2025

Technology and Innovation Report

Inclusive Artificial Intelligence
for Development

UN
trade
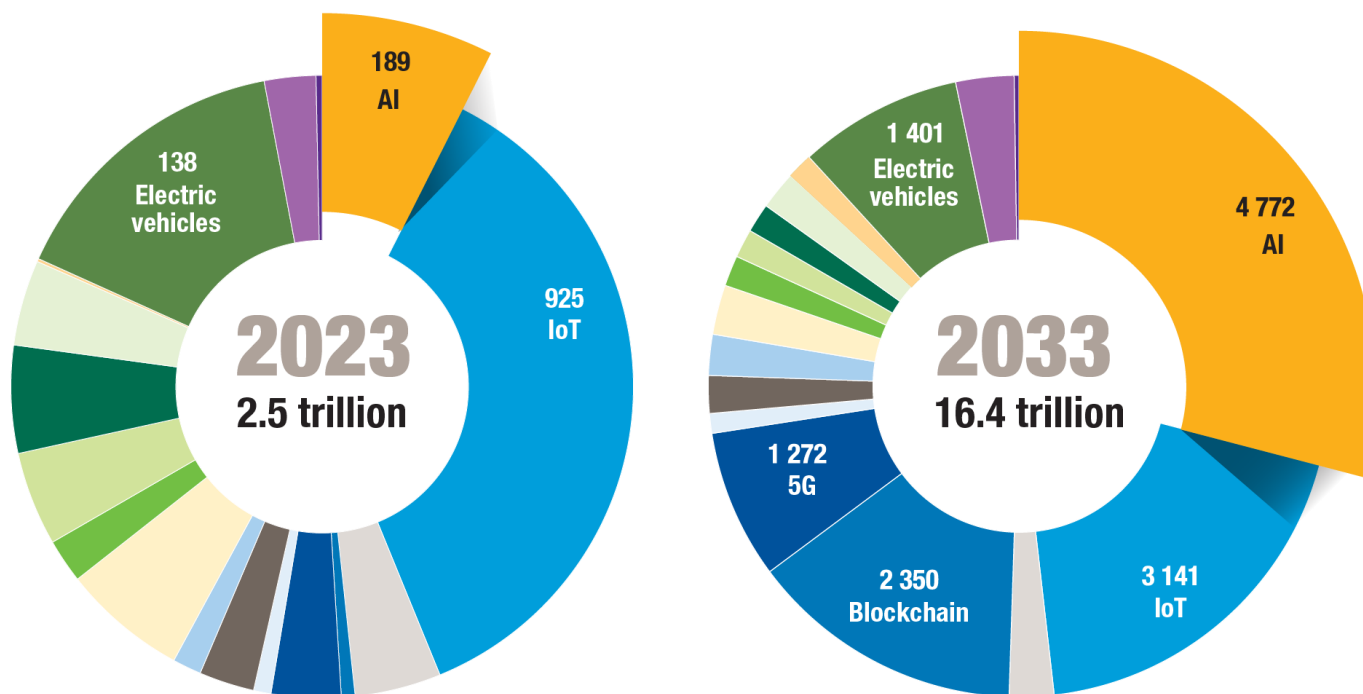& development

UNCTAD

Report structure
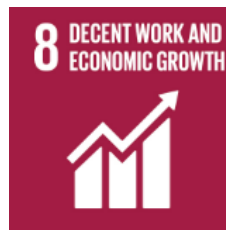
AI show high market potential and concentration

UN trade & development (UNCTAD)

Rapid expansion of frontier technologies
(Market size estimates, billions of dollars)

Legend:
- AI
- IoT
- Big data
- Blockchain technology
- 5G
- 3D Printing
- Robotics
- Drone technology
- Solar PV
- Concentrated solar power
- Biofuels
- Biogas and biomass
- Wind energy
- Green hydrogen
- Electric vehicles
- Nanotechnology
- Gene editing

2023 — 2.5 trillion
- 189 AI
- 925 IoT
- 138 Electric vehicles

2033 — 16.4 trillion
- 4 772 AI
- 3 141 IoT
- 2 350 Blockchain
- 1 272 5G
- 1 401 Electric vehicles

▶ Significant **AI divide** between countries across infrastructure, R&D investment, knowledge creation and talents

Source: UNCTAD based on various online market research reports.

Synergies among three key leverage points

Infrastructure

Algorithms to optimize the use of computational power

Data to optimize the use of infrastructure

Infrastructure to enable the operation of AI models and applications

AI

Infrastructure to support the processing and storage of complex data sets

Skills

Data to train AI models

Algorithms to extract the most from data

Data
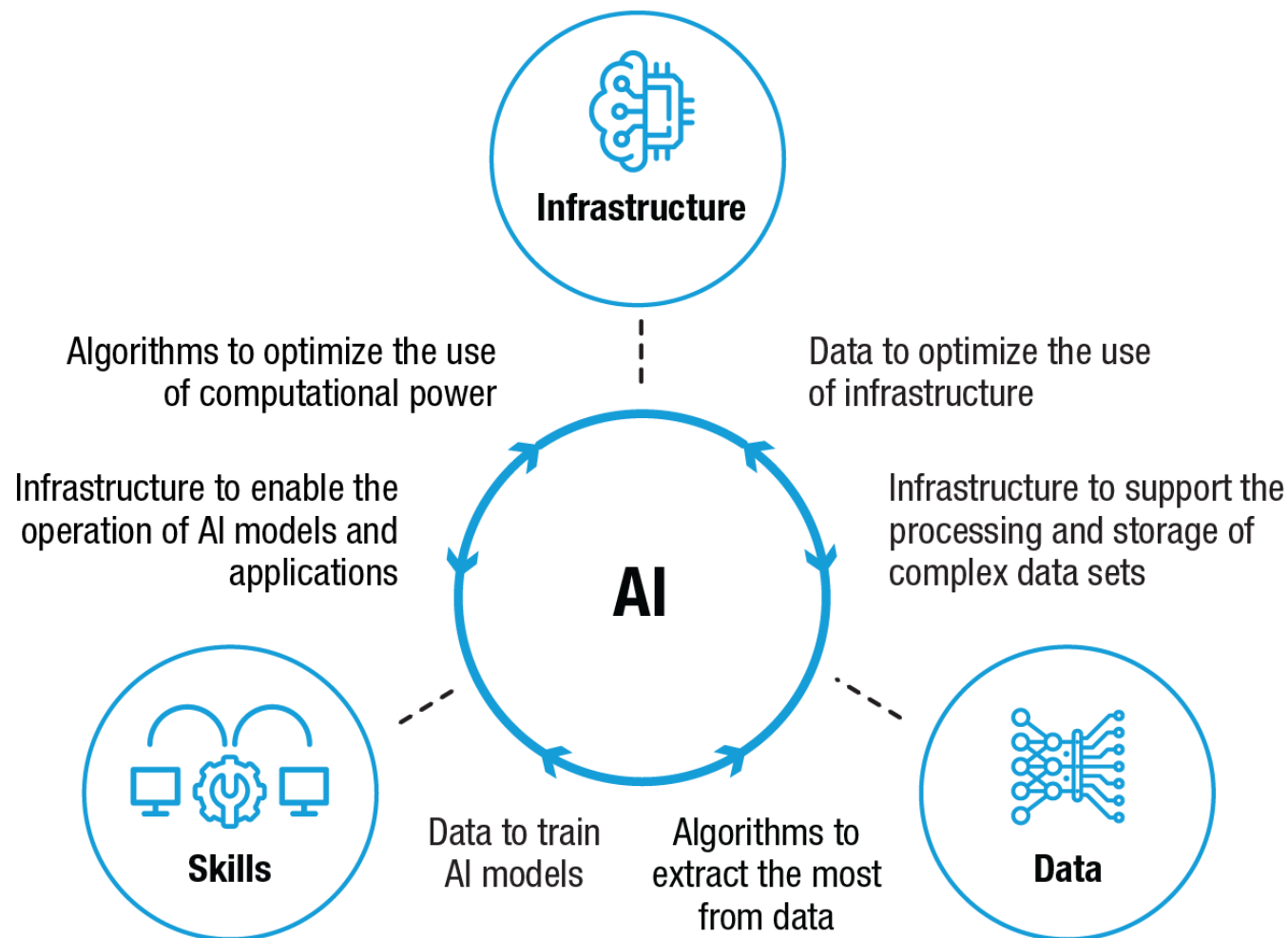
GPTs lead to new methods of production and innovation, transform industries and create new markets over decades

GPTs are characterized by:

- *Pervasiveness*
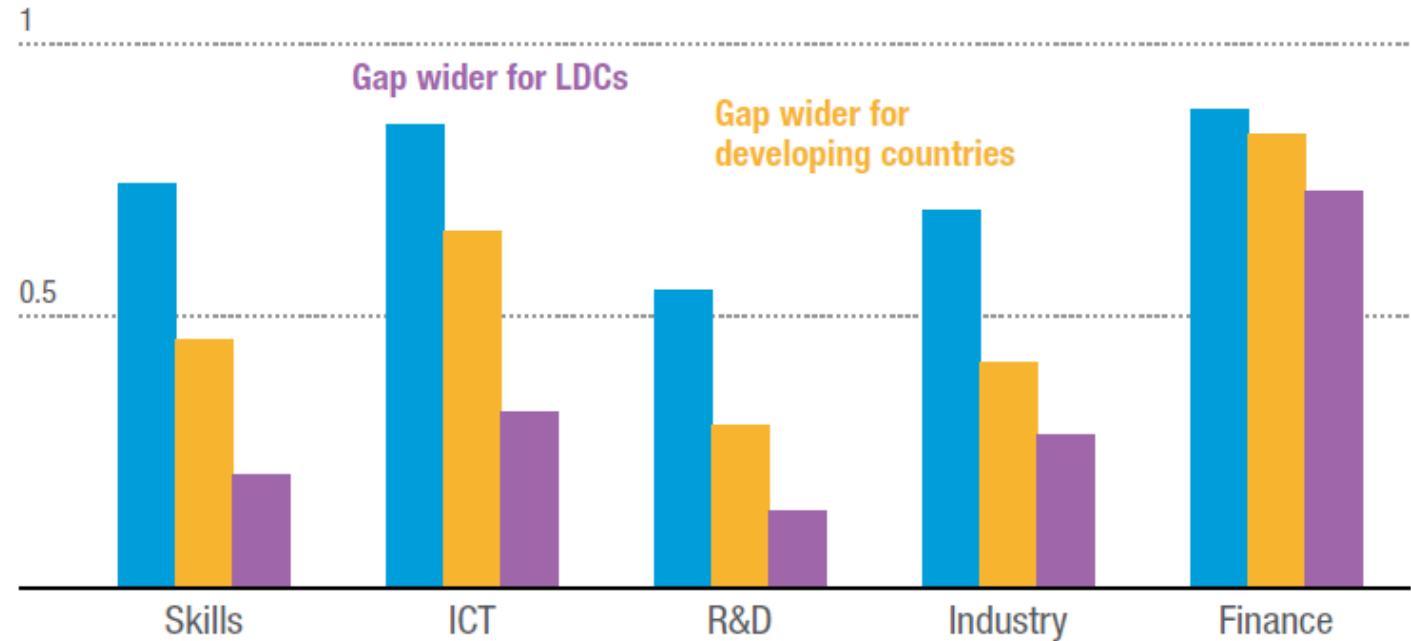- *Dynamicity*
- *Innovational complementarities*

UNCTAD frontier technologies readiness index

Some countries perform better than expected

Disparities in AI preparedness across countries

Assessing the preparedness of AI adoption and development

Country AI preparedness categorized into 4 groups according to adoption and development capacities

AI adoption capacity

Practitioners
High adoption
Low development

Leaders
High adoption
High development

Laggards
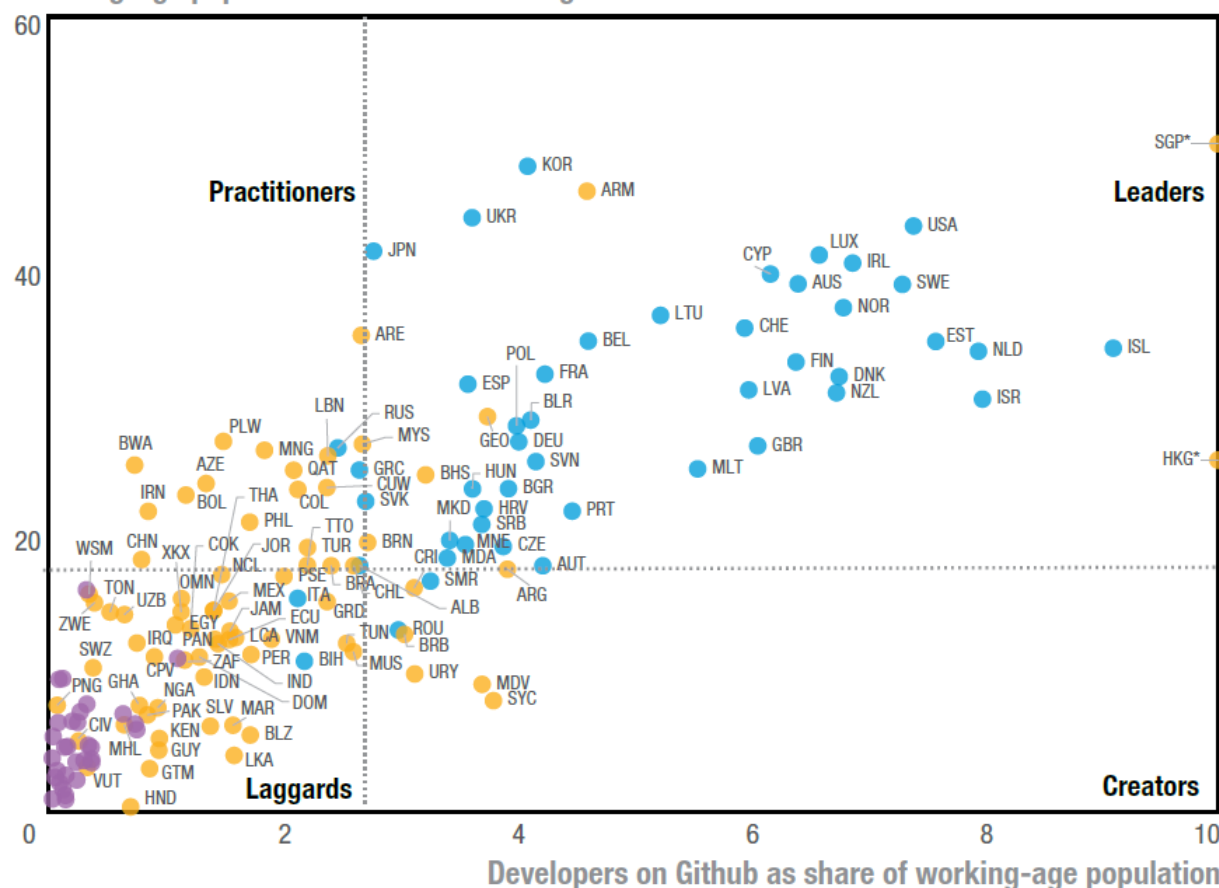Low adoption
Low development

Creators
Low adoption
High development

AI development capacity

Assessing preparedness along the 3 leverage points:
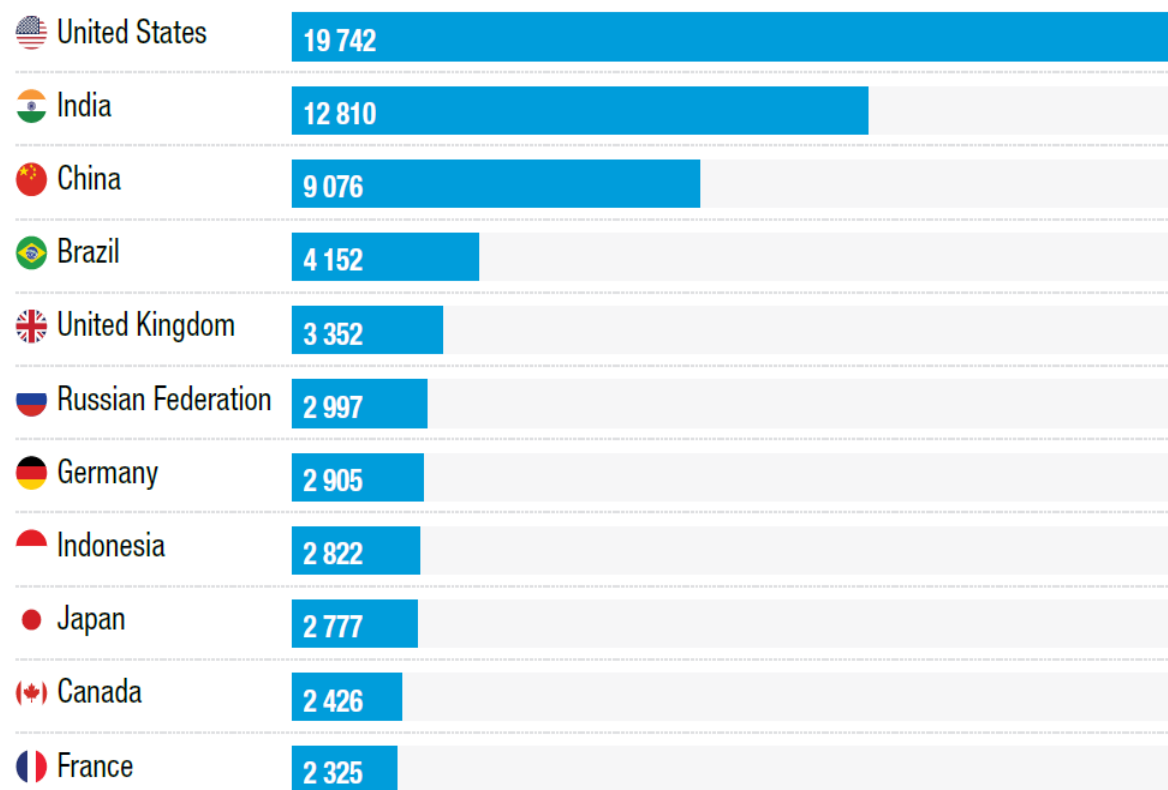
▶ **Infrastructure, Data, Skills**

Working-age population with advanced degree

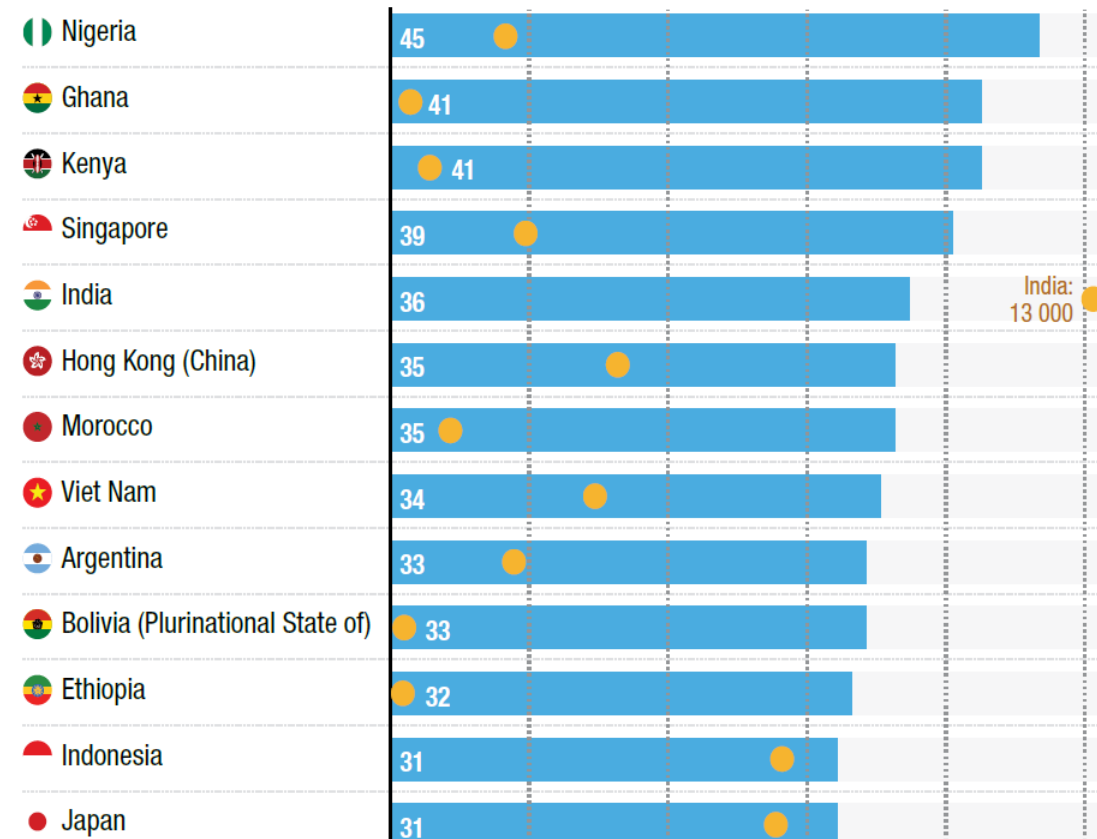Developers on Github as share of working-age population

Size and dynamics matter too

Economies with at least 2 million GitHub developers, 2023

GitHub developers (thousands)

Country	Developers
🇺🇸 United States	19 742
🇮🇳 India	12 810
🇨🇳 China	9 076
🇧🇷 Brazil	4 152
🇬🇧 United Kingdom	3 352
🇷🇺 Russian Federation	2 997
🇩🇪 Germany	2 905
🇮🇩 Indonesia	2 822
🇯🇵 Japan	2 777
🇨🇦 Canada	2 426
🇫🇷 France	2 325

## Economies with the fastest growth in number of developers

■ Growth rate, 2022–2023 (percentage)   ● Number of developers (thousands)

Country	Growth rate
🇳🇬 Nigeria	45
🇬🇭 Ghana	41
🇰🇪 Kenya	41
🇸🇬 Singapore	39
🇮🇳 India	36
🇭🇰 Hong Kong (China)	35
🇲🇦 Morocco	35
🇻🇳 Viet Nam	34
🇦🇷 Argentina	33
🇧🇴 Bolivia (Plurinational State of)	33
🇪🇹 Ethiopia	32
🇮🇩 Indonesia	31
🇯🇵 Japan	31

India: 13 000

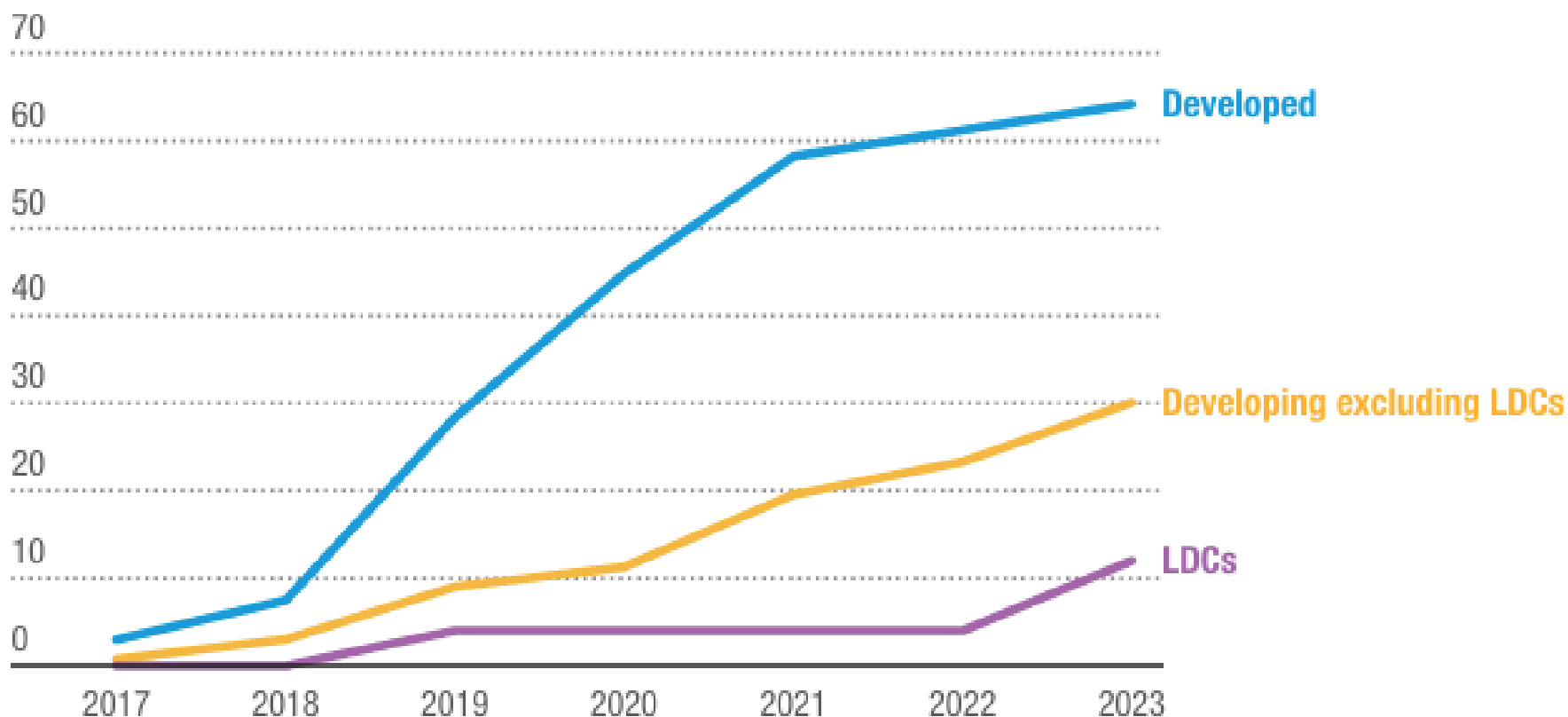# Policies at the technological frontier

The share of services exports is increasing in total world trade exports
(Percentage)
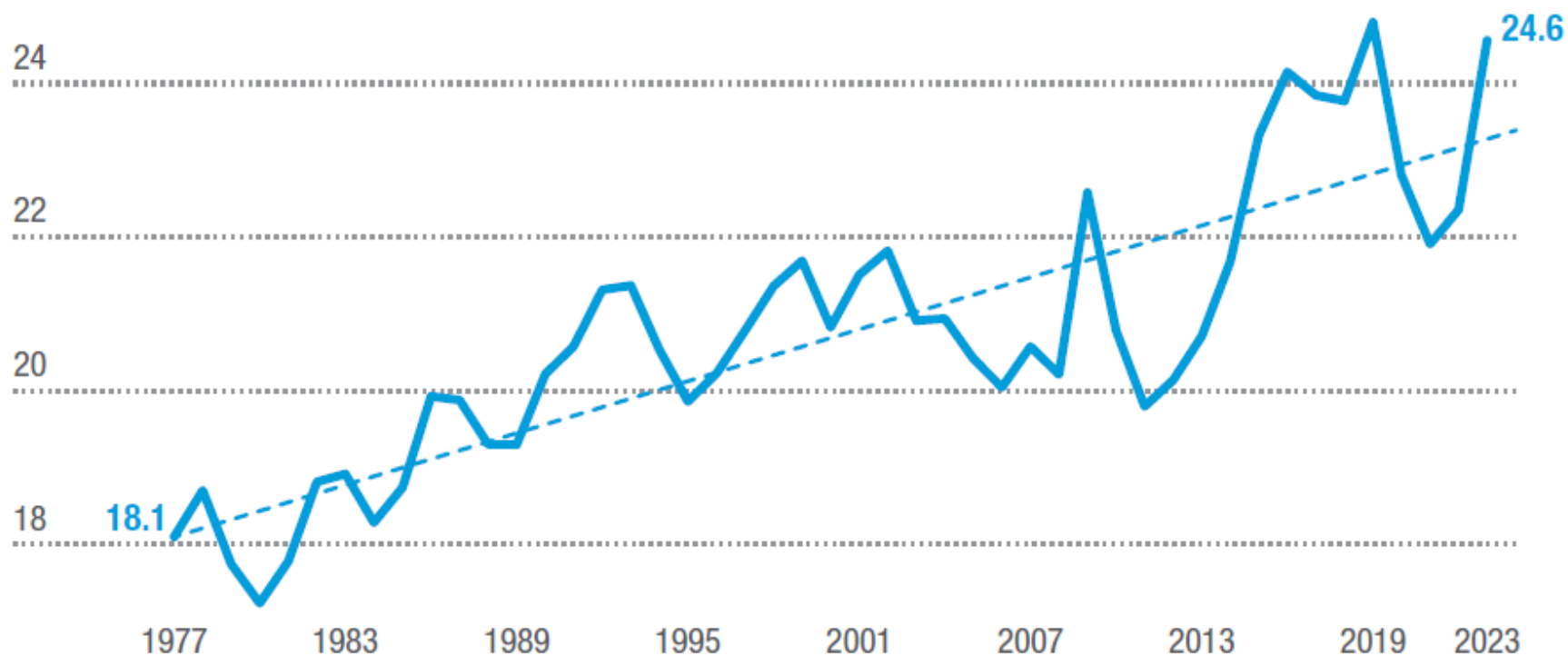
Few developing countries have national AI strategies

Cumulative share of countries with national AI strategy, by country grouping; percentage

Source: UNCTAD elaboration on data from Artificial Intelligence Index Report 2024.

Designing national policies for AI

Case studies of national policies for AI

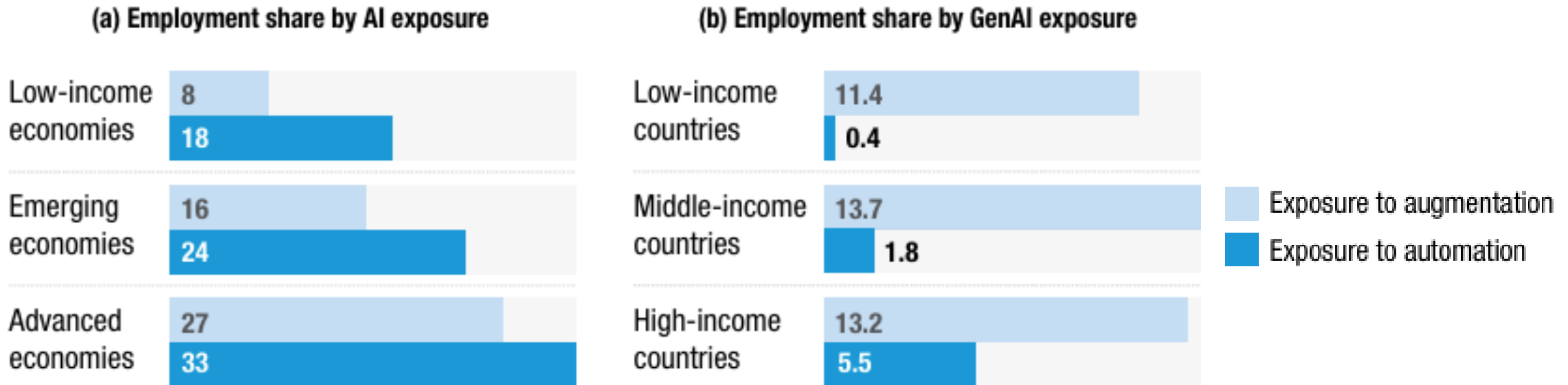|	Adoption (supporting the uptake and diffusion of AI)	Development (cultivating the capacity to generate new AI)
Overarching approaches	Measures for the Administration of Generative Artificial Intelligence Services (China) AI Act (European Union) CHIPS [Creating Helpful Incentives to Produce Semiconductors] and Science Act (United States)	
Infrastructure	Digital inclusion and connectivity (Brazil) e-Agriculture (Côte d'Ivoire)	High-performance computing infrastructure (Japan) K-Chips Act (the Republic of Korea)
Data	Data Observatory (Chile) Mobility Data Space (Germany) Ethical Guidelines for Application of AI in Biomedical Research and Healthcare (India)	Sandbox on privacy by design and by default in AI projects (Colombia) Computational data analysis provision (Singapore)
Skills	Digital Workforce Competitiveness Act (Philippines) National Plan for Digital Skills (Spain)	National Junior High School Computing Curriculum (Ghana) AI Research Scheme (Nigeria)

Session 2

This session will focus on the implication of AI for the workforce, present successful cases of AI adoption in developing countries, and propose recommendations to improve global AI governance

Developing countries have lower likelihoods of AI automation but also lower opportunities for augmentation

Employment share exposed to AI, by country grouping; percentages

(a) Employment share by AI exposure

Low-income economies	8 (augmentation) / 18 (automation)
Emerging economies	16 (augmentation) / 24 (automation)
Advanced economies	27 (augmentation) / 33 (automation)

(b) Employment share by GenAI exposure

Low-income countries	11.4 (augmentation) / 0.4 (automation)
Middle-income countries	13.7 (augmentation) / 1.8 (automation)
High-income countries	13.2 (augmentation) / 5.5 (automation)

Exposure to augmentation
Exposure to automation

AI has a significant impact on cognitive and service-related tasks

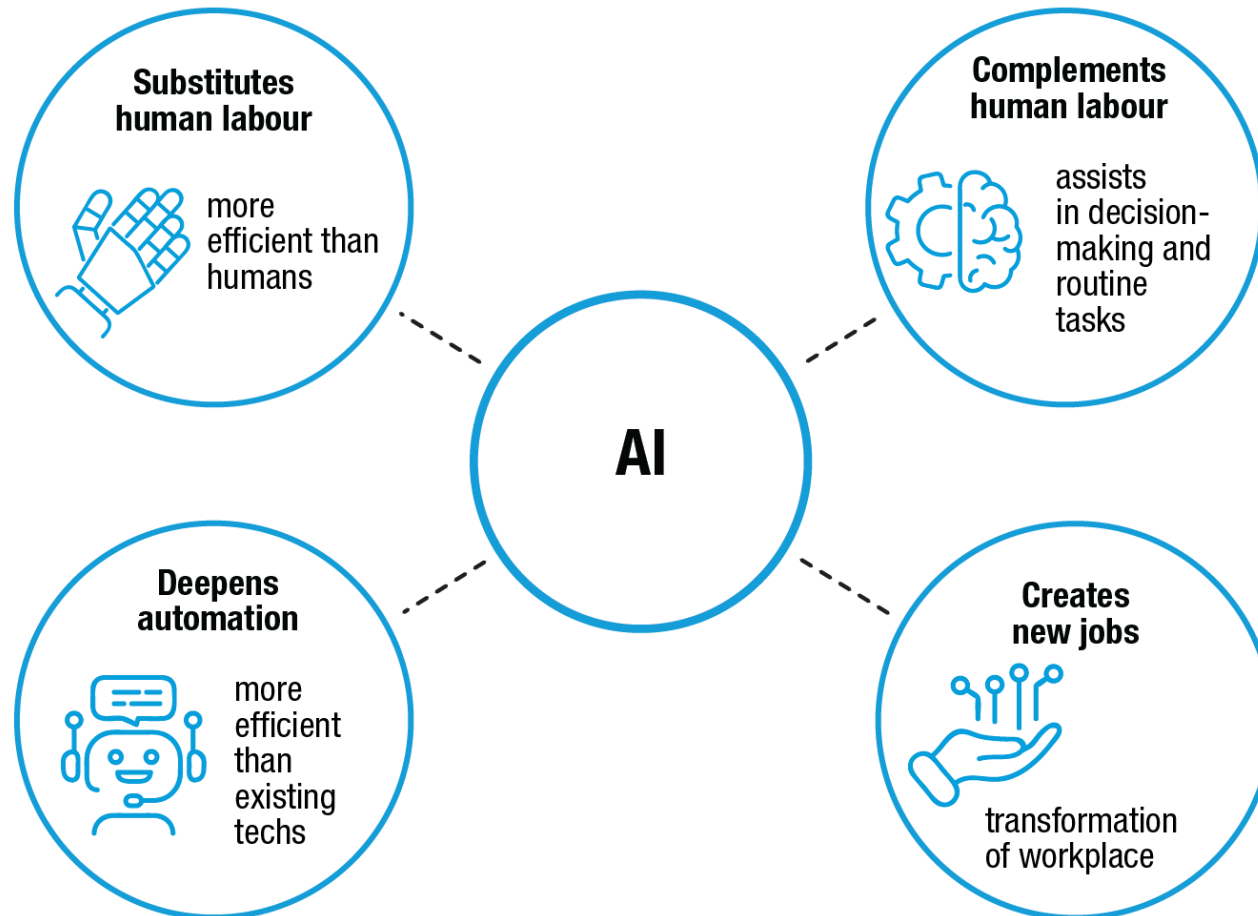## Selected micro-level studies on GenAI productivity impacts

Study	Sample	GenAI used	Identification strategy	Measurement	Impact
Brynjolfsson et al., 2023	Call centre workers in a Fortune 500 company, 2020–2021	Customized ChatGPT	Difference-in-difference	Number of resolutions per hour	14 per cent increase
Dell'Acqua et al., 2023	Consultants in leading consulting firm, 2023	ChatGPT	Experiment	Number of tasks completed in given time	12.2 per cent increase
Noy et al., 2023	Working professionals, 2022	ChatGPT	Experiment	Completion time of writing tasks	37 per cent improvement
Peng et al., 2023	Professional freelance programmers, 2022	GitHub Copilot	Experiment	Completion time of programming tasks	55.8 per cent improvement

Source: UNCTAD, based on cited sources.
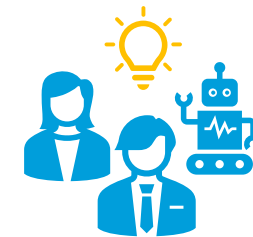
A worker-centric approach to AI adoption

Four channels through which AI impacts productivity and the workforce

- **Substitutes human labour** — more efficient than humans
- **Complements human labour** — assists in decision-making and routine tasks
- **Deepens automation** — more efficient than existing techs
- **Creates new jobs** — transformation of workplace
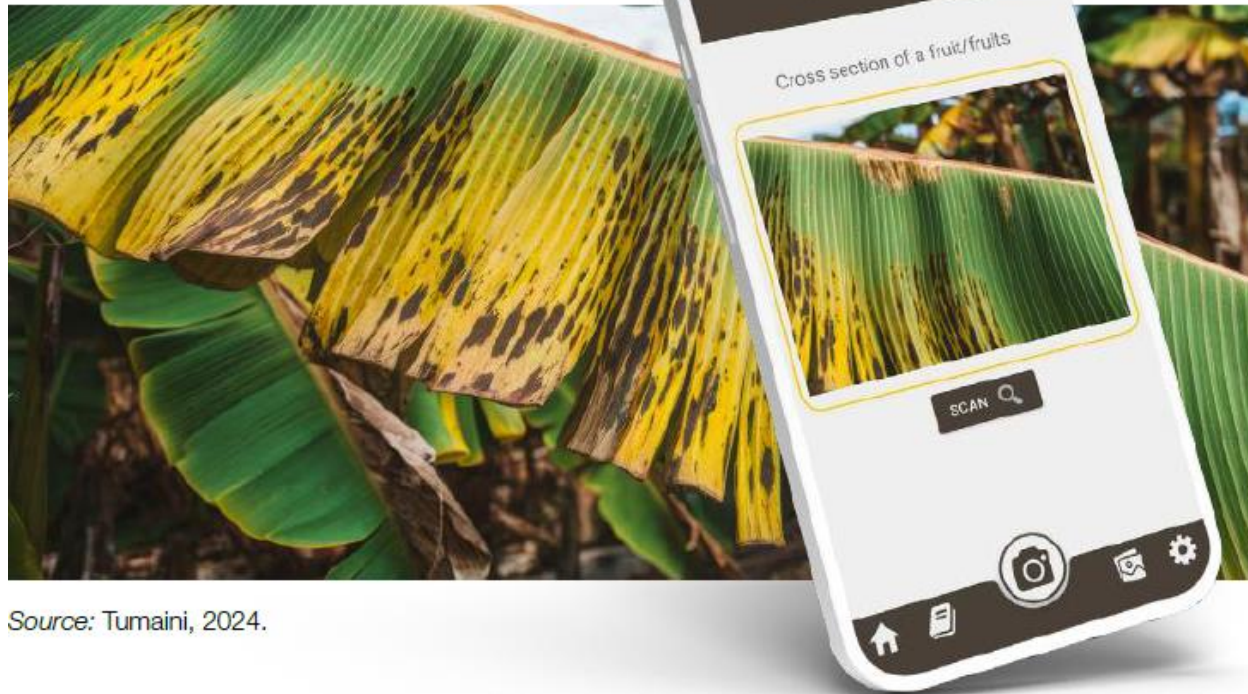
AI

Empower the workforce

Engage worker in the design and implementation of AI

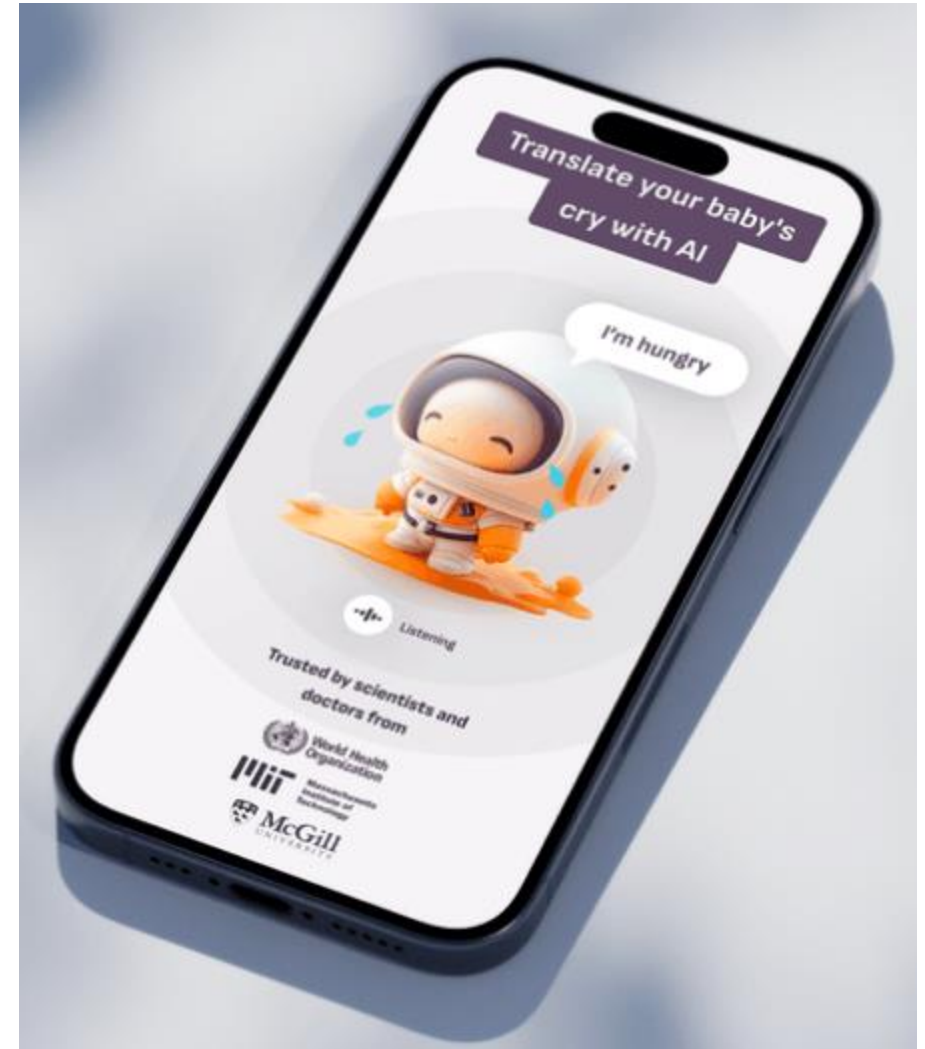Foster the development of human-centric AI solutions

Examples of AI adoption in developing countries

Diagnosing a suspected infection on banana

Source: Tumaini, 2024.

Identifying anomalies in infant cries

Key takeaways to promote AI adoption

UN trade & development | UNCTAD

Infrastructure

Redesign AI solutions around locally available digital infrastructure

Data

Utilize new sources of data combined with appropriate AI techniques

Skills

Lower the skill barriers for AI solutions with simple interfaces

Partnerships

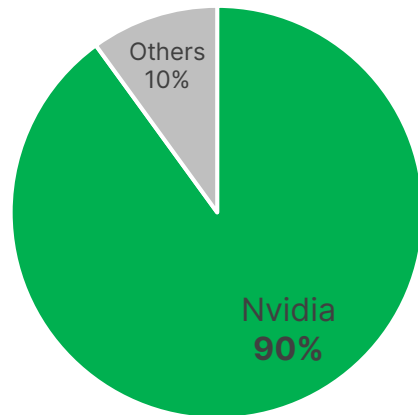Build international partnerships to access vital resources and technical capabilities

The AI divide

Strong market concentration in both AI hardware and software

Market Share in GPUs

Others
10%

Nvidia
90%

NVIDIA.

powered by

tsmc

Production of Advanced Semiconductors

Others
10%

TSMC
90%

amazon
web services

Microsoft
Azure

Google Cloud
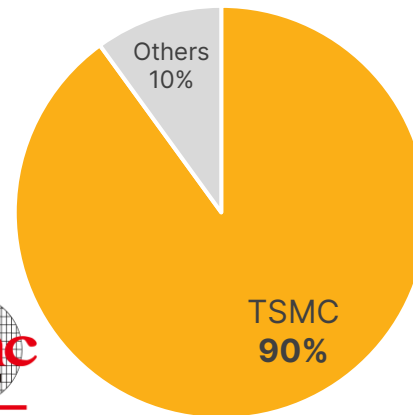
2/3 of the global cloud market

Fragmented international AI governance initiatives

International AI governance initiatives are largely driven by G7 members

Country involvement, from 0 to 7 initiatives
(Box size proportional to number of countries in each category)

118 countries, primarily in the global South, are not parties to any of the sampled initiatives or instruments

0/7
1/7
2/7
3/7
4/7
5/7
6/7
7/7
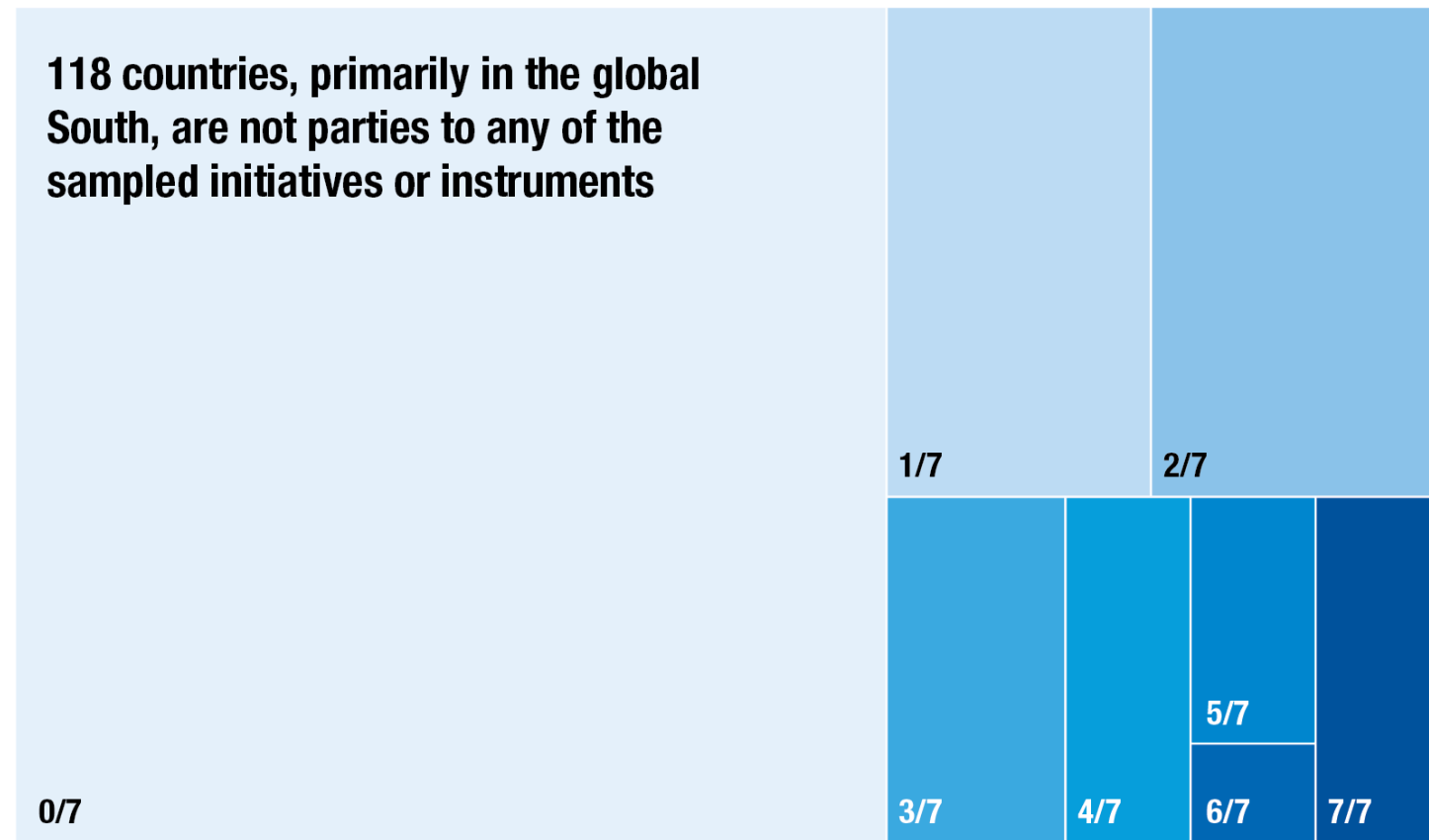
Source: UNCTAD, based on United Nations, High-Level Advisory Body on Artificial Intelligence, 2024.

Key United Nations efforts in global AI governance

Multi-stakeholder platforms
1993 · 2016 · 2017

CSTD — Commission on Science and Technology for Development (CSTD)

STI FORUM — Multistakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals (STI Forum)

AI for Good — AI for Good Global Summit

Ethical standard
2021

UNESCO

Recommendation on the Ethics of Artifitial Intelligence

Readiness Assessment Methodology

Ethical Impact Assessment

Global resolutions
2024

United Nations General Assembly Resolutions on AI:

- Steering AI towards global good
- Enhancing international cooperation on capacity-building of AI

New initiatives

Pact for the Future Commitment to new initiatives:

- Establish a multidisciplinary independent international scientific panel on AI
- Initiate a global dialogue on AI governance
- Set up a dedicated working group on data governance

Four propositions for global AI collaboration

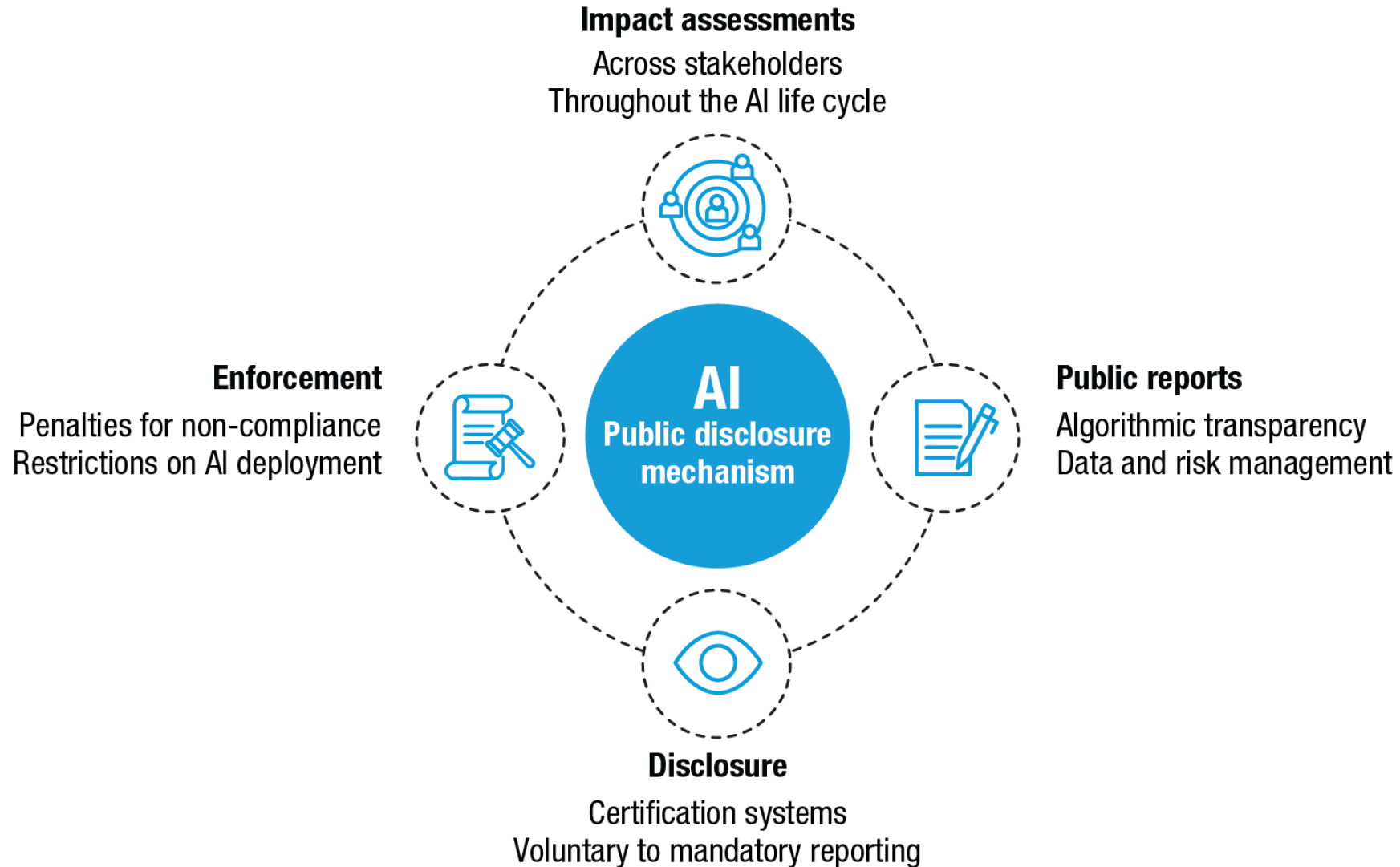**Accountability in AI Governance**
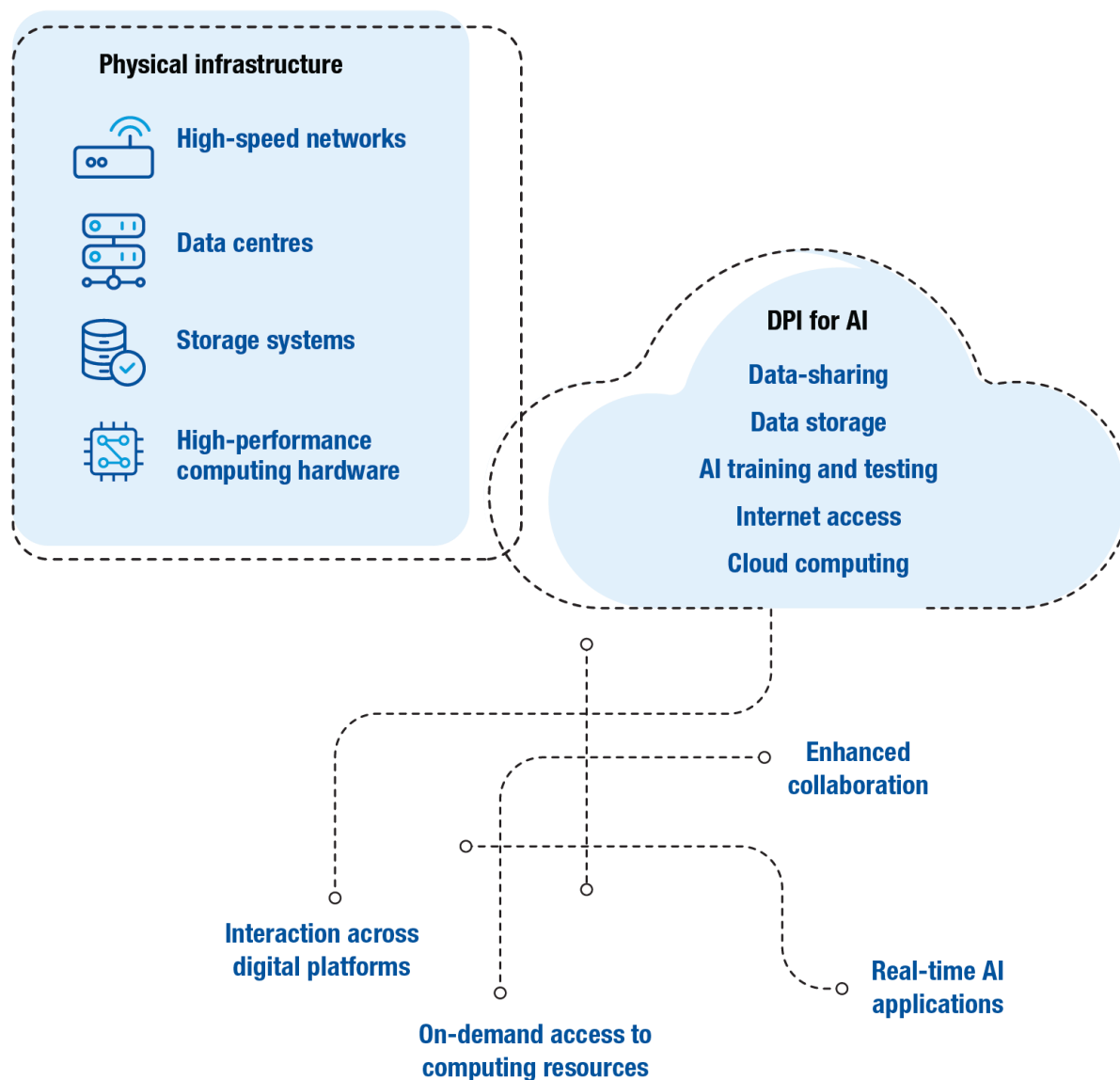
Shared Digital Infrastructure

Open Innovation

Capacity-Building Partnerships

Establishing an AI public disclosure mechanism to ensure accountability

Impact assessments

Across stakeholders
Throughout the AI life cycle

Enforcement

Penalties for non-compliance
Restrictions on AI deployment

AI
Public disclosure
mechanism

Public reports

Algorithmic transparency
Data and risk management

Disclosure

Certification systems
Voluntary to mandatory reporting

Building shared digital public infrastructure for AI

Physical infrastructure

- High-speed networks
- Data centres
- Storage systems
- High-performance computing hardware

DPI for AI

- Data-sharing
- Data storage
- AI training and testing
- Internet access
- Cloud computing

- Enhanced collaboration
- Interaction across digital platforms
- On-demand access to computing resources
- Real-time AI applications

▸ **Public-private partnerships** to accelerate the development of DPI for AI

▸ **A CERN for AI** model to provide equitable access to AI infrastructure

Promoting open innovation for AI
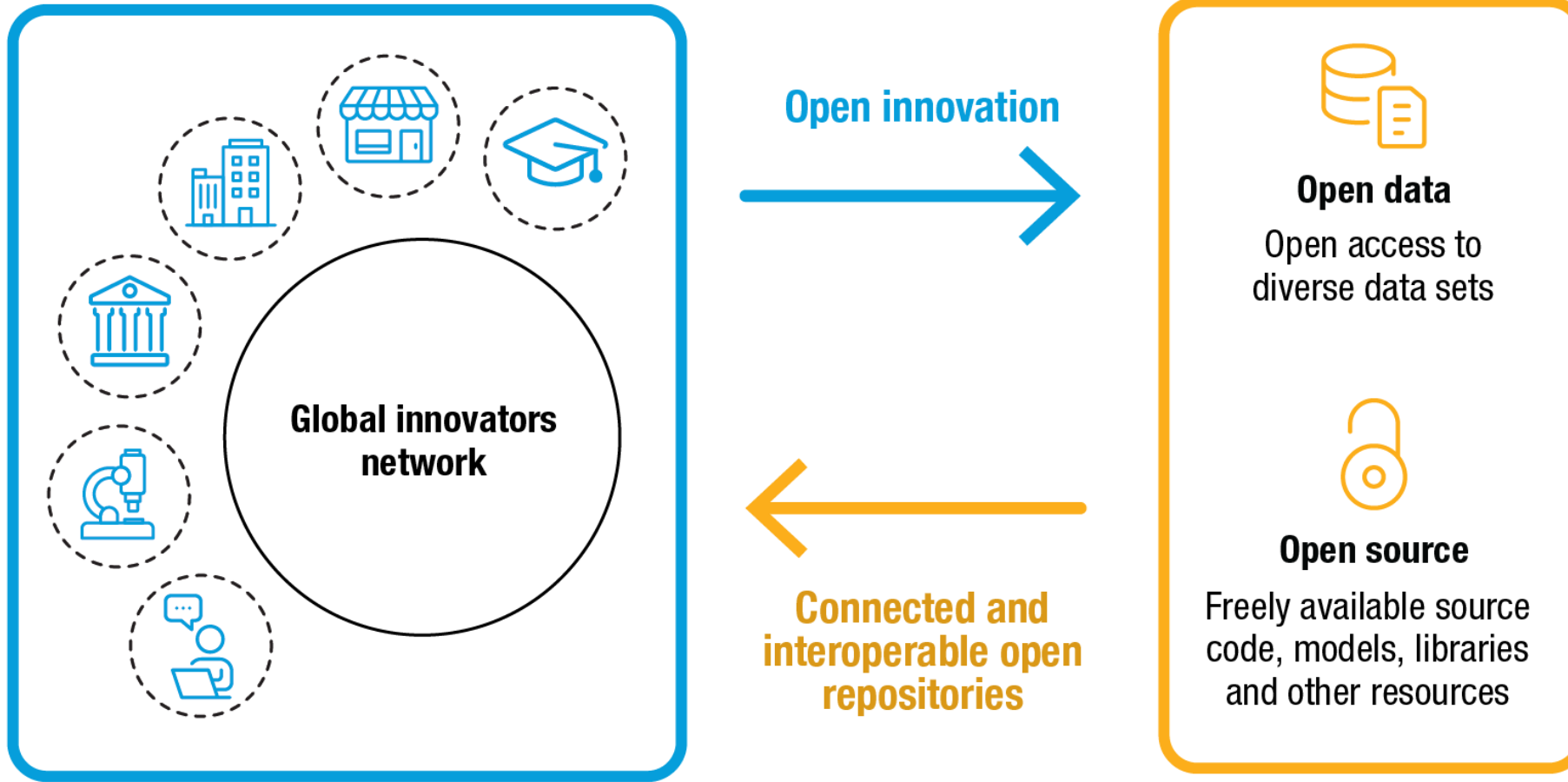
Strengthening AI capacity-building partnerships

Knowledge sharing

International dialogue, global networks of exchange

Technology transfer

Technical assistance, tailored solutions based on local needs

Capacity-building activities

Training workshops, educational programmes, AI incubators and research hubs

South–South cooperation

Regional centres of excellence for AI, thematic approach of AI partnership

Thank you

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