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4IR technology innovations in achieving the SDGs – Challenges and opportunities for the Asia-Pacific

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the SDGs : beginning of a "new knowledge civilization"

- ✓ Sustainable and inclusive development of human society and solutions to environmental problems
- ✓ Planet, People, Prosperity, Peace, Partnership: 5Ps
- ✓ Integrated efforts in social system reform, industrial structural reform, and scientific and technological innovation
- ✓ Proactive activities by people who share common human values
- ✓ Respect for national and regional history and culture

a compass for social, economic, and scientific change as a new norm across the globe

Challenges the world faces

Solving environmental problems: climate change, natural disasters, ecosystem destruction

Infectious disease pandemic preparedness : COVID-19 and other infectious diseases

Overcoming international conflicts : peace

Economic growth and economic security : GDP, energy, resources, food, water

Human security: poverty eradication, food security, health, education, equity, gender equality

STI for overcoming challenges

Digital transformation(DX) : Reforming social and economic systems through AI and IoT

Human resource development: digital human resources, startup human resources

Effective finance: ODA, blended finance, crowdfunding

Global partnership: STI ecosystem with STI for SDGs roadmaps

Progress and challenges of STI for SDGs (1)

Climate Change and Energy

- ✓ The commitment of major countries to achieve carbon neutrality with the goal of a climate rise of 1.5°C or less by around 2050 in response to the Paris Agreement has been encouraged by the past progress and future potential of STI regarding low-cost renewable energy, high-performance battery, hydrogen energy, and energy conservation.
- ✓ As highlighted in the IPCC's 6th Assessment Report, negative emissions by carbon dioxide removal (CDR) technologies are considered essential, which is an extremely high technical and cost challenge.

Public Health and Social Systems

- ✓ An effective vaccine development against COVID-19 in a short time puts the brakes on the pandemic expansion.
- ✓ Open science and open data have been accelerated in scientific community to tackle with COVID-19.
- ✓ Teleconferencing has taken root and has demonstrated its power in a variety of fields, including education, healthcare, economics, and other fields.

Progress and challenges of STI for SDGs (2)

Digital Transformation (DX)

- ✓ With advances in AI and IoT technologies, DX has been taken up as a priority theme across the SDG 17 goals in each country. To this end, human resource development, telecommunications infrastructure investment, and data utilization have been considered.
- ✓ The United Nations has also promoted the Secretary-General‘s Digital Partnership Program. Global Digital Compact is expected to strengthen global collaboration in DX.

Future Outlook

- ✓ A global ecosystem is expected to be developed under the "Partnership in Action on STI for SDG Roadmaps.“
- ✓ UN and national government support, especially in human resource development, technology transfer, intermediary functions, and financing, is important

Examples of Emerging Technologies

- knowledge creation and knowledge synthesis -

Digital technology

- Cyber-physical-system (CPS)
- AI, IoT
- Data Science/Modeling
- 5G/post 5G
- Quantum communication
- Quantum computing
- Soft robotics
- Blockchains
- Metaverse

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Biotechnology

- Genome editing, synthetic biology
- Single-cell/whole body analysis
- Gene and cell therapy
- Brain and neuroscience
- Covid-19 vaccines, therapeutics
- Microflora
- Plant-derived materials

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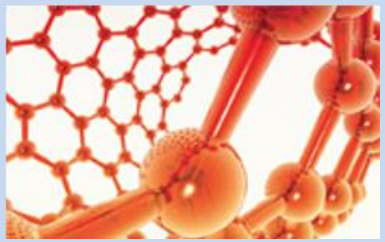
Nano/quantum technology

- IoT/AI chips
- Wearable devices
- SiC/GaN power electronics
- Scarce resource alternative tech
- New catalysts, porous materials
- Quantum devices



Environment and Energy

- Highly efficient renewable energy
- All solid-state battery
- Hydrogen generation, transport and storage
- CO_2 capture, storage, utilization (CCSU)
- Earth system model
- Degradable plastics

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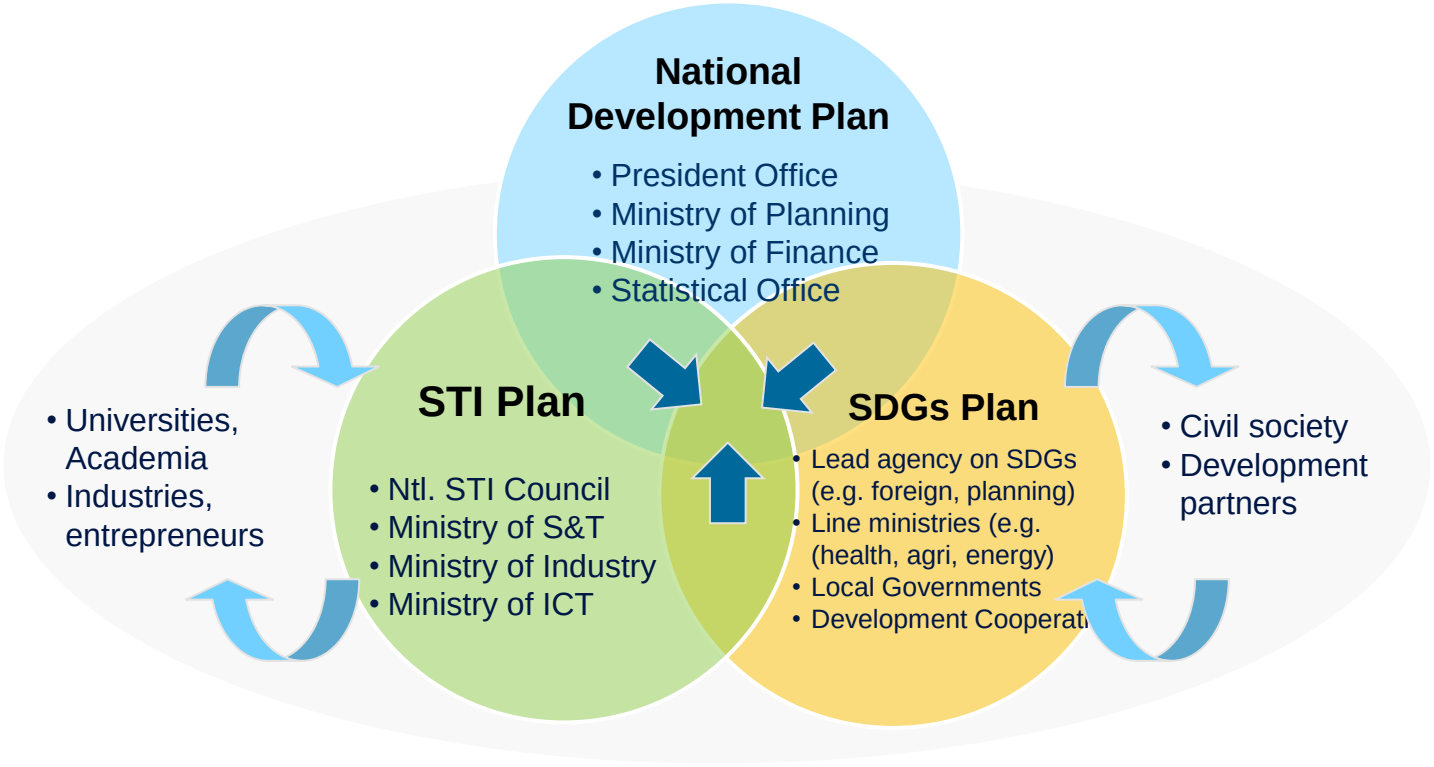
Digital convergence

- Power system stabilization tech
- Advanced ITS
- Disaster prevention/mitigation system
- Security system
- Material informatics
- IoBMT for precision medicine
- AI drug discovery/molecule prediction
- Human-robot symbiosis system
- Smart manufacturing
- Smart Agriculture
- Plant factory
- Data driven decision making system
- Future foresight and scenarios for the STI for SDGs

Source: JST CRDS “Panoramic View of the System and Information Science and Technology 2021”

UN Guidebook for the Preparation of Science, Technology and Innovation for SDGs Roadmaps

Intersection of Development, STI and SDG Plans and Key Actors

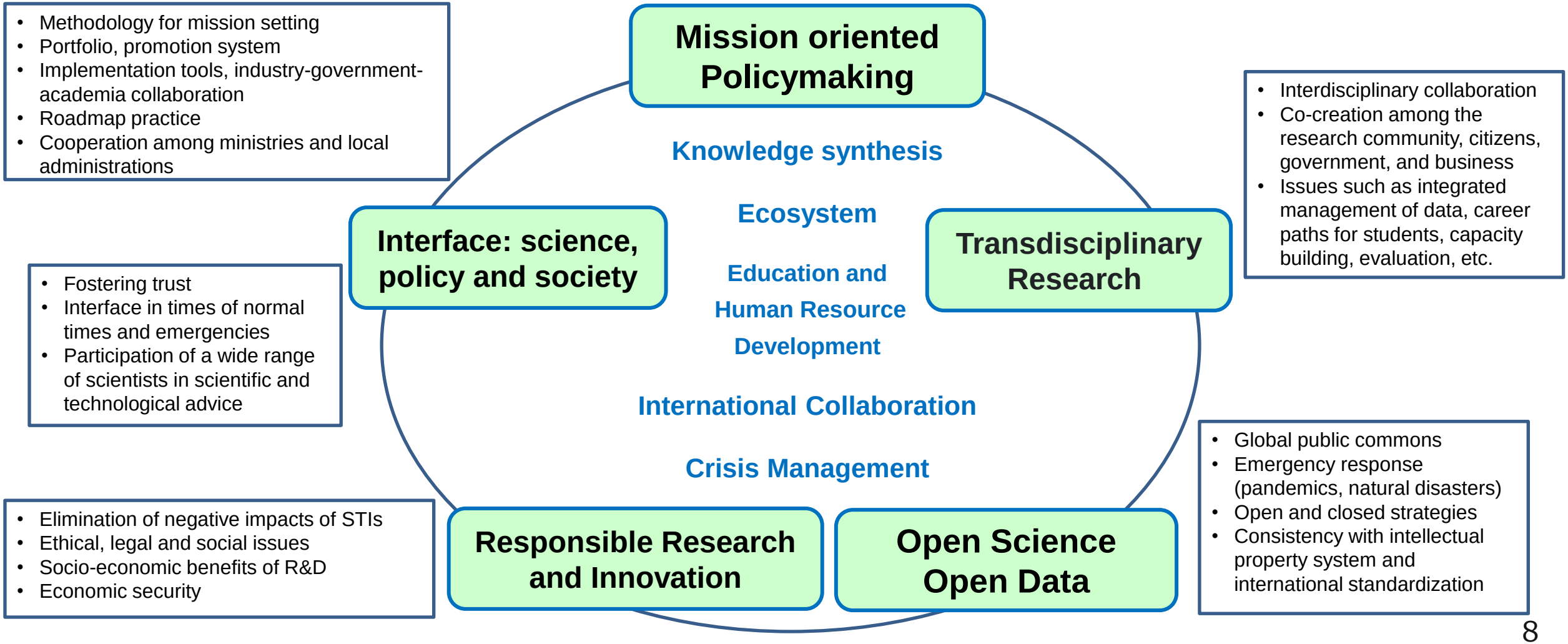


Process flow of six key steps in the development of STI for SDGs roadmaps

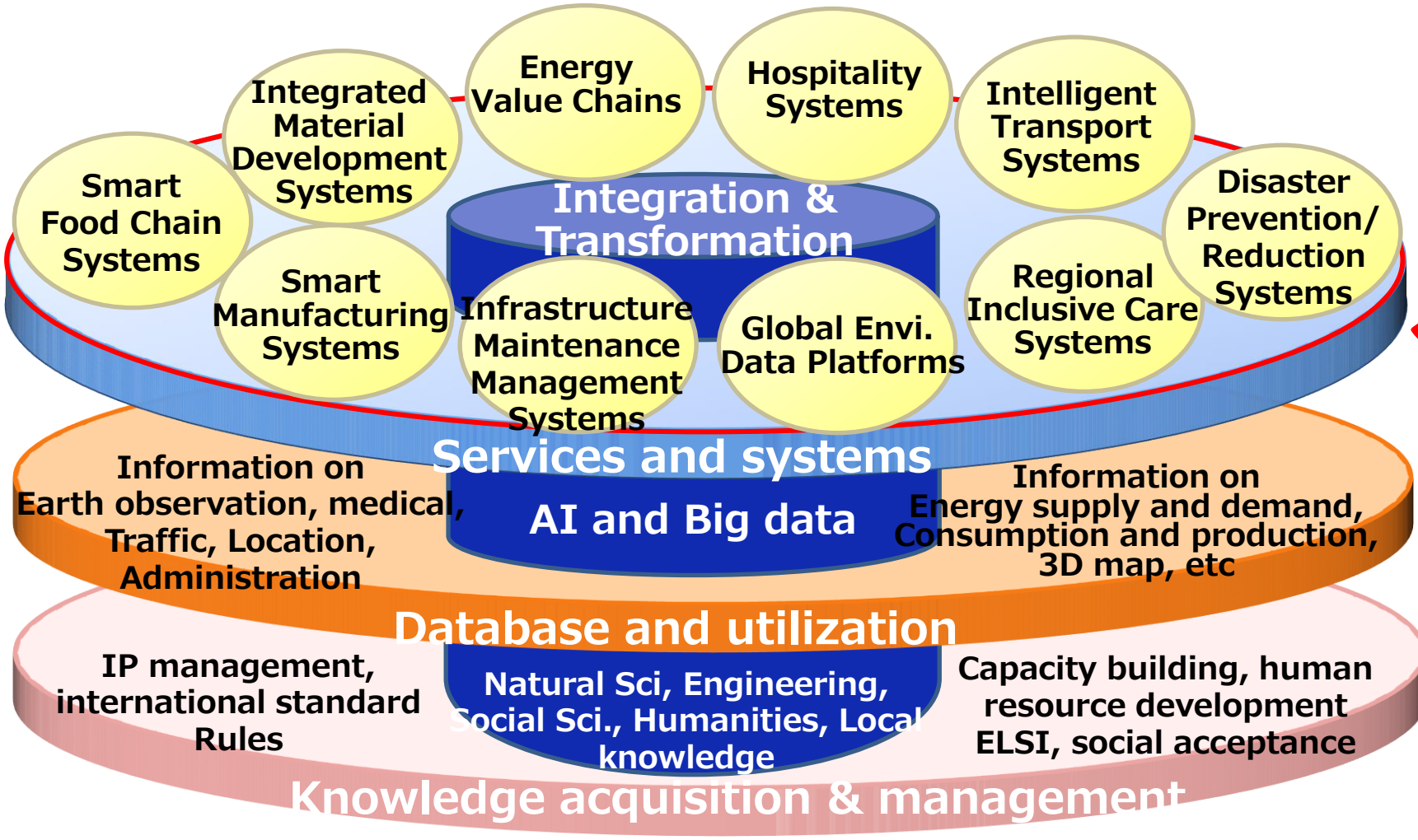
SOURCE: UN Guidebook for the Preparation of STI for SDGs Roadmaps

STI systems after Covid-19 pandemic

- ✓ SDGs drive paradigm change in STI systems and norms (SDGs for STI)
- ✓ Problem solving, risk mitigation, contingency planning, equity, inclusiveness
- ✓ Capacity building at individual and collective levels, diversity



Framework for “STI for Society 5.0 and SDGs



Values / solutions for Sustainable society

Fundamental technologies / data

Interdisciplinary collaboration

Local - National –Regional - Global

Source: Dr. Kazuo Kyuma, Former member of Council for Science, Technology and Innovation (CSTI), Cabinet office: https://www8.cao.go.jp/cstp/tyousakai/juyoukadai/infra_fukkou/12kai/sanko2.pdf ,modified by JST

Vision for a Digital Garden City Nation

The vision of the Government of Japan for achieving Rural-Urban Digital Integration and Transformation

- ✓ Realizing convenient and attractive rural environments while maintaining their prosperity
- ✓ Revitalizing Japan through the bottom-up growth emanating from such areas

Four Key Initiatives:

1. Building digital infrastructure
2. Developing and securing human resources with digital skills
3. Implementing digital services to solve rural issues
4. Initiatives to leave no one behind

Source: KIZUNA, the official magazine of the Government of Japan
https://www.japan.go.jp/kizuna/_userdata/pdf/2022/spring2022/vision_for_a_digital_garden_city_nation.pdf

International Cooperation in "STI for SDGs" in Asia and Pacific

Concerted actions in both global communities and a variety of disciplines for

"Global Common Challenges"

Environment/Energy, Bioresources, Disaster Prevention & Mitigation, and Infectious Diseases Control etc.

ODA ⟷ Equal Footing

Social Implementation

S&T Research

Capacity Building

SATREPS
Science and Technology Research Partnership for Sustainable Development Program
https://www.jst.go.jp/global/english/
JICA JST AMED

NEDO
International Demonstration Project on Japan's Energy Efficiency Technologies
https://www.nedo.go.jp/english/activities/activities_AT1_00175.html

e-ASIA JRP
The e-ASIA Joint Research Program
https://www.the-easia.org/jrp/
JST AMED + Funders in Asia/Pacific

AUN/SEED-Net JICA
https://seed-net.org/

JST SAKURA SCIENCE Exchange Program
https://ssp.jst.go.jp/en/outline/detail/

In conclusion

- ✓ Pursue the universal values (5Ps) set forth in the SDGs
- ✓ Overcome COVID-19 pandemic and international conflicts and build back better
- ✓ Accelerate socio-economic transformation through the development of emerging technologies, utilization of existing technologies, technology transfer, and diffusion
- ✓ Reform the STI international partnership system
- ✓ Invest in human resources development

⇒ Leave no one behind

Thank you for your attention.