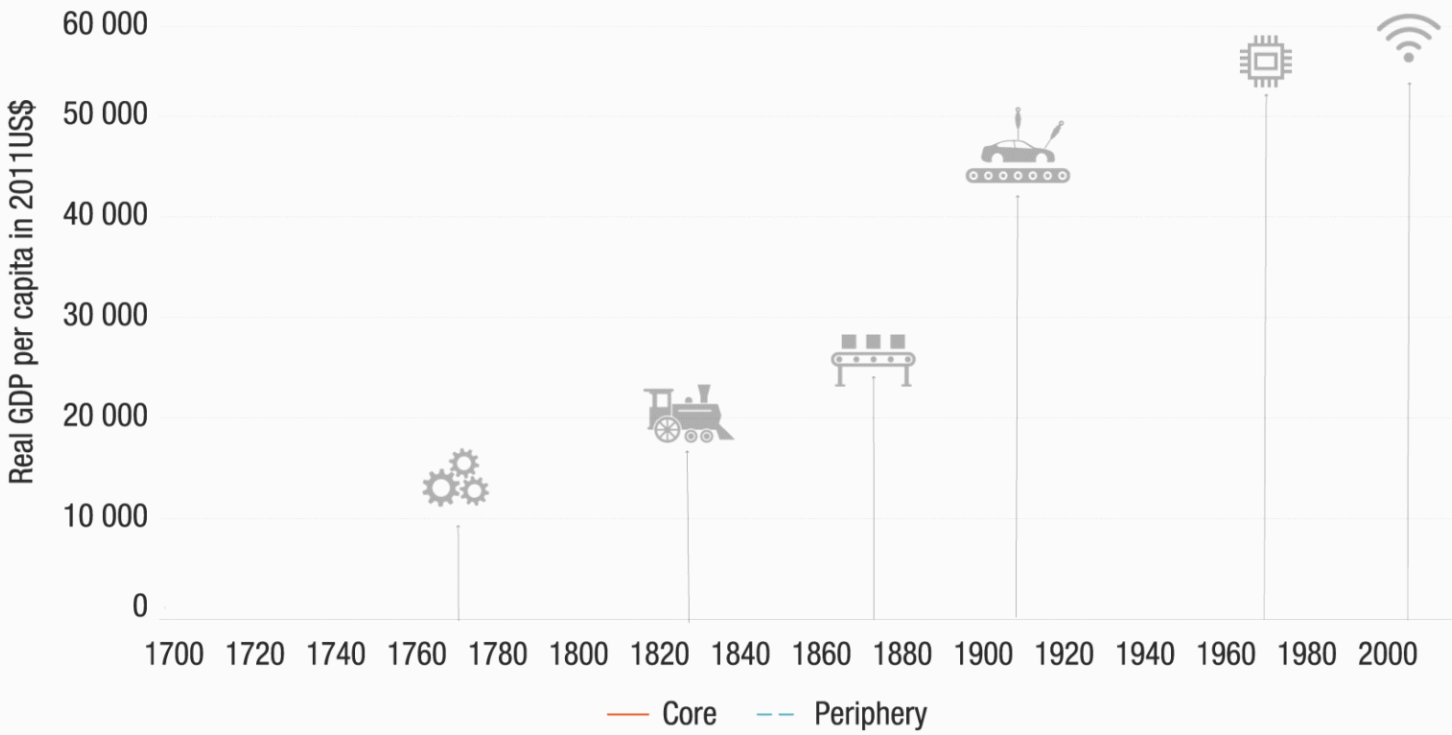

TECHNOLOGY
AND INNOVATION
REPORT
2021
UNITED NATIONS
UNCTAD

CATCHING THE WAVES

The great divide, and waves of technological change.

Technological change and inequality through the ages

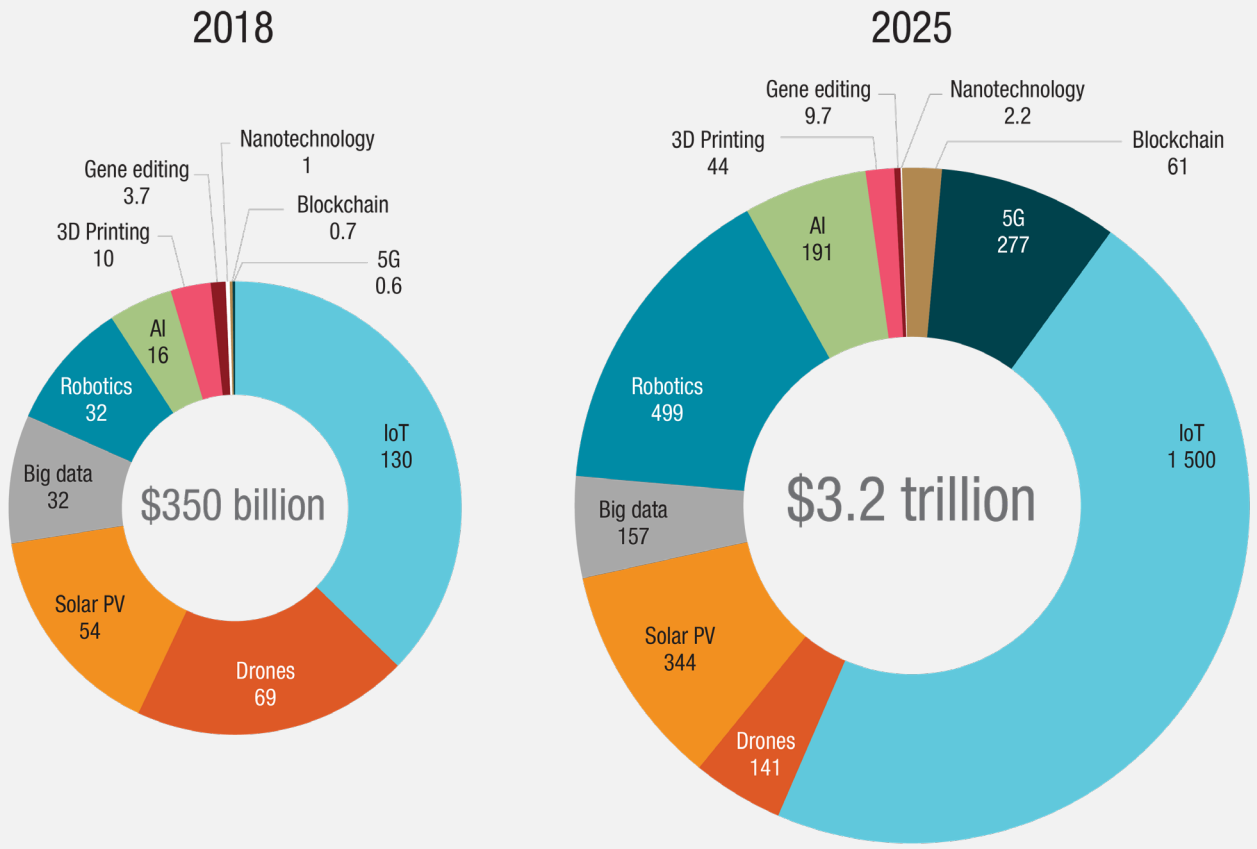


Source: UNCTAD's Technology and Innovation Report 2021

Source: UNCTAD, based on data from Maddison Project Database, version 2018, Bolt et al. (2018), Perez (2002), and Schwab (2013).
Notes: "Core" corresponds to Western Europe and its offshoots (i.e. Australia, Canada, New Zealand, the United States) as well as Japan. "Periphery" corresponds to the world, excluding the "core" countries.

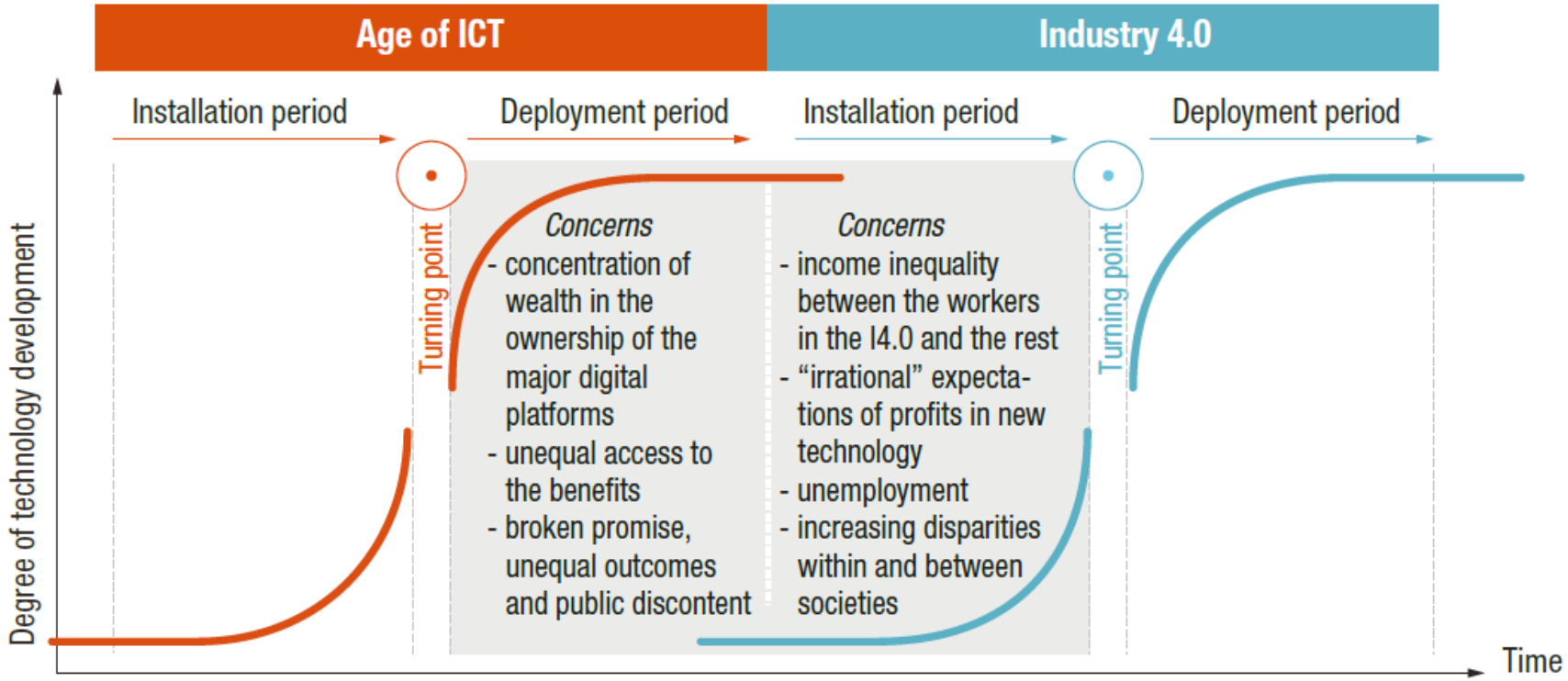
FRONTIER TECHNOLOGY MARKETS ARE EXPECTED TO GROW RAPIDLY

Market size estimates of Frontier technologies, $billions



Source: UNCTAD based on data estimates from Froese (2018), MarketsandMarkets (2018), Sawant and Kakadee (2018), Business Wire (2019), Chaudhary et al. (2019), GlobeNewswire (2019b), MarketsandMarkets (2019), MarketWatch (2019a), MarketWatch (20191), Raza (2019), Tewari and Baul (2019), Wagner (2019b), Mordor Intelligence (2020a).

Each wave of technological change brings inequality in new shapes



Source: UNCTAD based on Perez (2002).

A COUNTRY READINESS INDEX

Readiness towards the use, adoption and adaptation of frontier technologies, selected countries

Country name	Total ranking	ICT ranking	Skills ranking	R&D ranking	Industry ranking	Finance ranking
Top 10						
United States of America	1	14	17	2	20	2
Switzerland	2	7	13	13	3	3
United Kingdom	3	17	12	6	11	14
Sweden	4	1	7	16	15	16
Singapore	5	4	9	18	4	18
Netherlands	6	6	10	15	8	23
Korea, Republic of	7	19	27	3	9	8
Ireland	8	24	6	21	1	87
Germany	9	23	16	5	10	39
Denmark	10	2	4	25	21	5
Selected transition and developing economies						
China	25	99	96	1	7	6
Russian Federation	27	39	28	11	66	45
Brazil	41	73	53	17	42	60
India	43	93	108	4	28	76
South Africa	54	69	84	39	71	13

Source: UNCTAD (see the complete table in Statistical Appendix. Readiness for frontier technologies index).

COUNTRIES OVERPERFORMING

RELATIVE TO PER CAPITA GDP

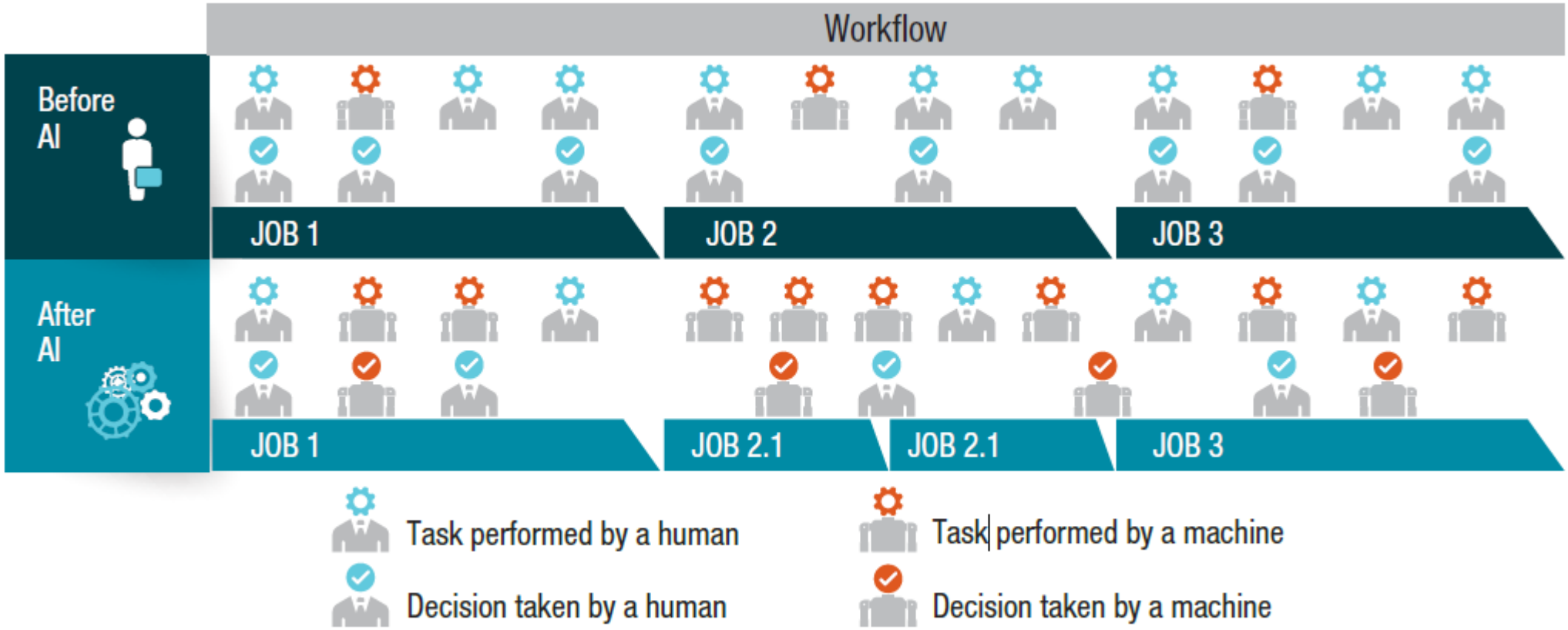
Gain in ranking position.

	Country	Overperformance (positions)		Country	Overperformance (positions)
1	India	65	11	Morocco	29
2	Philippines	57	12	Kenya	28
3	Ukraine	47	13	Nepal	28
4	Viet Nam	45	14	Serbia	25
5	China	40	15	Korea, Republic of	24
6	Jordan	34	16	Russian Federation	24
7	Brazil	33	17	Lebanon	24
8	Republic of Moldova	33	18	Togo	23
9	South Africa	29	19	United Kingdom	21
10	Tunisia	29	20	Ghana	20

Source: UNCTAD calculations based on GDP data by the World Bank (World Bank, 2020).
Note: Overperformance by gain in ranking position are measured taking the difference in positions between the actual index rankings and the estimated index rankings based on per capita income. For instance, India's actual index ranking was 43 while the estimated index ranking based on per capita income was 108. Hence, India overperformed by 65 ranking positions.

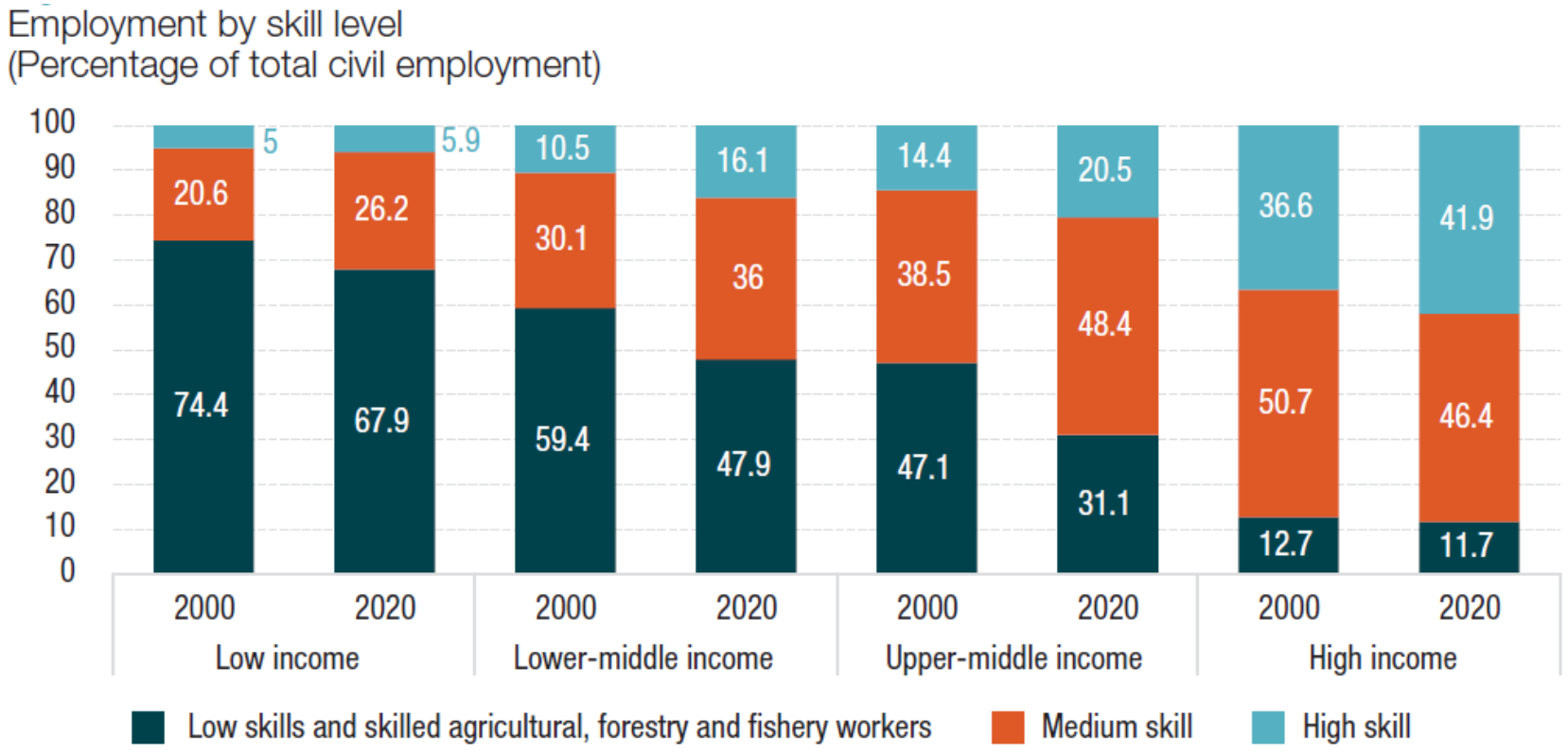
AUTOMATION TAKING JOBS

Jobs, tasks, decisions and automation by AI



Source: UNCTAD based on Agrawal et al. (2018) and Acemoglu and Restrepo (2019).

JOB POLARIZATION



Source: UNCTAD based on data from ILOStat according to the ISCO-08.

Notes: Following ISCO-08 construction logic, a high skill level refers to major groups 1 to 3, a medium skill level to major groups 4, 5, 7 and 8, and a low skill level to major group 9 (skilled agricultural, forestry and fishery workers correspond to group 6, which is also considered medium skill but is combined with group 9 in the data made available by ILOStat).[54]

AI AND GLOBAL ECONOMIC INEQUALITIES

TYPE OF INPUT DATA

1

If AI primarily uses 'big data' generated by users, this will mainly benefit the United States and China, whose digital platforms gather massive amounts of such data.

2

If it primarily uses big data gathered by the Internet of Things this would benefit other countries with strong manufacturing – such as the EU, Japan and the Republic of Korea.

3

Allow computers to learn more like humans would still demand resources and capabilities more likely to be found in the developed countries.

Frontier technologies need to be scaled-up to reach those most in need

Five As of Technology Deployment

Availability
Technology is available in the place that the person lives

Affordability
Price of the technology is affordable

Awareness
People are aware of the ways that the technology is relevent to their lives

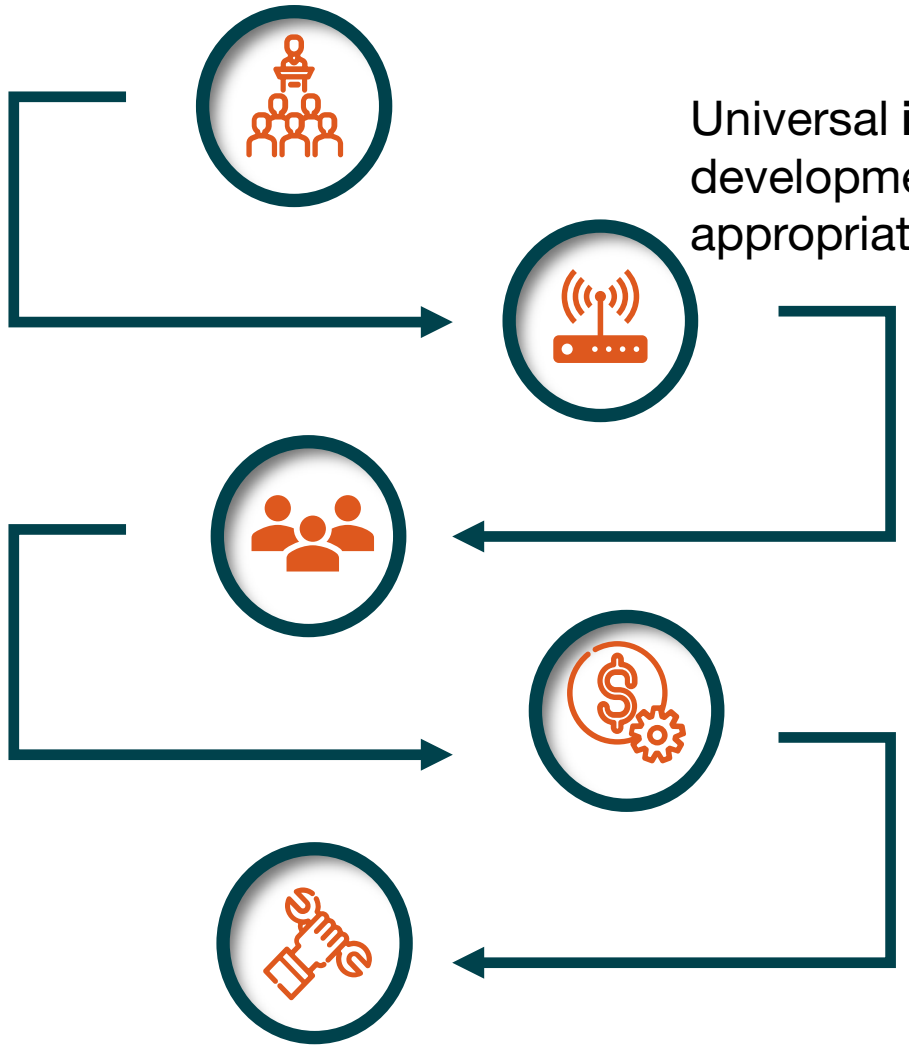
Accessibility
The technology is accessible considering language and physical conditions of users

Ability
Appropriate user skills to translate technology access into valued development

Source: UNCTAD based on Roberts (2017) and Hernandez and Roberts (2018)

PREPARING FOR FRONTIER TECH REVOLUTION

Big role of the Government to promote frontier tech use, adoption and adaptation to local needs



Universal **internet access**, **skills** development, **social protection**, appropriate **regulations**

How much societal inequality that can be tolerated is also a **political decision**

Finance could come from **“robot tax”** and taxing the resulting wealth

Labour unions in developing countries will also have a big role to play to protect worker

RISKS OF **BIAS AND DISCRIMINATION**

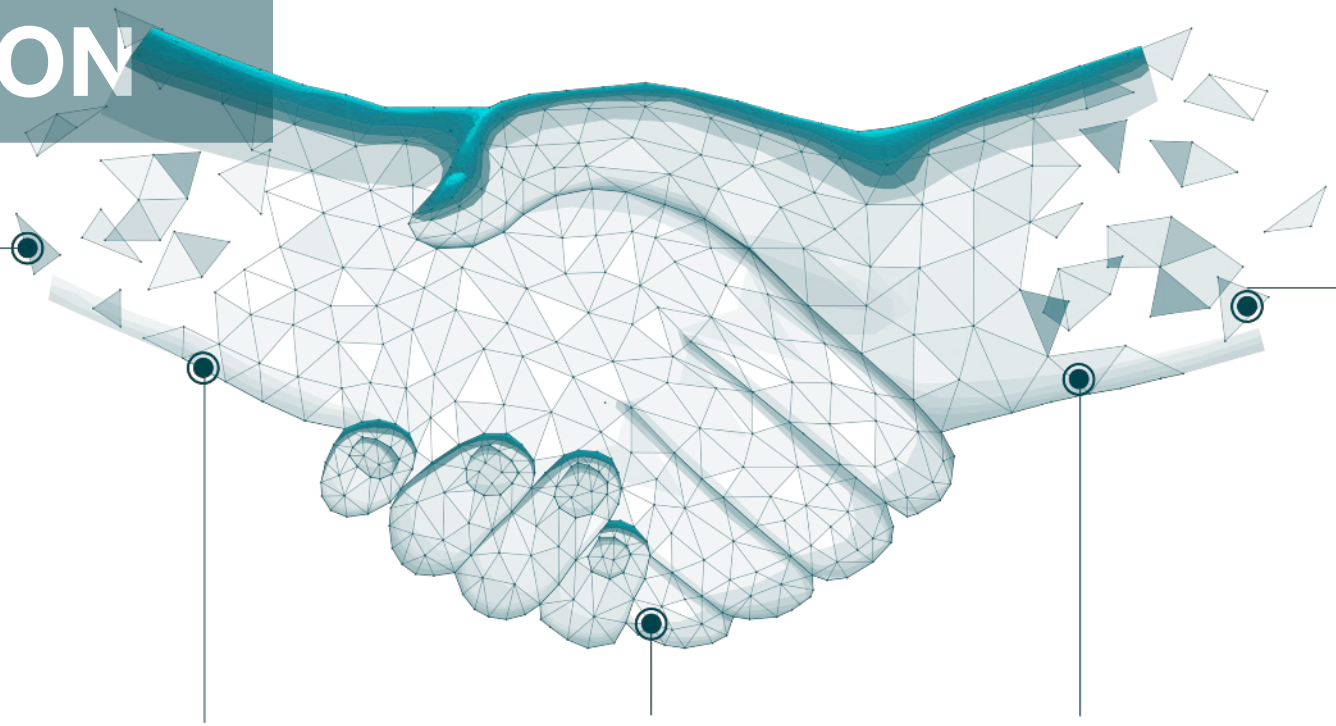
AI algorithms with built in bias

Genomic inequalities

Gene editing and intellectual property

Ethical questions in gene editing

PRIORITIES FOR INTERNATIONAL COOPERATION



- Build stronger national capacities in STI
- Smooth technology transfer
- Increase women participation in STEM
- Improve foresight and technological assessment
- Promote inclusive debate on frontier technologies

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