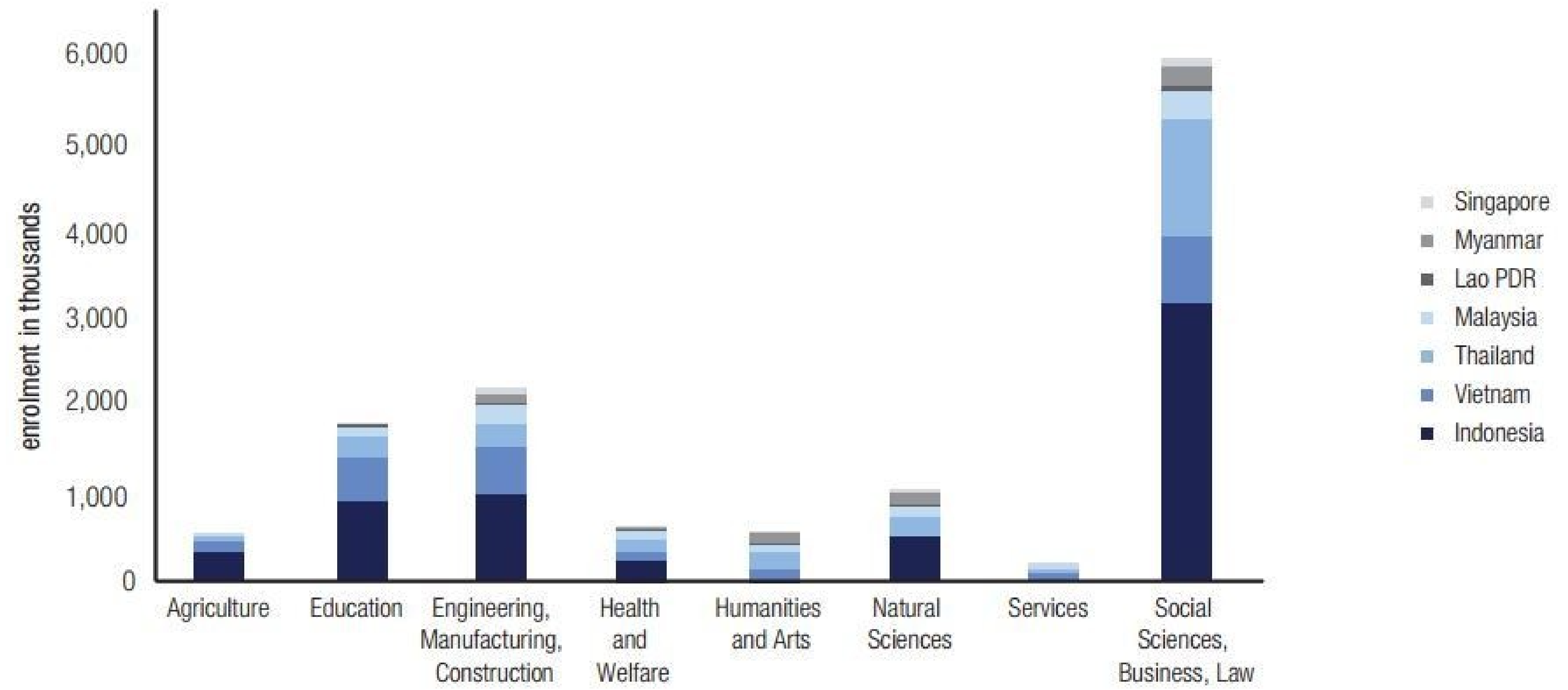


Mobile internet connectivity, new energy technologies, cheap processing power and data analytics, as well as flexible and remote working are expected to create more jobs, especially in the areas of transportation and logistics, sales, management and business, law and finance.

To take advantage of these opportunities, countries will need to help their workforces learn the appropriate skills. Several economies, notably Malaysia, Singapore, the Philippines and Indonesia, have plenty of skilled talent available and compete well globally. In other countries, such as Cambodia, Laos and Thailand, employers say it is much harder to find skilled workers.



In ASEAN, a large number of students are studying social sciences, business and law, while enrollment in subjects that will be critical to taking advantage of technological change, such as engineering, health and the natural sciences, lags behind.



# Challenge in employment

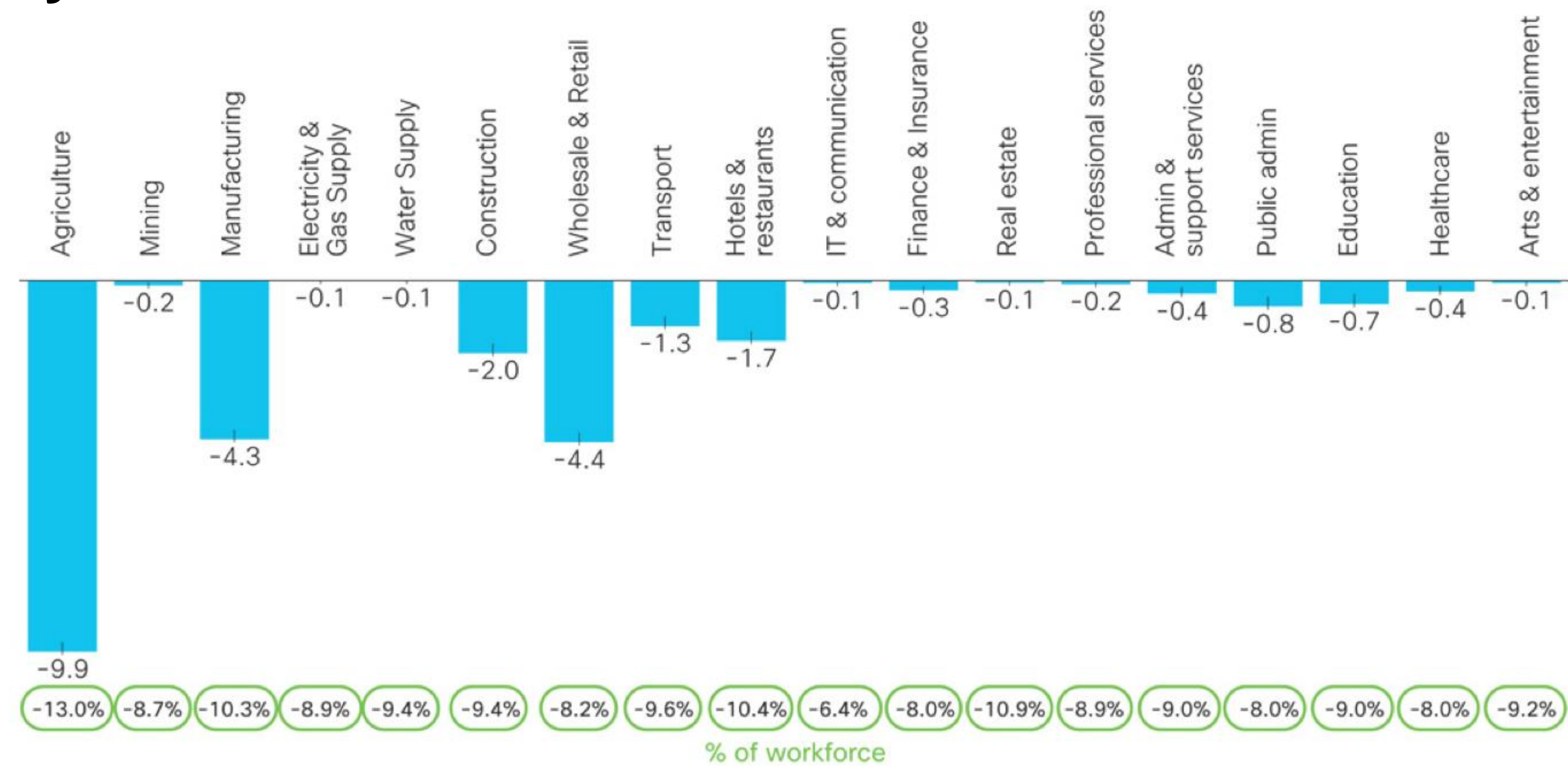
One of the paradoxes that **modern education** faces is that it becomes less effective in relation to solving **local problems**.

The crucial problem that a student community faces after obtaining a degree from a university is scarcity of jobs from the **skills mismatching** in the job market.

The job market is so competitive in some places that **less than 20 percent** of the students find jobs **in their *chosen area***.



# Technology-driven displacement of jobs in ASEAN 6 by industry

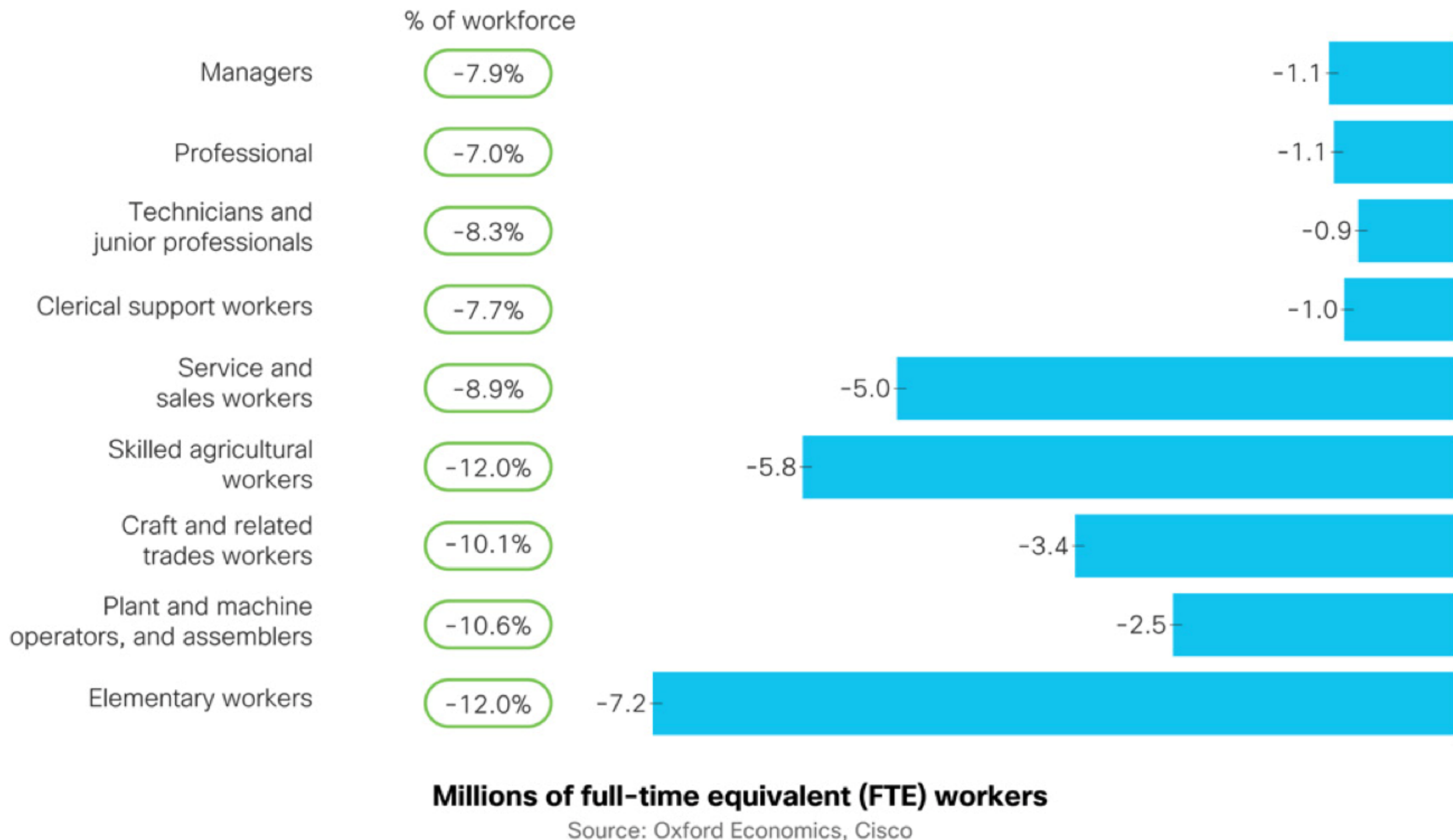


Millions of full-time equivalent (FTE) workers  
Source: Oxford Economics, Cisco

Displaced mainly in agriculture, manufacturing, wholesales & retail

Ref: [https://www.cisco.com/c/dam/global/en\\_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf](https://www.cisco.com/c/dam/global/en_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf)

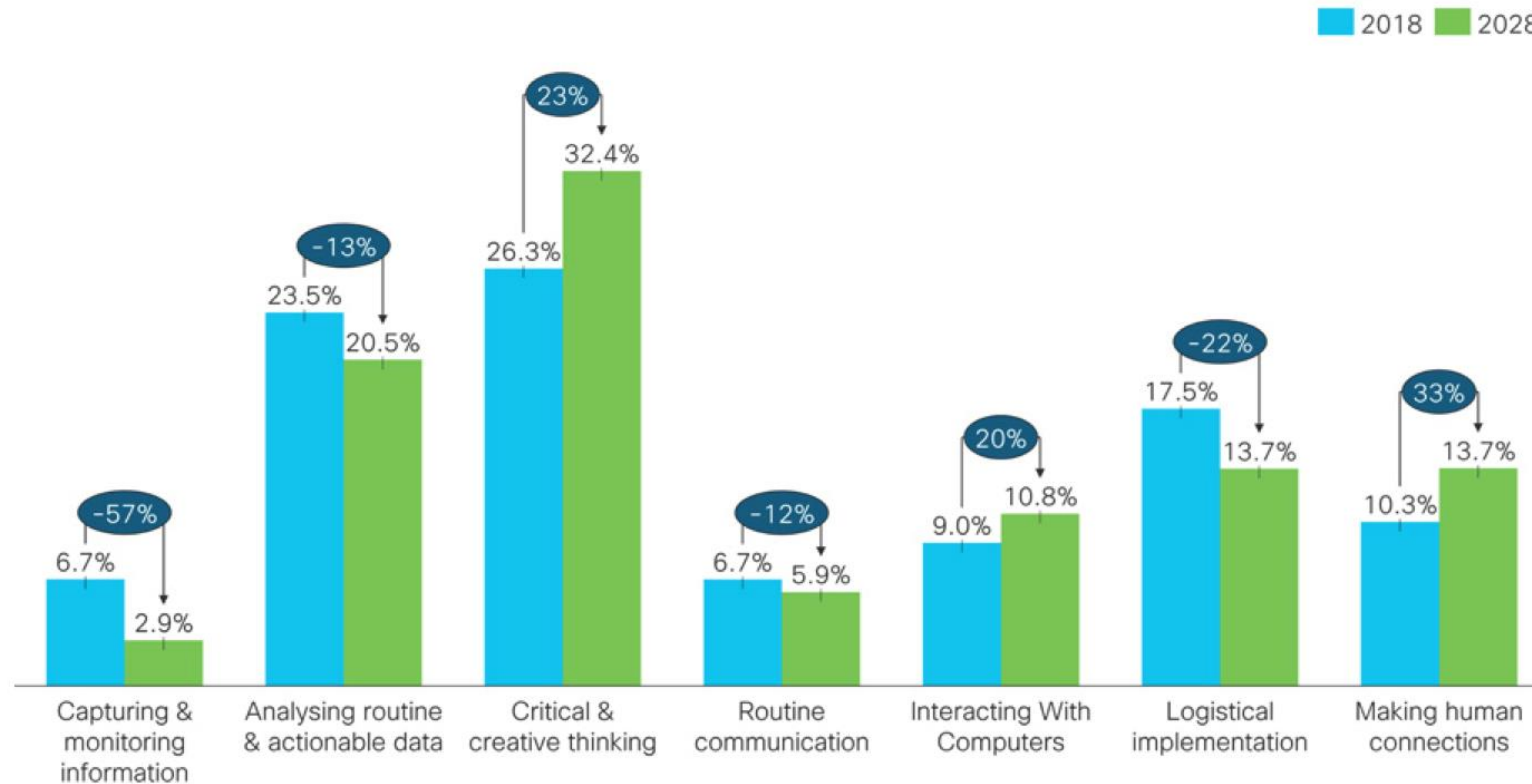
# Technology-driven displacement of workers in ASEAN 6 by occupati



Displaced mainly in elementary workers, agricultural workers, service and sales



# Reduction in labour effort required to perform task - Software Developer

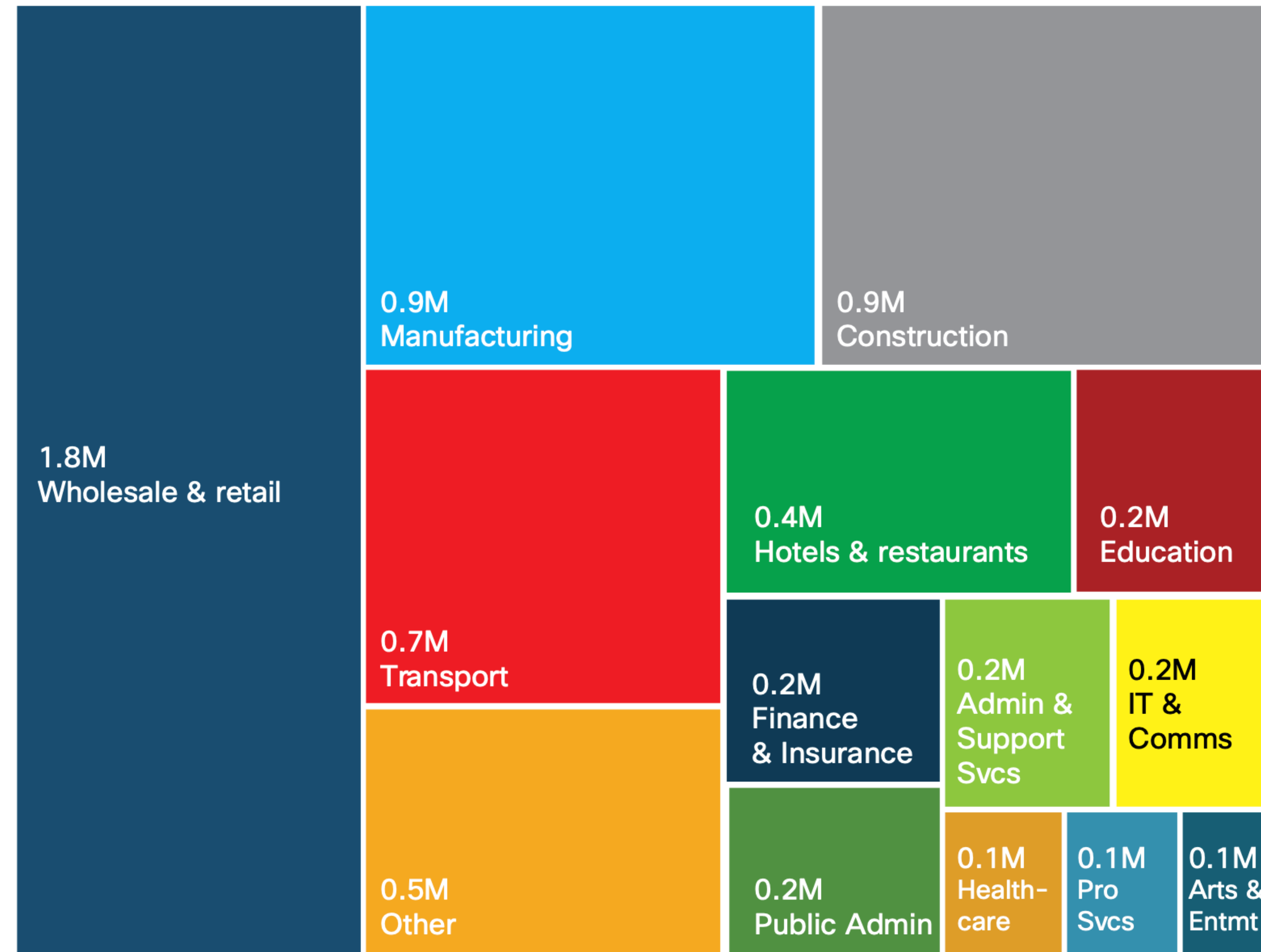


Source: Oxford Economics, Cisco

**Even software developer requires to do more critical and creative thinking and making human connections**

Ref: [https://www.cisco.com/c/dam/global/en\\_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf](https://www.cisco.com/c/dam/global/en_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf)

# Vacancies by industry sector (2018-2028)



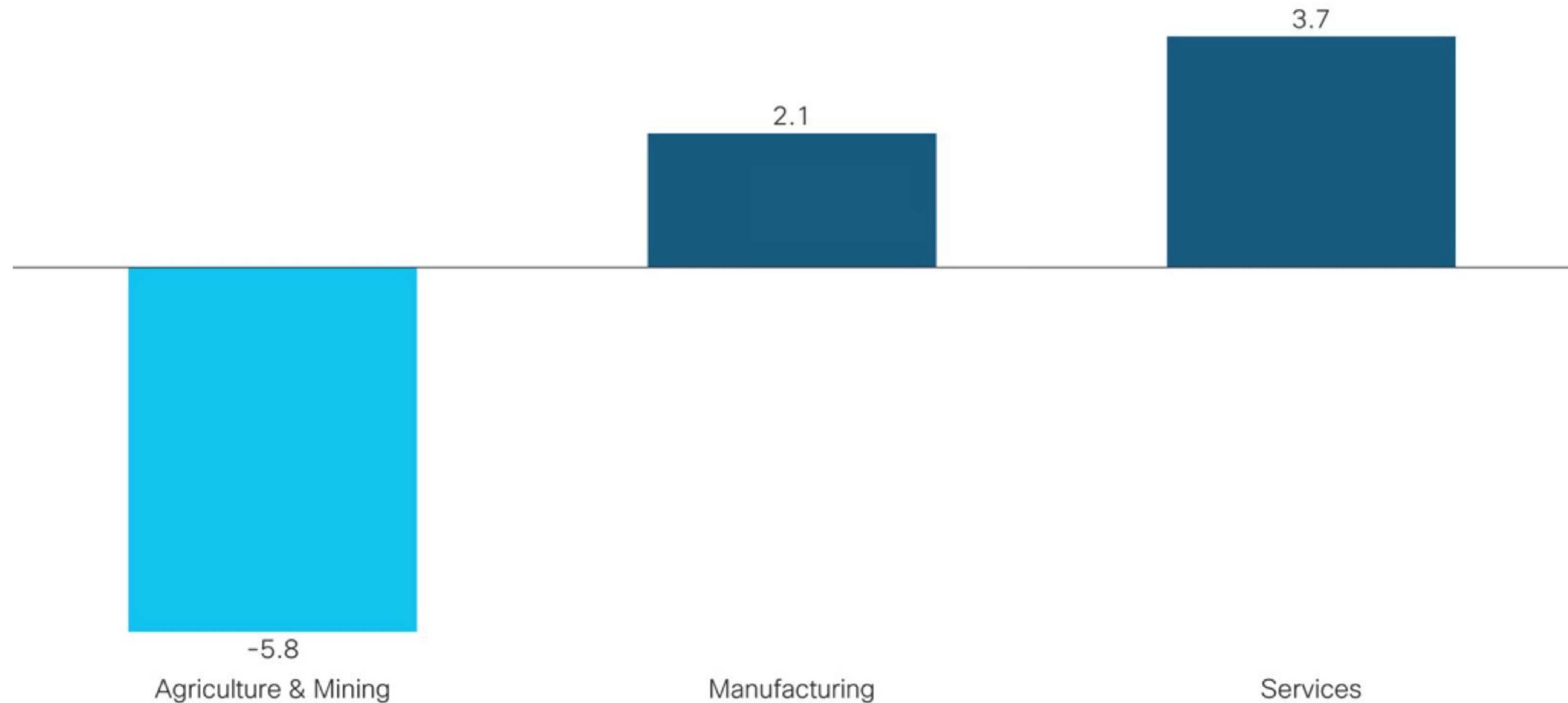
Source: Oxford Economics, Cisco

**Vacancies mainly in wholesale & retail followed by manufacturing and construction**



## Net change in workers in 2028 ASEAN 6 labour market forecast

### Workers leapfrogging the manufacturing sectors

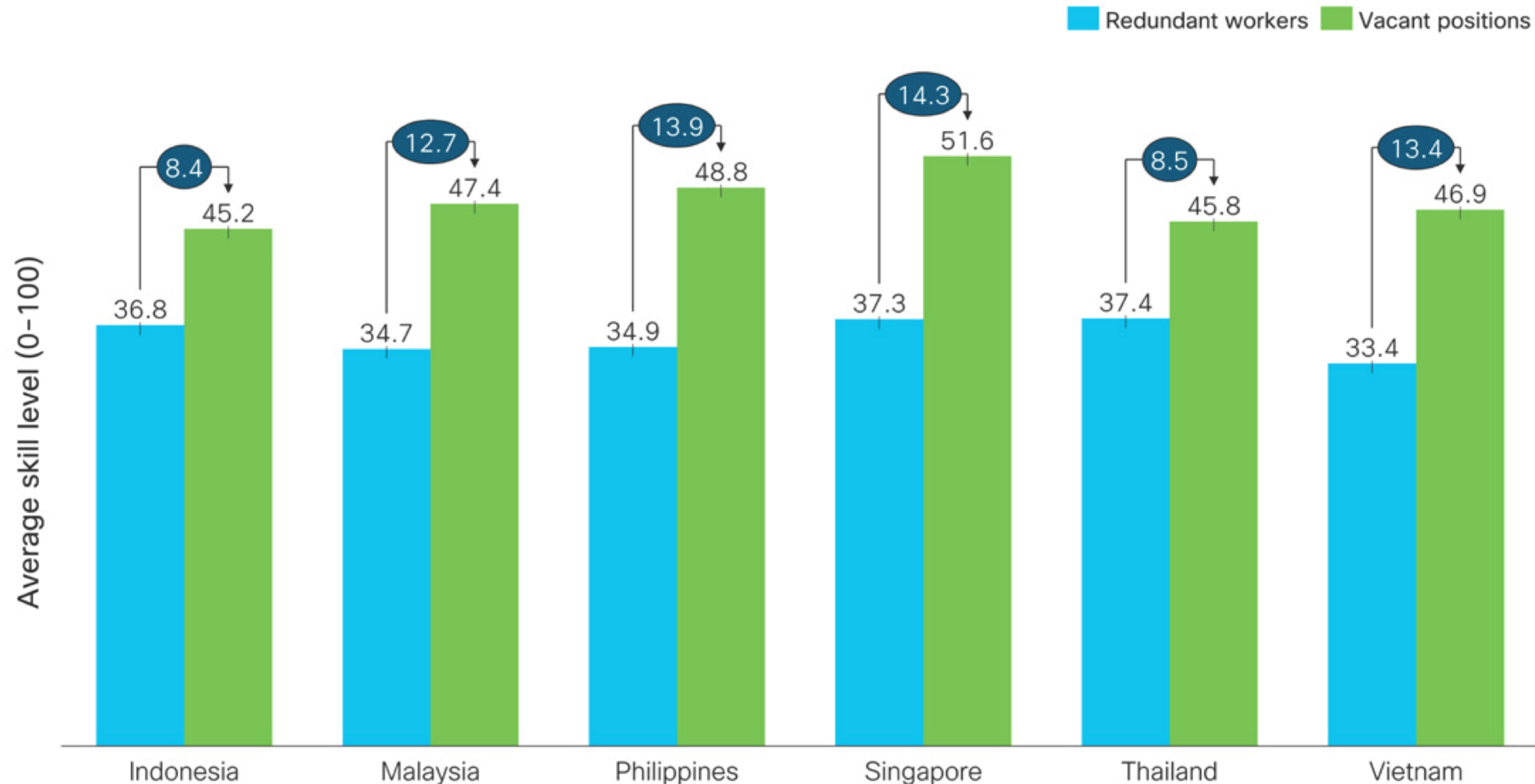


**Millions of full-time equivalent (FTE) workers**

Source: Oxford Economics

# Skills mismatch by country

## Skills of redundant workers vs skills needed in vacant positions



Source: Oxford Economics, Cisco

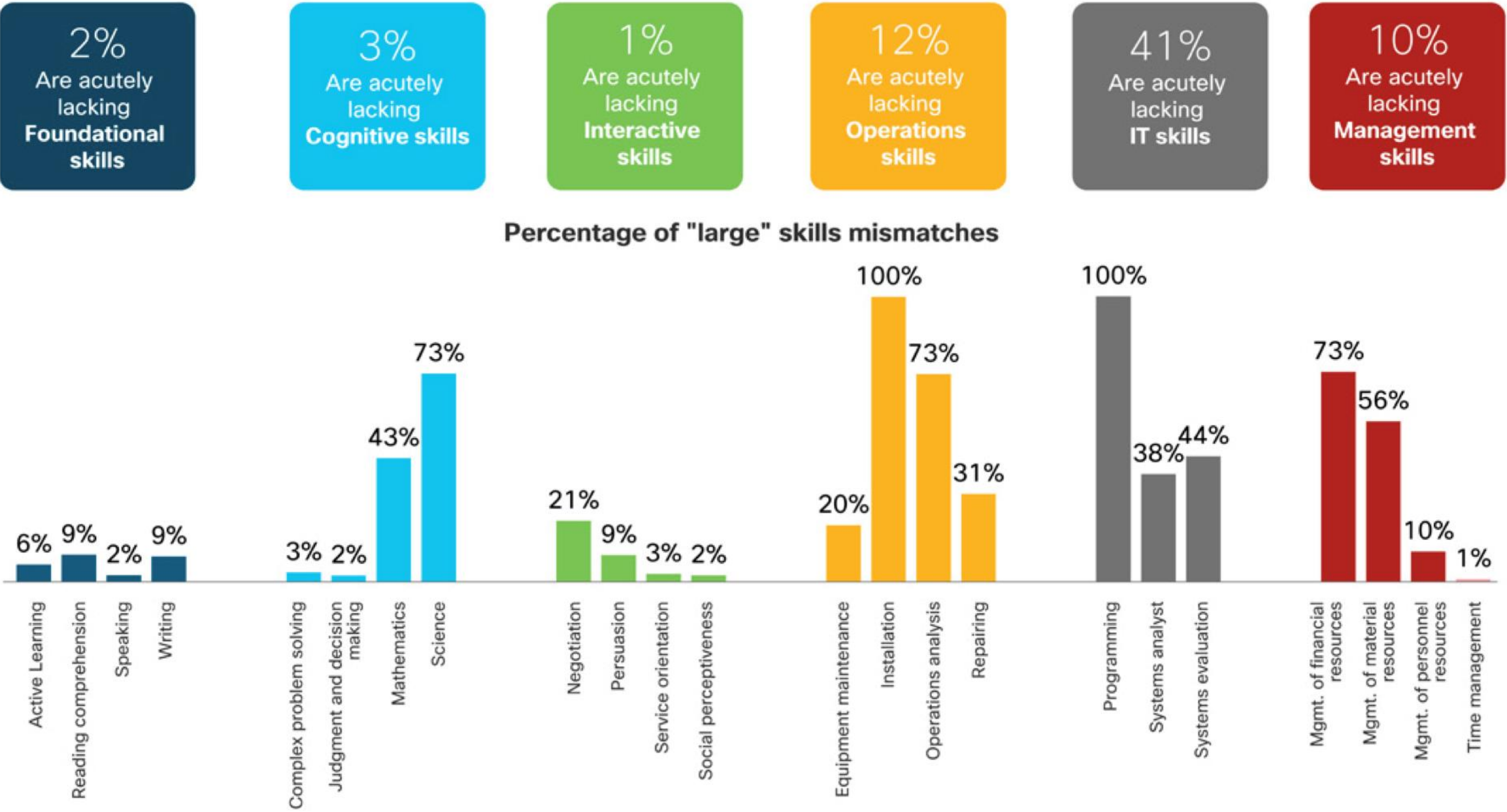
**Displaced labour needs skill  
upgrades**

Ref: [https://www.cisco.com/c/dam/global/en\\_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf](https://www.cisco.com/c/dam/global/en_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf)



# Acute skills shortfalls emerge in niche, technical areas

## Incidence of large skills mismatches between redundant workers and vacancies, by skill, ASEAN aggregate



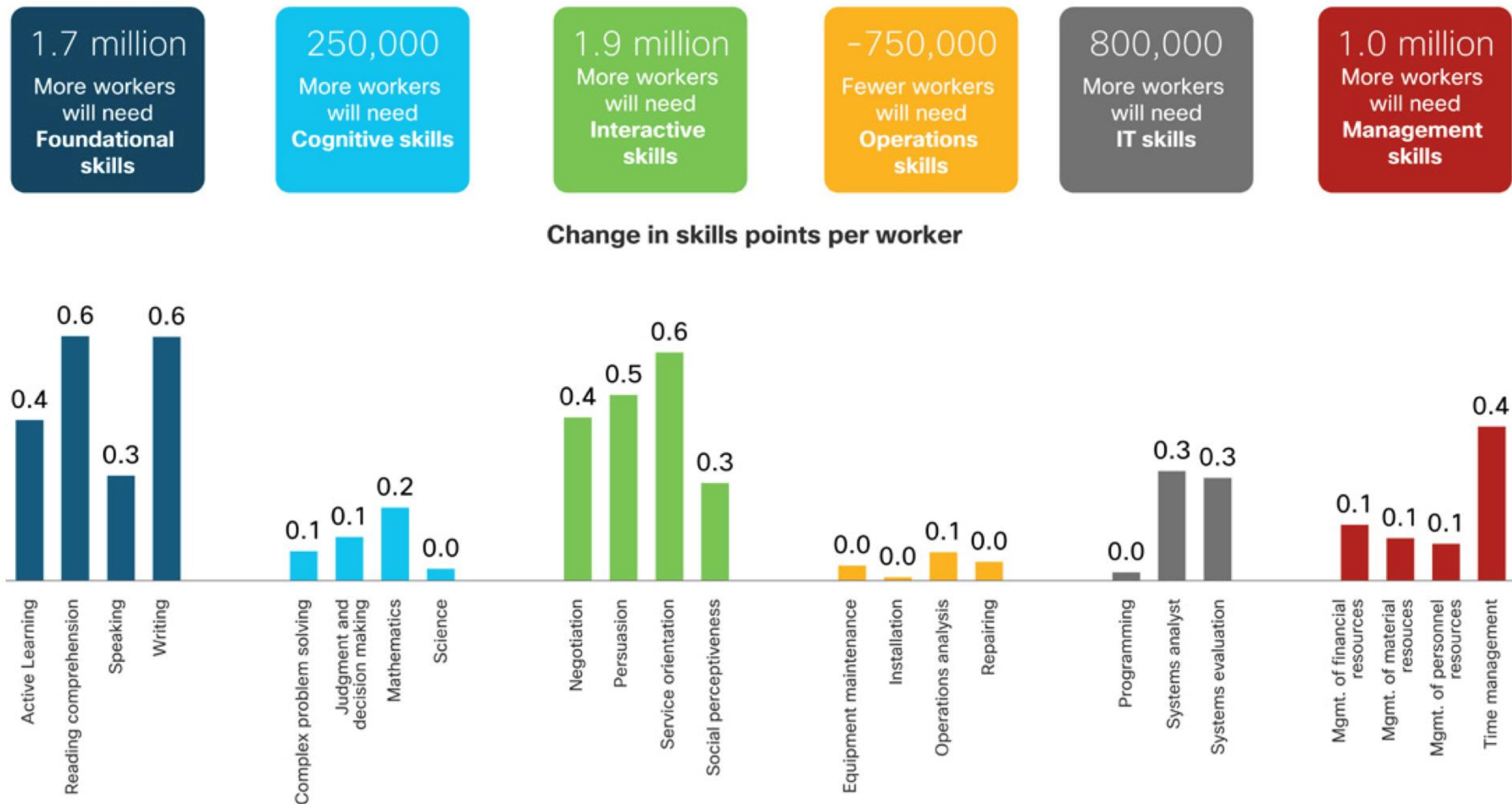
Source: Oxford Economics, Cisco

**Skill shortfalls mainly in IT, operations & Management:**  
**IT - Programming, Operation - Installation, Management - Financial Resources**

Ref: [https://www.cisco.com/c/dam/global/en\\_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf](https://www.cisco.com/c/dam/global/en_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf)

A structural lack of softer skills must be overcome

Overall size of skills mismatch in “skills points” per worker, by skill category, ASEAN aggregate



Source: Oxford Economics, Cisco

Soft-skill shortfalls mainly in Interactive, Foundational & Management

Interactive- service orientation, Foundational - Reading & Writing, Management - Team Management

Ref: [https://www.cisco.com/c/dam/global/en\\_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf](https://www.cisco.com/c/dam/global/en_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf)



# Largest growing and declining jobs by 2030



## Top largest growing jobs











1	Farmworkers, labourers and other agricultural workers
2	Light truck or delivery services drivers
3	Software and applications developers
4	Building framers, finishers and related trades workers
5	Shop salespersons
6	Food processing and related trades workers
7	Car, van and motorcycle drivers
8	Nursing professionals
9	Food and beverage serving workers
10	General and operations managers
11	Social work and counselling professionals
12	Project managers
13	University and higher education teachers
14	Secondary education teachers
15	Personal care aides



## Top largest declining jobs

1	Cashiers and ticket clerks
2	Administrative assistants and executive secretaries
3	Building caretakers, cleaners and housekeepers
4	Material-recording and stock-keeping clerks
5	Printing and related trades workers
6	Accounting, bookkeeping and payroll clerks
7	Accountants and auditors
8	Transportation attendants and conductors
9	Security guards
10	Bank tellers and related clerks
11	Data entry clerks
12	Client information and customer service workers
13	Graphic designers
14	Business services and administration managers
15	Claims adjusters, examiners, and investigators

# Top 10 fastest growing skills by 2030

1.  AI and big data
2.  Networks and cybersecurity
3.  Technological literacy
4.  Creative thinking
5.  Resilience, flexibility and agility
6.  Curiosity and lifelong learning
7.  Leadership and social influence
8.  Talent management
9.  Analytical thinking
10.  Environmental stewardship



# 5 Key Factors Creating Jobs in 2030



Technological  
change



Green transition



Demographic shifts



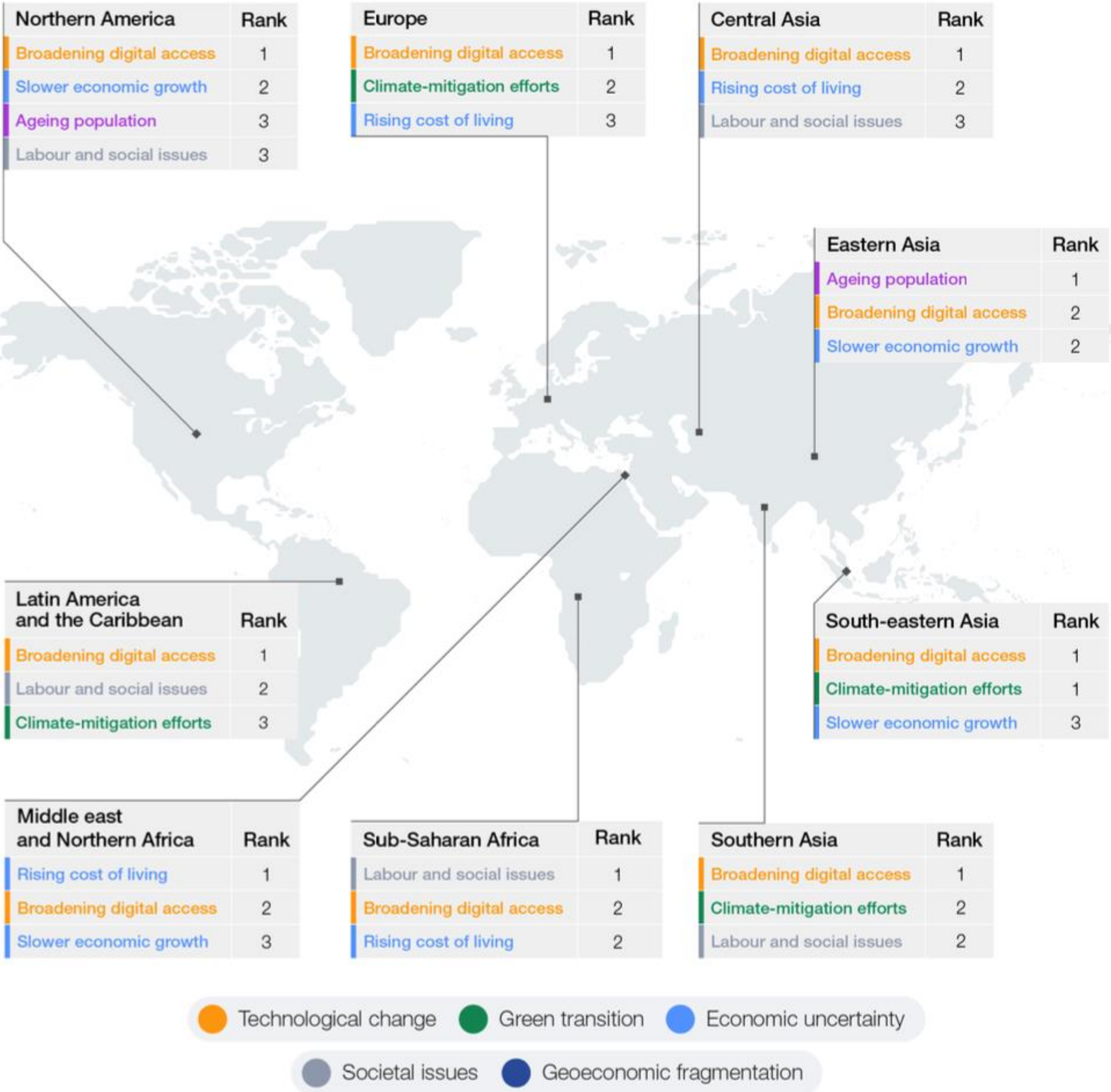
Geoeconomic  
fragmentation



Economic  
uncertainty

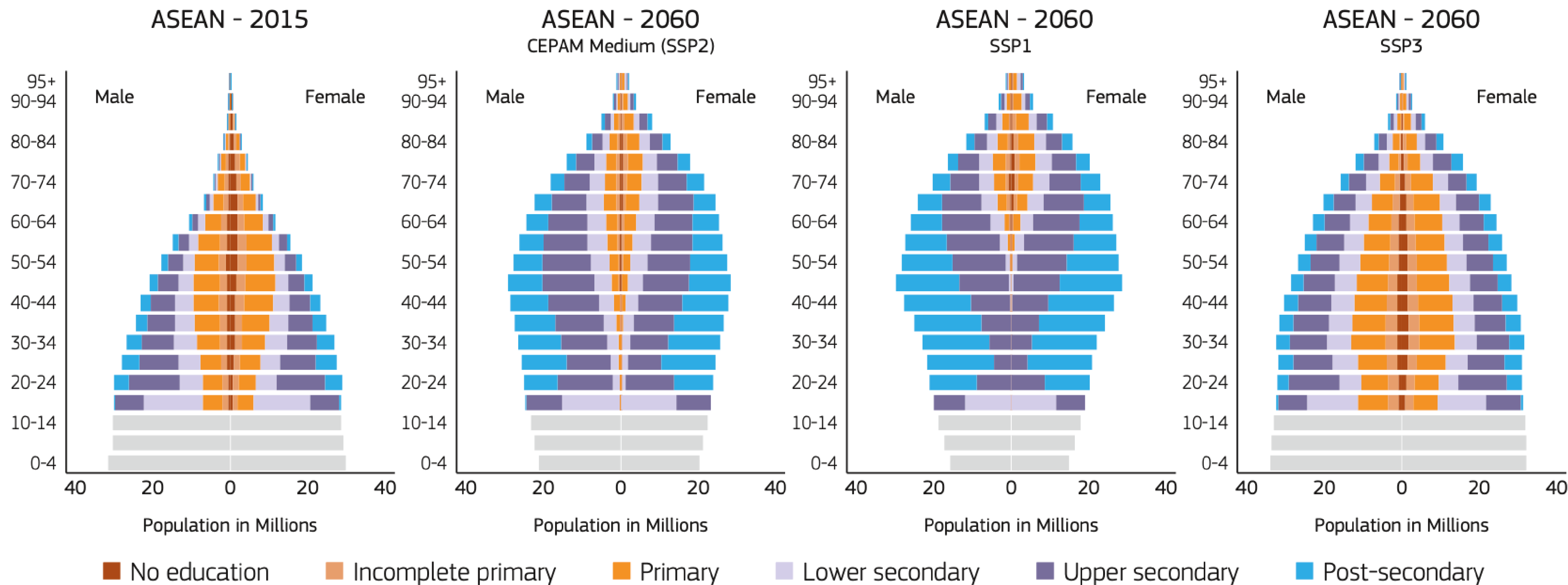


# Which macrotrends will shape regional labour markets by 2030?



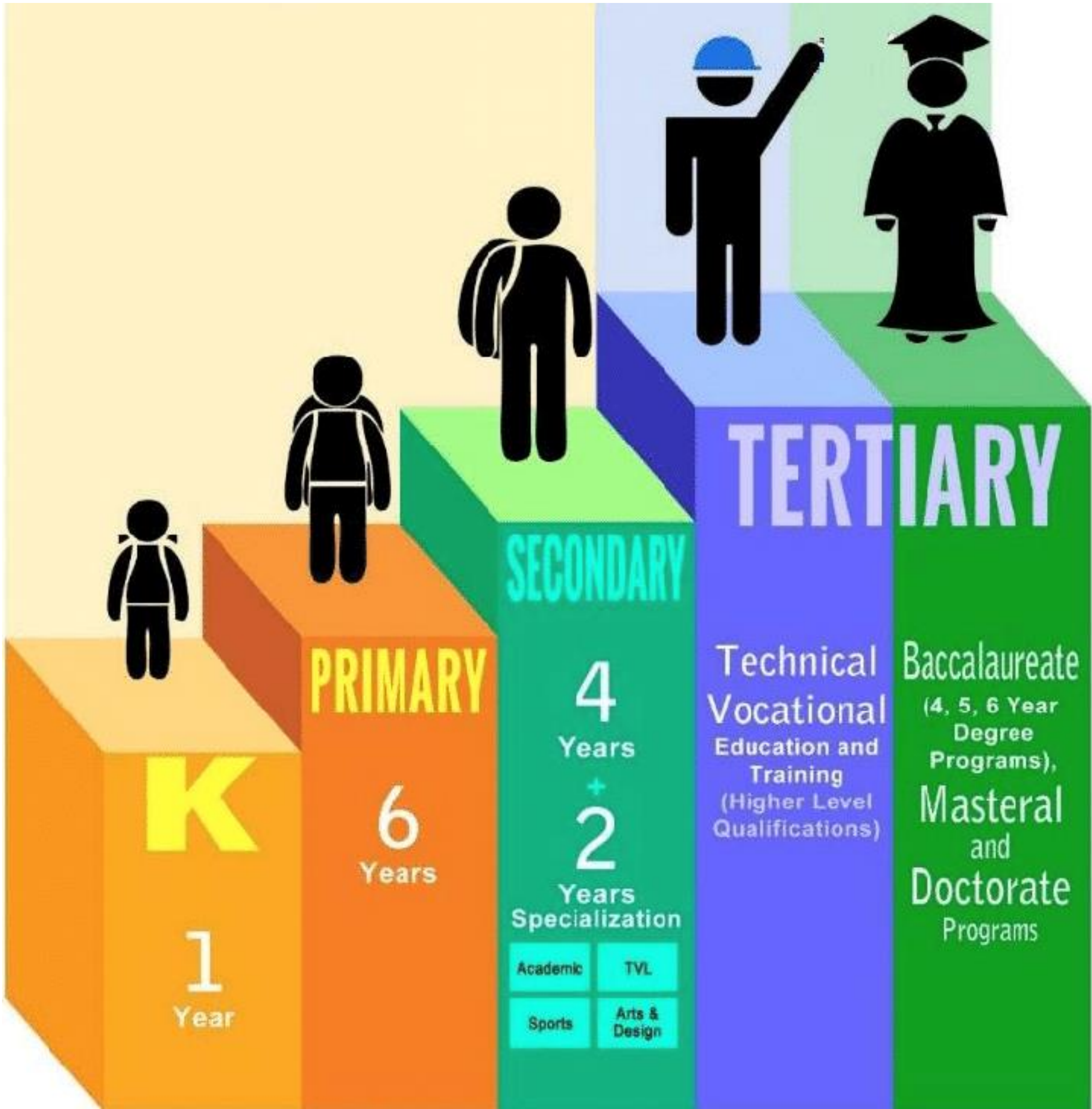


# ASEAN Population Composition 2015-2060



A young demographic profile and a rapidly expanding workforce

ASEAN urgently needs to shift its approach to education curricula, bringing major reform to the education value chain, from basic education through to vocational training and higher education.





# Much more than just distance learning

## Investment in educational technologies:

Many educational establishments are stuck in time when it comes to technology. Even when they have **management software**, these platforms **aren't always integrated** and **pedagogic and administrative processes are kept separate**.

## Investment in teacher training:

And it's not only the educational establishments that are behind the times. Many professionals are left behind and **still teach the way they learned at the beginning of their careers**. To turn viewpoints to Education 5.0, it's essential for instructors to be trained in this new outlook. If before the focus was to develop technical abilities in students, now it is **to concentrate on soft skills**.

## Capacity or Will or Both?

**49 percent of Japanese jobs are automatable. Yet Japan has been too little investment in labour-saving innovation, not too much.**

**While Japan has been a slow adapter to the ICT revolution, it is determined to lead the robotics revolution.**

**25 percent of Japans population is 65 or older. By 2060, this number will have increased to 40 percent. During the boom years of the 1980s, Japan had more than two workers for every senior or child;. By 2050, it will have only one.**

**As new technologies are being adopted, some skills will be automated into obsolescence. Western countries have experienced a surge in wage disparities since the computer revolution of the 1980s.**

**To avoid this, the robot revolution needs to be accompanied by investments in skills and training.**



# Engineering the **ASEAN** Future

**For Industry 5.0 & Education 5.0**

**Appropriate & timely investments in skills and training together with the adoption of new technologies?**

**OR**

**Up to last minute continuation of importing comparatively affordable migrant labour?**

**OR**

**Both?**



# Thank You & Welcome for Questions

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# ASEAN

## SMART CITIES NETWORK

— Pilot Cities —





# Singapore, as a city state, is going ahead with its Smart Nation Initiative.



[ABOUT SMART NATION](#) ▾

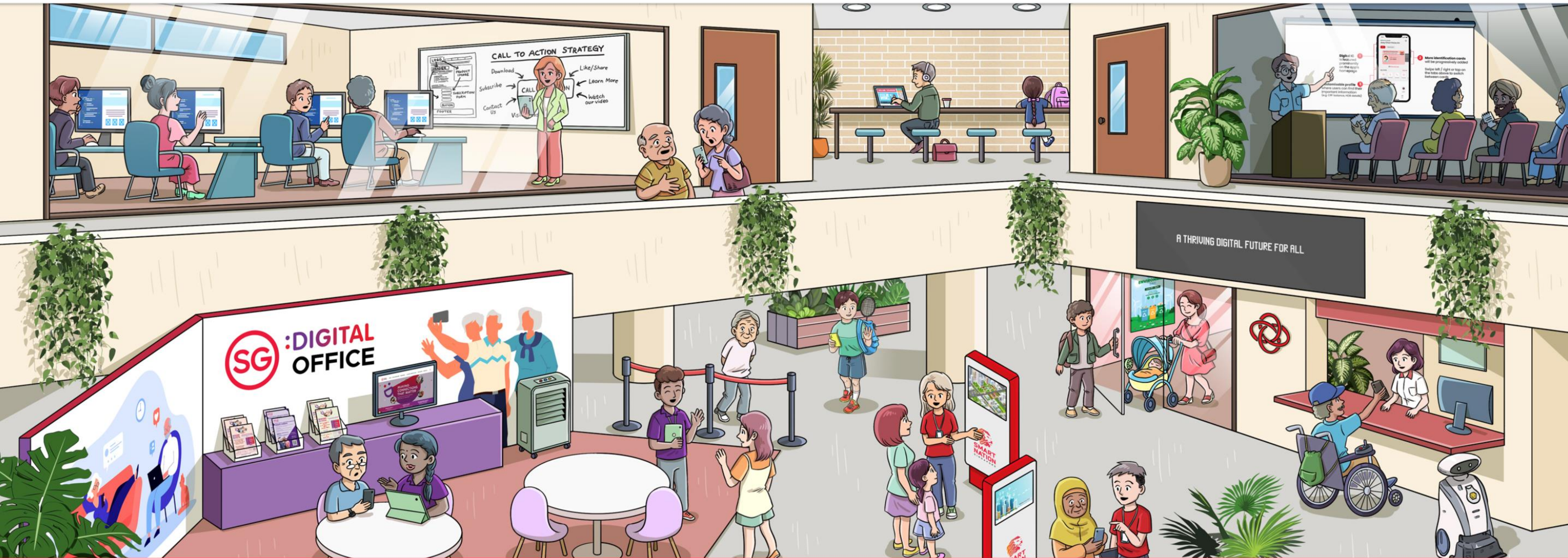
[INITIATIVES](#) ▾

[FRAMEWORKS AND BLUEPRINTS](#) ▾

[CITIZEN ENGAGEMENT](#) ▾

[RESOURCES](#) ▾

[CAREERS](#) ▾



## OUR VISION

Learn more about Smart Nation

## OUR INITIATIVES

Discover the benefits of tech

## OUR ACHIEVEMENTS

See what we've accomplished



# ASEAN

## SMART CITIES NETWORK

Pilot Cities



### Vision

Governance at the palm of your hands.

#### Project 1

Command Centre Upgrade

#### Project 2

E-Education

**Read More**

### Focus Areas

Public Safety and Order

Public and Social Services

Environment and Disaster Response-Ability

Technology Enhanced Educational Delivery

Educational Delivery

Integrated Health Care Management

[www.asean2018.sg](http://www.asean2018.sg)

[asean.org](http://asean.org)



Exhibit 1: ASCN Smart City Projects across the Six Focus Areas as of September 2024





Exhibit 2: Overall Implementation Progress of ASCN Smart City Projects as of September 2024

<b>Bandar Seri Begawan</b> Brunei Darussalam 	<b>Battambang</b> Cambodia 	<b>Phnom Penh</b> Cambodia 	<b>Siem Reap</b> Cambodia 
<b>Sihanoukville City</b> Cambodia 	<b>Banyuwangi</b> Indonesia 	<b>Jakarta</b> Indonesia 	<b>Makassar</b> Indonesia 
<b>Sumedang</b> Indonesia 	<b>Luang Prabang</b> Lao PDR 	<b>Vientiane</b> Lao PDR 	<b>Johor Bahru</b> Malaysia 
<b>Kota Kinabalu</b> Malaysia 	<b>Kuala Lumpur</b> Malaysia 	<b>Kuching</b> Malaysia 	<b>Mandalay</b> Myanmar 
<b>Nay Pyi Taw</b> Myanmar 	<b>Yangon</b> Myanmar 	<b>Cebu City</b> The Philippines 	<b>Davao City</b> The Philippines 
<b>Manila</b> The Philippines 	<b>Singapore</b> Singapore 	<b>Bangkok</b> Thailand 	<b>Chiang Mai</b> Thailand 
<b>Chonburi</b> Thailand 	<b>Khon Kaen</b> Thailand 	<b>Phuket</b> Thailand 	<b>Rayong</b> Thailand 
<b>Da Nang</b> Viet Nam 	<b>Ha Noi</b> Viet Nam 	<b>Ho Chi Minh City</b> Viet Nam 	<p>Greyed: Planning(*) Coloured: On-going Squared: Completed</p> <p>(*) Planning includes: proposal stage; pre-feasibility stage; and feasibility stage.</p>



# Jobs popular in 2000 that have almost disappeared in US

## Video-tape and disk rental

127,828 employed in 2000, 12,780 in 2017, **90% drop**

## Music stores

141,262 employed in 2000, 39,687 in 2017, **72% drop**



**Entertainment industry go online**

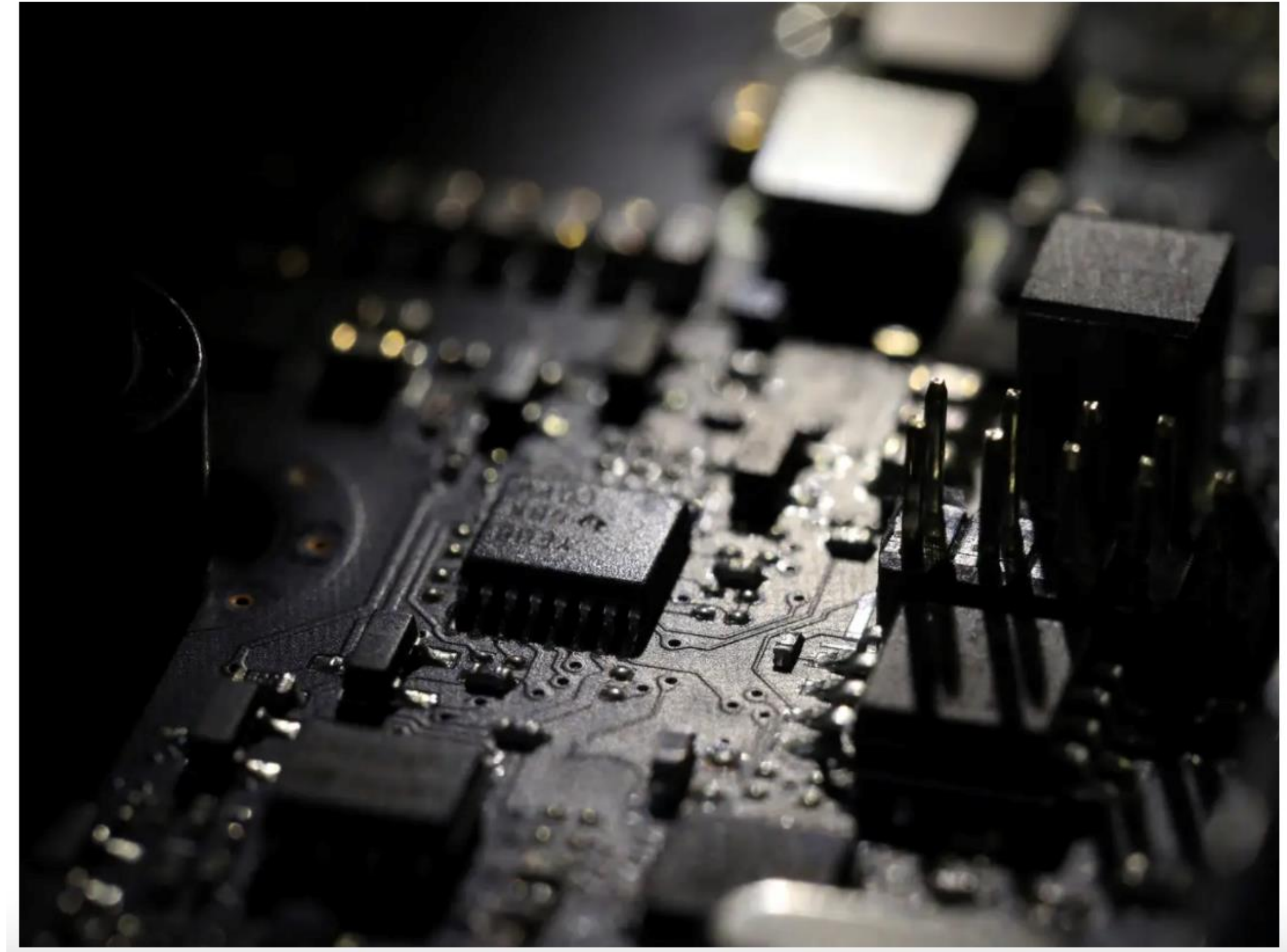
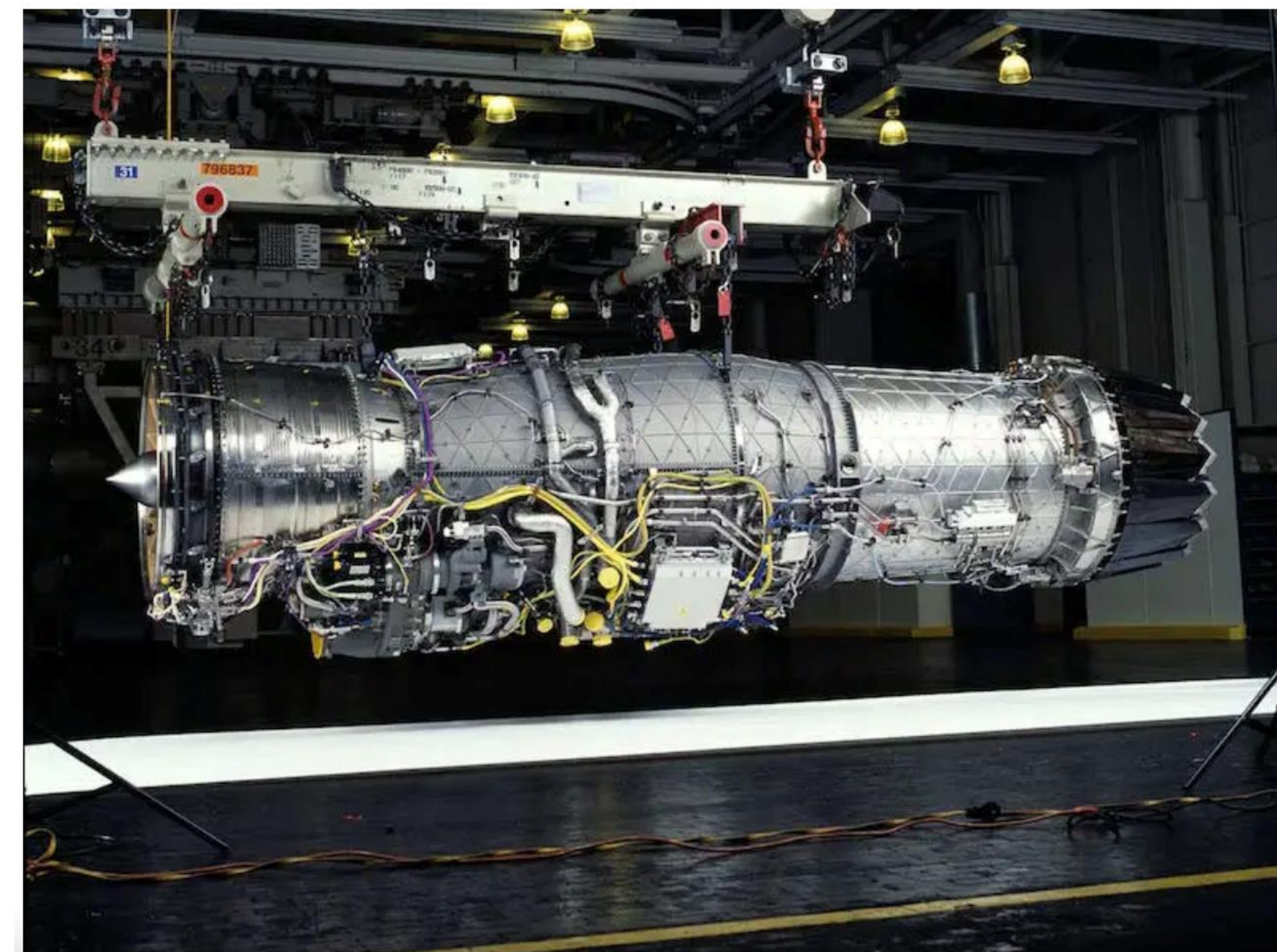
Ref: <https://www.businessinsider.com/jobs-that-were-popular-in-2000-that-have-almost-disappeared#1-video-tape-and-disk-rental-127828-people-were-employed-in-2000-falling-to-12780-in-2017-a-90-drop-20>



# Jobs popular in 2000 that have almost disappeared in US

Aerospace product and parts manufacturing  
233,559 employed in 2000, 66,921 in 2017, **71% drop**

Computer and peripheral equipment manufacturing  
425,694 employed in 2000, 146,624 in 2017, **66% drop**



**Manufacturing industry go outsourced**

Ref: <https://www.businessinsider.com/jobs-that-were-popular-in-2000-that-have-almost-disappeared#1-video-tape-and-disk-rental-127828-people-were-employed-in-2000-falling-to-12780-in-2017-a-90-drop-20>