



TECHNOLOGY AND INNOVATION REPORT 2021

**Catching technological
waves: Innovation with
equity**



UNITED NATIONS
UNCTAD

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CATCHING TECHNOLOGICAL WAVES



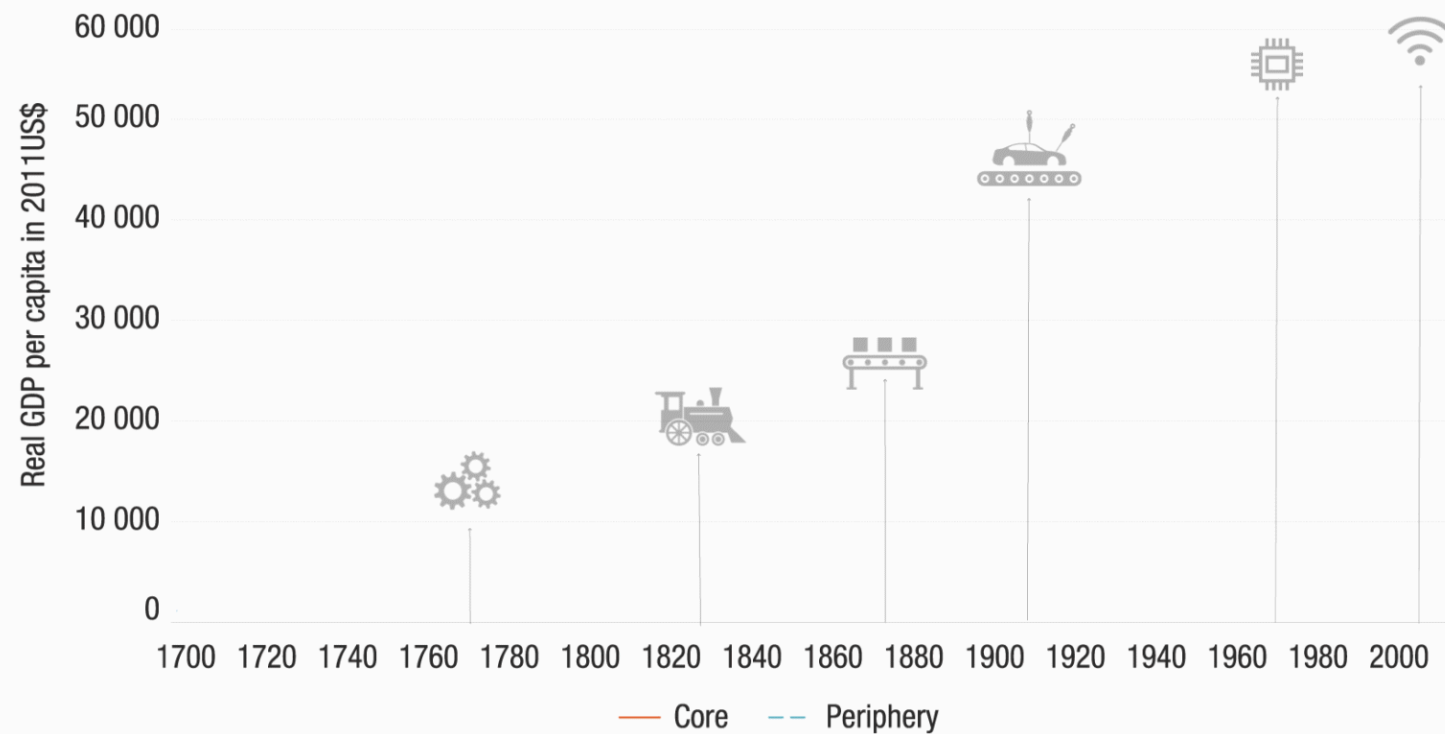
- Focus is on the impact of frontier technologies in developing countries
- Context
 - COVID-19
 - Rise of China and US-China relations
 - Climate change

<https://unctad.org/webflyer/technology-and-innovation-report-2021>

CATCHING THE WAVES

The great divide, and
waves of technological
change.

Technological change and inequality through the ages



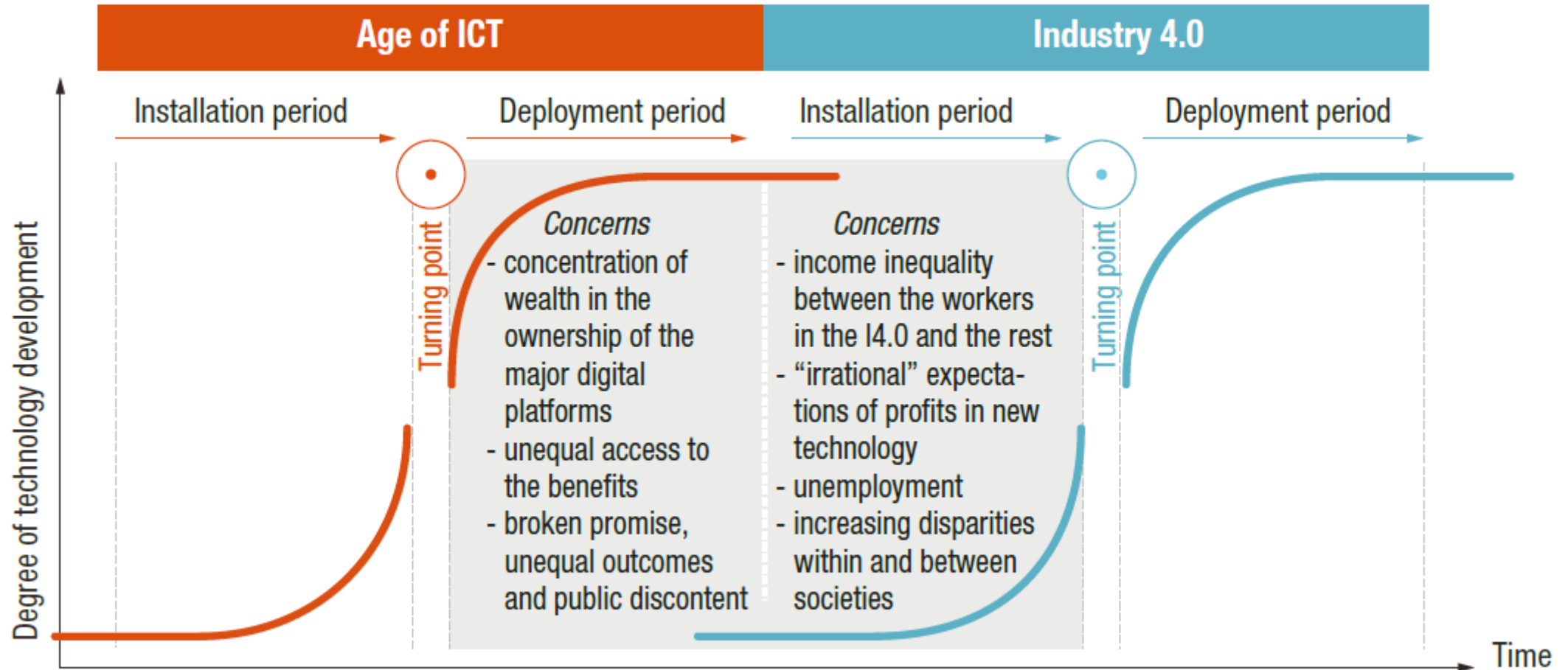
Source: UNCTAD's Technology and Innovation Report 2021

Source: UNCTAD, based on data from Maddison Project Database, version 2018, Bolt et al. (2018), Perez (2002), and Schwab (2013).

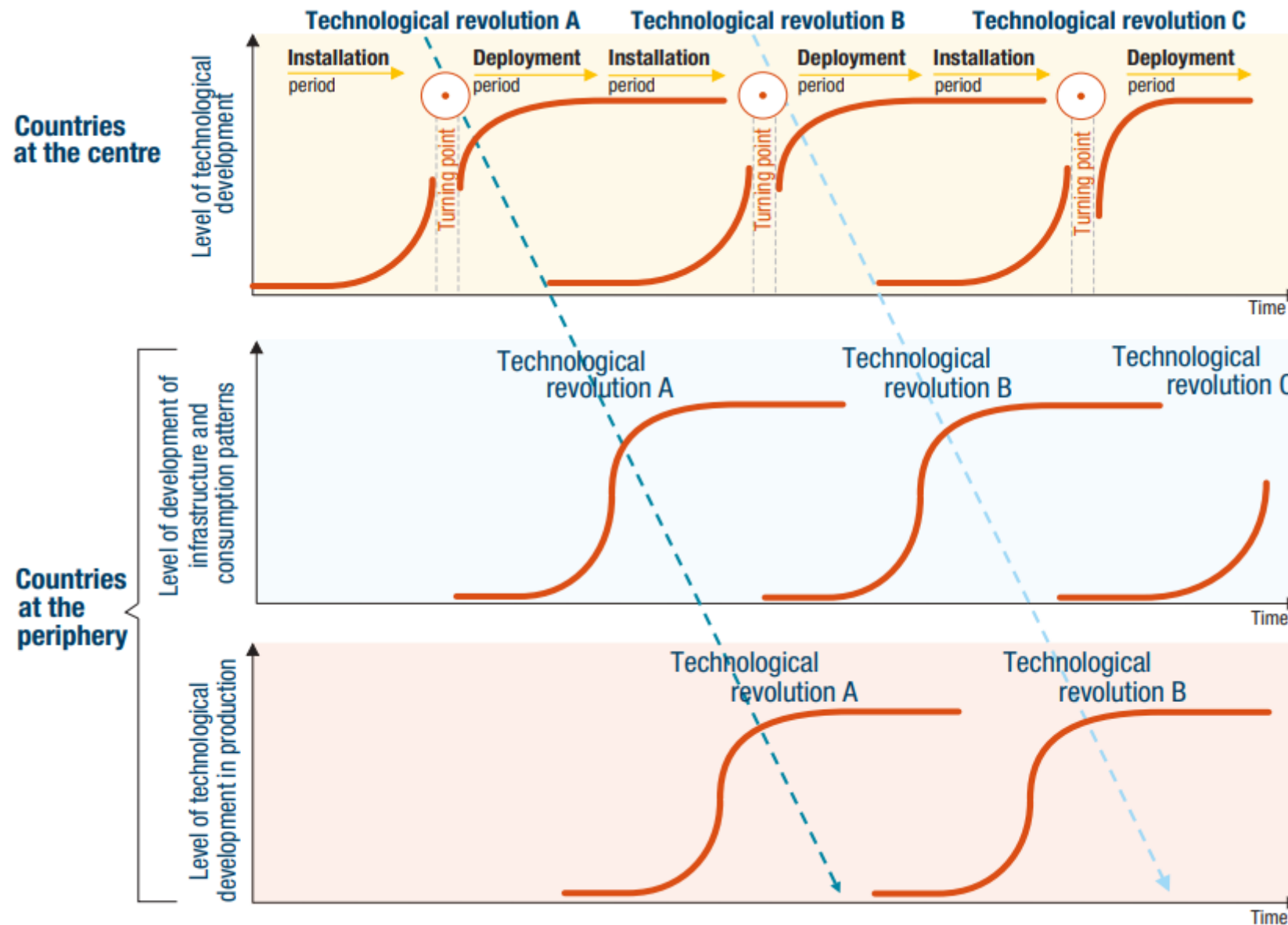
Notes: "Core" corresponds to Western Europe and its offshoots (i.e. Australia, Canada, New Zealand, the United States) as well as Japan. "Periphery" corresponds to the world, excluding the "core" countries.

TWO-PHASE REVOLUTIONS

Technological revolutions and inequalities



Source: UNCTAD based on Perez (2002).



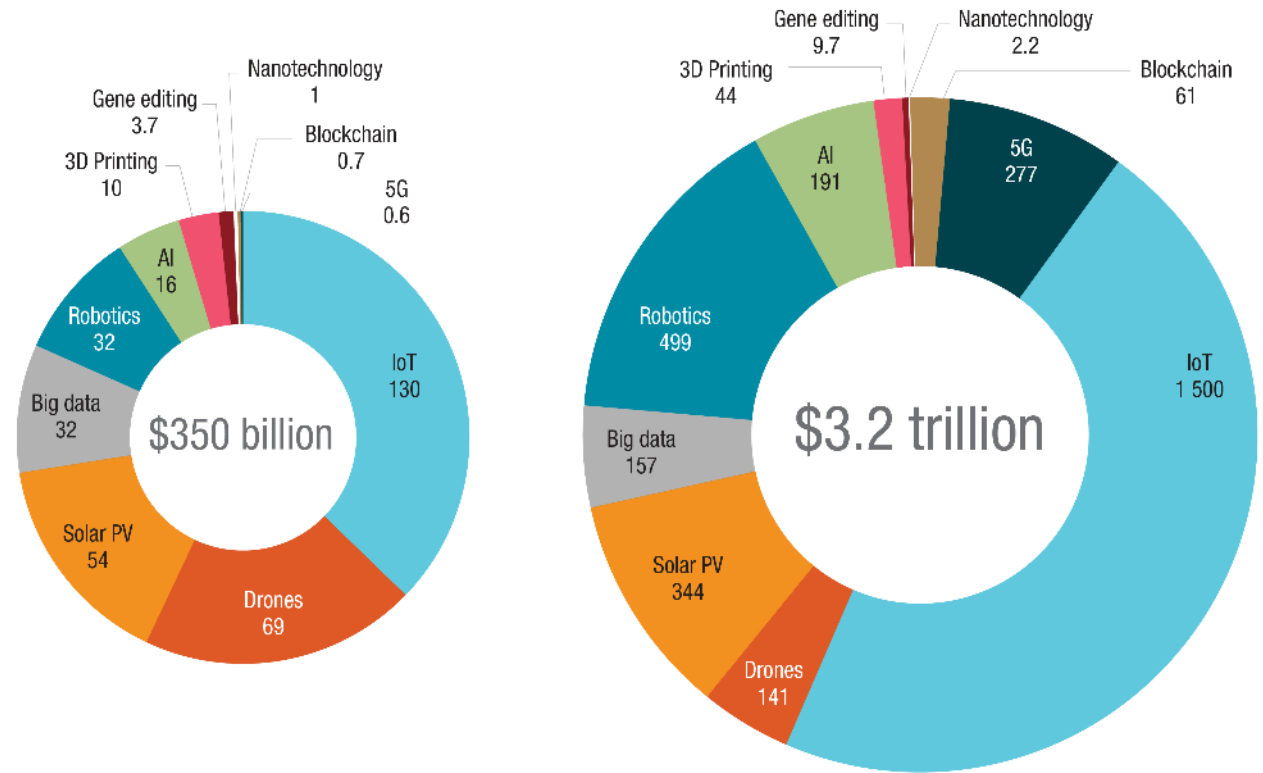
Source: UNCTAD, based on Perez, 2002.

Market size estimates of Frontier technologies, \$billions

2018

2025

**FRONTIER
TECHNOLOGY
MARKETS ARE
EXPECTED TO
GROW RAPIDLY**



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).

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.

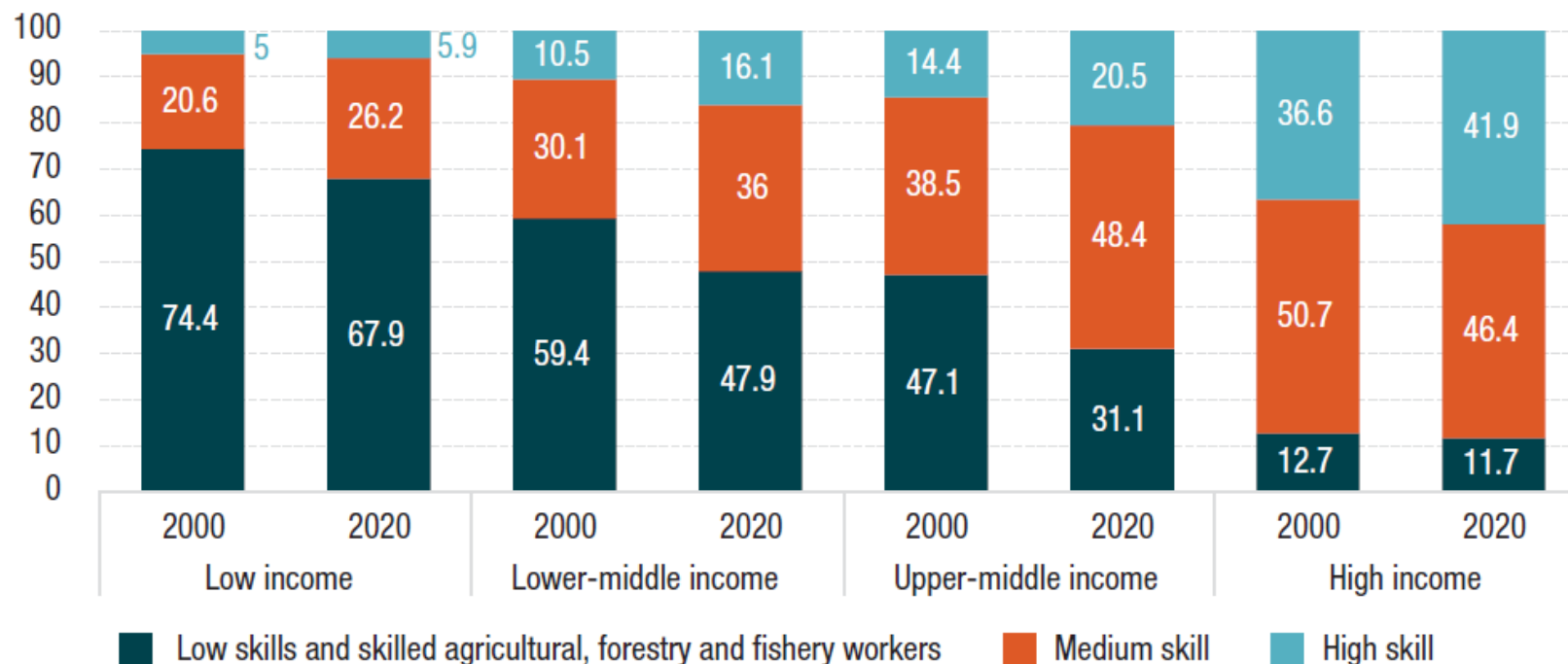


3

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

JOB POLARIZATION

Employment by skill level
(Percentage of total civil employment)

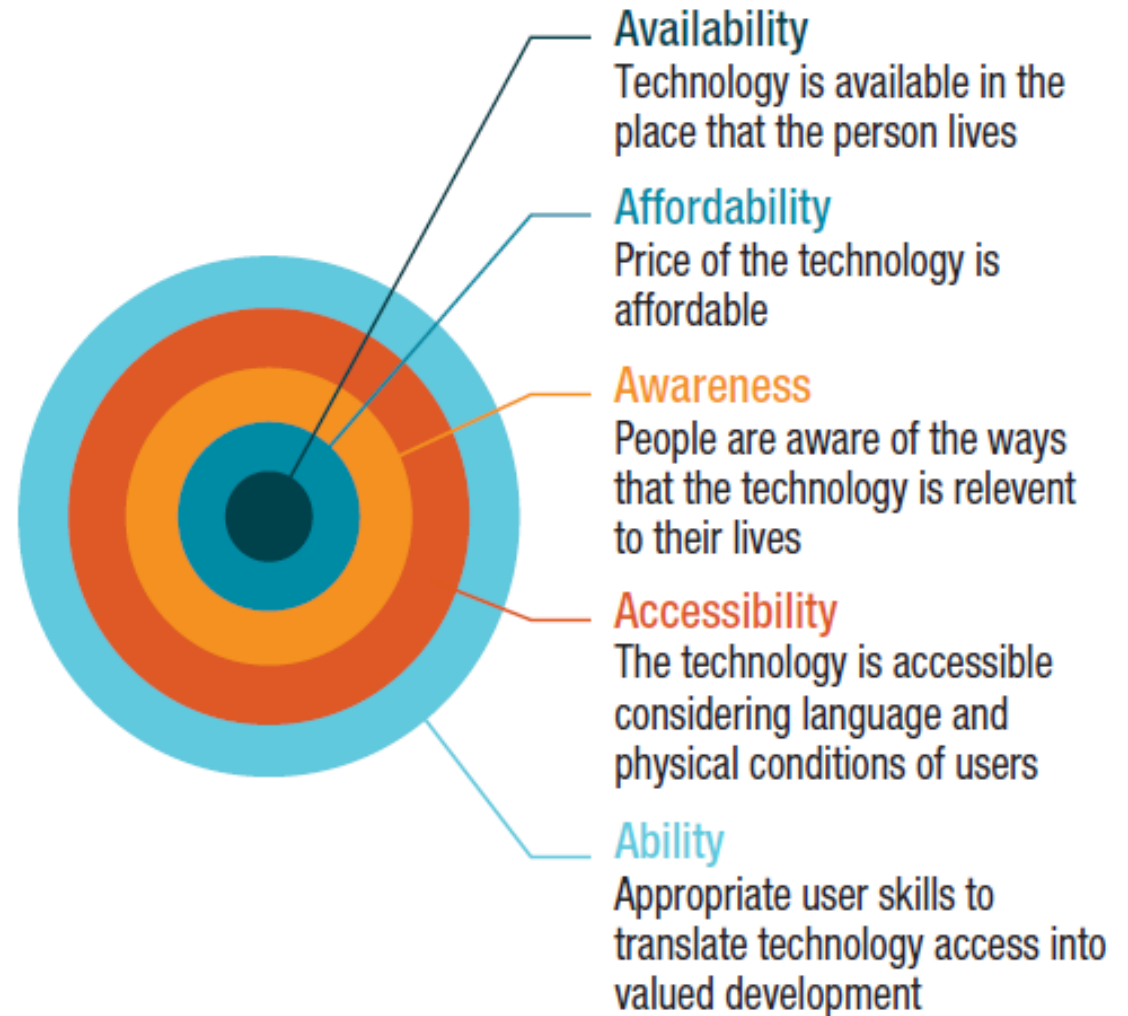


Source: UNCTAD based on data from ILOStat according to the ISCO-08.

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

TECHNOLOGIES AFFECTING INEQUALITIES THROUGH ACCESS & DESIGN

Five as of technology access



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



RISKS OF BIAS AND DISCRIMINATION



AI algorithms
with built in
bias



Genomic
inequalitie
s



Gene editing and
intellectual
property



Ethical
questions in
gene editing



CHALLENGES FOR DEVELOPING COUNTRIES

Production



Demographic
changes



Existing
technological
gaps



Low economic
diversification



Stringent intellectual
property rights



Weak financing
mechanism

Use



Higher levels of
poverty

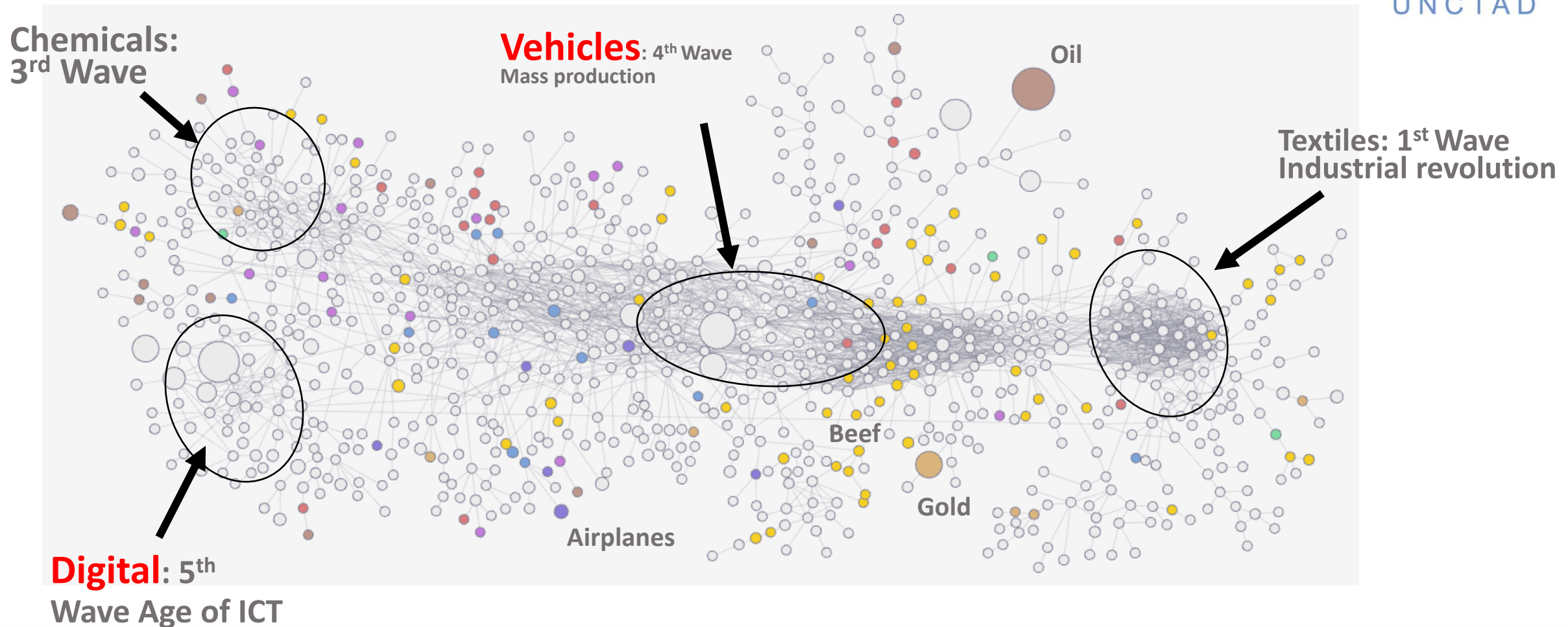


Digital divide



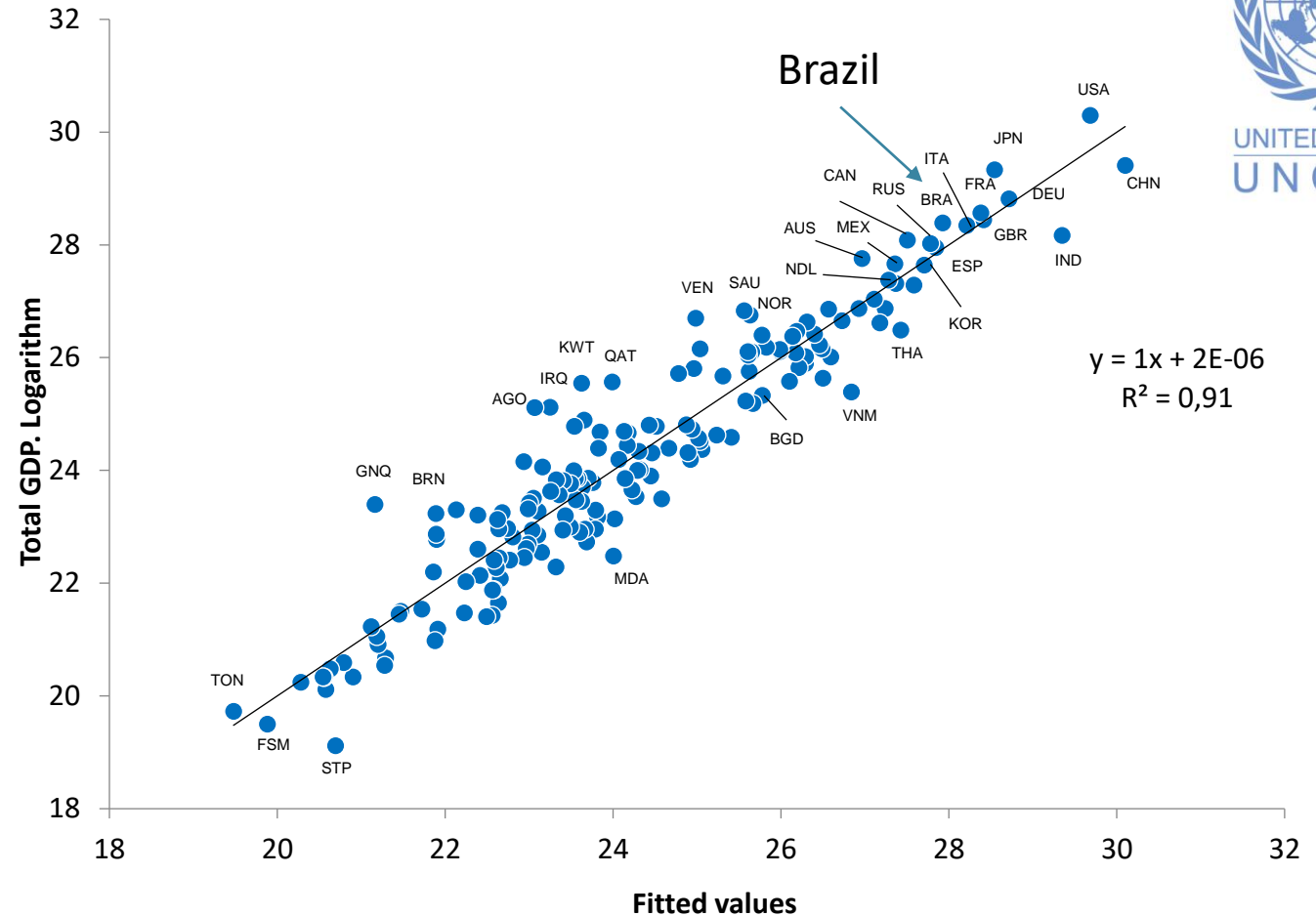
Shortage of
skills

TECHNOLOGICAL CHANGE MOVES OVER TIME FROM CORE SECTORS TO MORE TRADITIONAL SECTORS



Product space showing products connected to each other based on the likelihood of they being exported together

GROWTH-ENHANCING
STRUCTURAL
TRANSFORMATION
REQUIRES
ECONOMIC
DIVERSIFICATION +
COMPLEXITY
WHICH ARE THE RESULT OF
INNOVATION
(NEW PRODUCTS &
UPGRADE)



Diversification & Average Complexity & Size of labour force
explain **91%** of differences in **total GDP** between countries

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
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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).



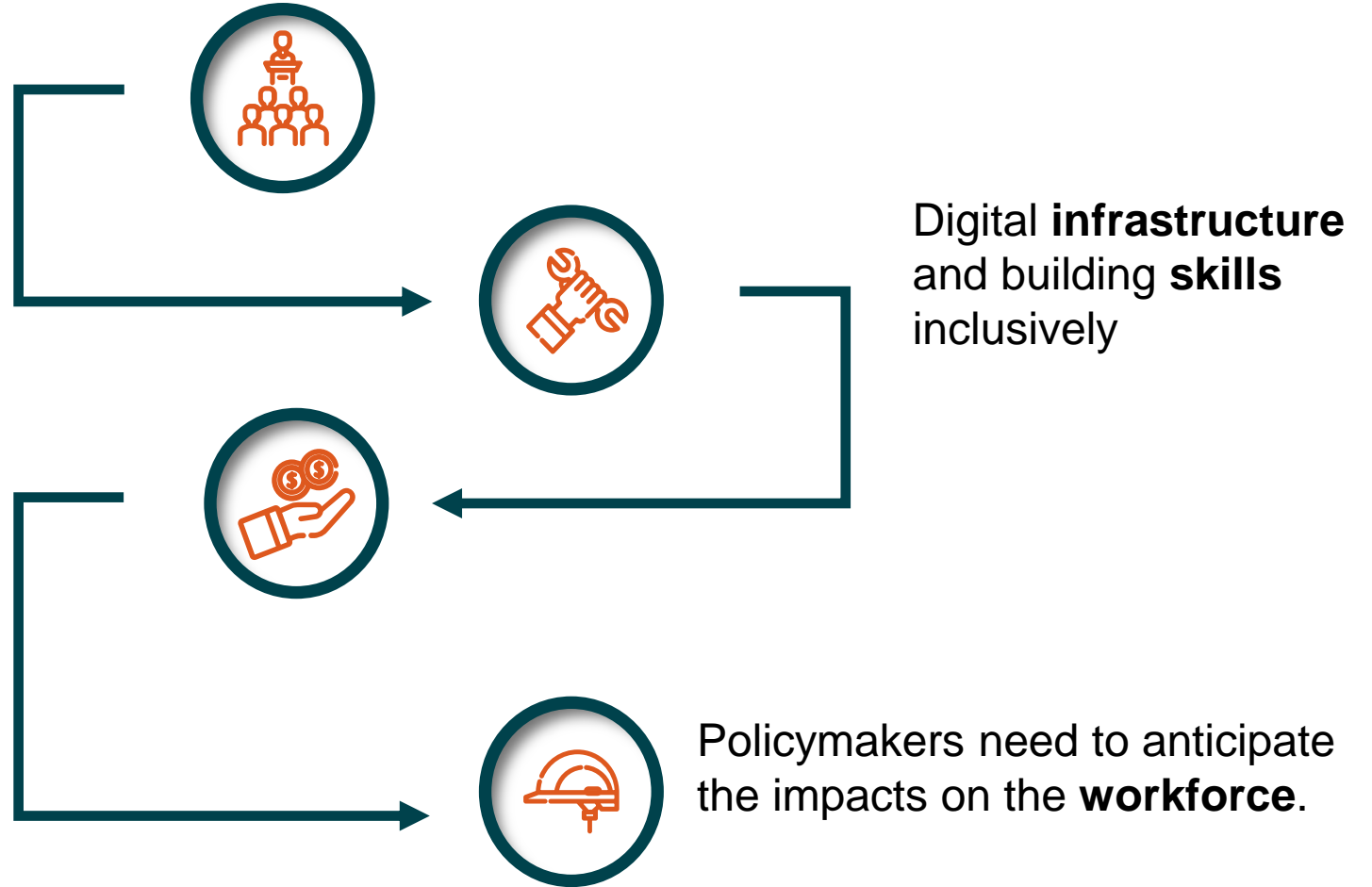
Three areas of action

- Digital transformation
- Industry 4.0
- Economic diversification

ACCELERATING TOWARDS INDUSTRY 4.0

National innovation policies need to align with industrial policies.

Domestic demand in close connection with investment in **STI capacity**





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