Overview of the Outcomes from

e-ASIA JRP International Workshop on Intelligent Infrastructure for Water

Session 1: Intelligent Infrastructure for Climate Change Adaptation

Shinjiro Kanae
Tokyo Institute of Technology
and
Dao Trong Tu
Vietnam Commission on Irrigation and Drainage
IWRP Office, Hanoi, Vietnam

Towards Multilateral Collaboration on Session 1

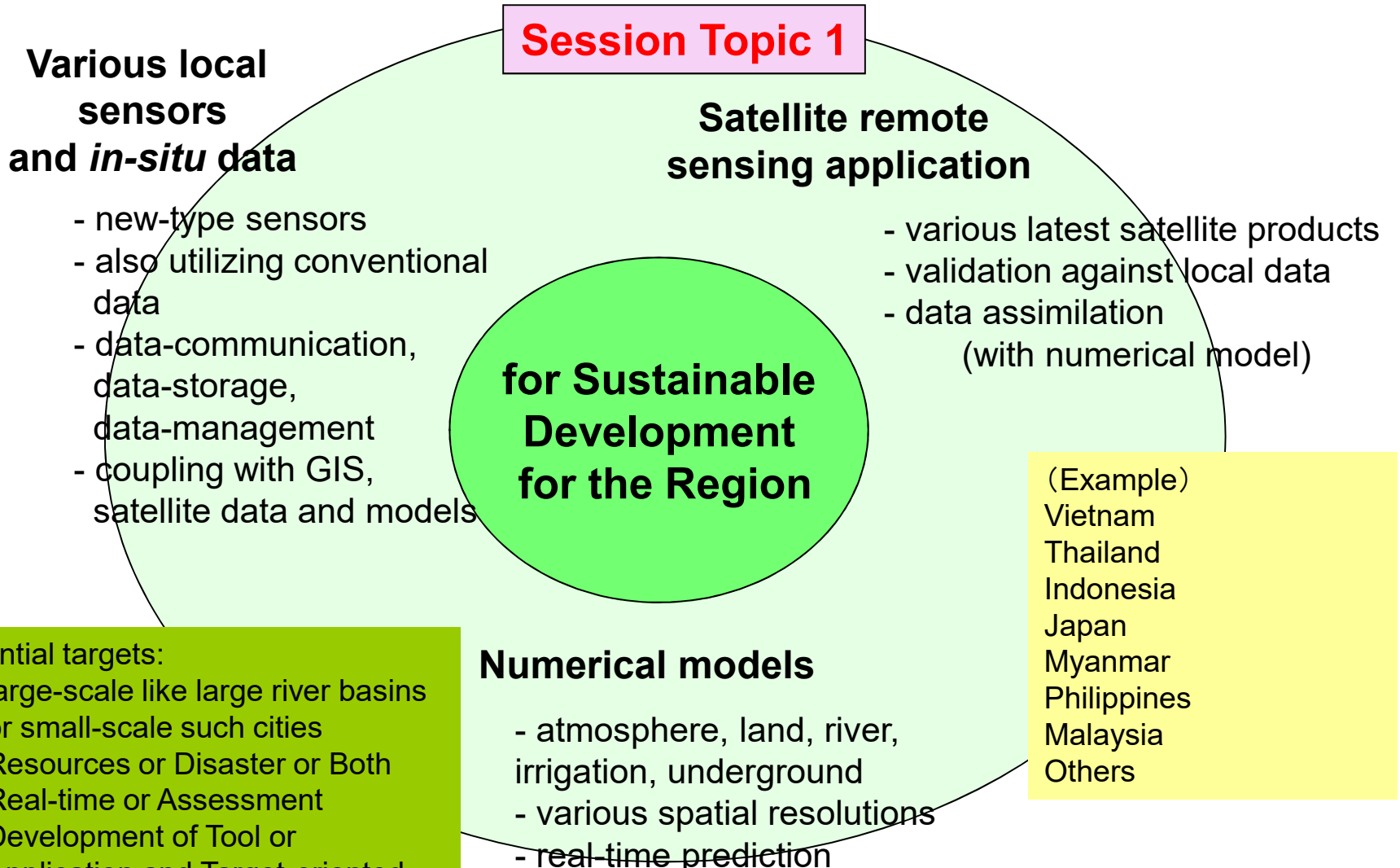
- Climate Change Adaptation including the adaptation to socio-economic changes (and possibly with earthquakes).

- Use of massive data (potentially):
  - satellite remote sensing
  - in-situ data
  - various local sensors:
    surface and underground
  - Data management system: ITC

- Numerical models: atmosphere, river, land, irrigation, underground, …. Also, real-time simulation/prediction, and impact assessment.

- Linkage from quantity to quality.
  Linkages from water resources to agriculture.

Prospective Players in the Research Field



Potential targets:

- large-scale like large river basins or small-scale such cities
- Resources or Disaster or Both
- Real-time or Assessment
- Development of Tool or Application and Target-oriented
- Linkage to other two sessions.

（Example）
Vietnam
Thailand
Indonesia
Japan
Myanmar
Philippines
Malaysia
Others

Proposed Research Themes and Partners (1)
(Session 1)

Proposed Theme:

Intelligent Infrastructure toward better water management under climate change and socio-economic change with the fusion of various sensor data, GIS, and models of hydrology and water resources

Prospective Partners:

- Country A: Vietnam
- Country B: Japan
- Country C: Philippines
- Although A, B, C are in the session today, Any country is possible to join this theme.

Proposed Research Themes and Partners (2)
(Session 1)

- ✓ Intelligent Water Infrastructure for mega cities (surface water, reservoir, groundwater, rainfall information for disaster mitigation)
- ✓ Intelligent Infrastructure for mega irrigation areas (surface water, reservoir, groundwater, rainfall information, sea level rise impact)
- ✓ Climate change impact assessment by fully utilizing various data and model
- ✓ Tool development for the above purposes (how to fully gather, manage and utilize various sensor data; how to combine with models; model development)
- ✓ Linkage of fusion with other two sessions

What can be expected from e-ASIA JRP Collaboration in Session 1

- Intelligent Water Infrastructure for heavily populated mega cities in warm-humid climate, in Asian geology
  - Many common problems to be solved
  - Economy is inter-linked
  - Not only mega cities, but also paddy rice field

- Better international water management for peace
  - Peace is UNESCO's top priority
  - Do you know IHP (Intergovernmental Hydrological Panel) under UNESCO, which is one of only three panels directly under UNESCO?
- As for climate change, we have common climate change phenomena (very heavy rainfall, tropical cyclone, Asian monsoon, ENSO, mountain climate); we need information exchange to have a comprehensive view.
- Contribute to SDGs

Anything Else

- Research Topic and Technology
  - Nature-based solution.
  - Groundwater – surface water interaction research.
  - Sea water intrusion research.
  - Portable water-isotope analysis and measurement. Any new generation sensors; not expensive, portable.
  - For GIS database, we need more data! Without data, software is just an empty box. Creating data by ourselves (particularly for cities in Asia) is important.
  - Develop an integrated system (observation -> optimization -> prediction ->); Seamless integrated observation/prediction tool.
  - Online flood inundation depth measurement.

- Concept and Approach
  - Now time to move to real time water management/monitoring/forecast system.
  - Holistic approach (including social system, human behavior), not only technology.
  - Multi-scale approach (horizontal, temporal, technical, different stakeholders, etc.)

Overview of the Outcomes from

e-ASIA JRP International Workshop on Intelligent Infrastructure for Water

Session 2: Smart/Intelligent Water Infrastructure

for Water Quality and Environment

February 21 and 22, 2019

Chairs: Prof. Hiroyuki Katayama, University of Tokyo
and
Prof. Nguyen Van Tuan, MARD

IWRP Office, Hanoi, Vietnam

Towards Multilateral Collaboration on Session 2

- Sensing devices for water treatment
- Rapid detection of water quality
- Saving energy Wastewater treatment
- Pumping/Valve control for NRW reduction
- Dam safety and disaster mitigation
- Groundwater management

Social needs to the new infra era

Water is cheap

Cheaper than cost of transporting by truck

How to add value?

- Access to useful tools
  - Sensing device
  - Telecommunication system
- Big data and AI
- Renovation of infrastructure
  - 40 years since high economic growth in developed countries
  - Need some excuse for high pricing
- New expansion in developing countries

Implementable Social Infrastructure

Examples

Japan and Developed countries

Shrinking society

- Unused distribution pipeline
- Movement toward compact city
- Detection of emergency in user's daily life

Developing countries

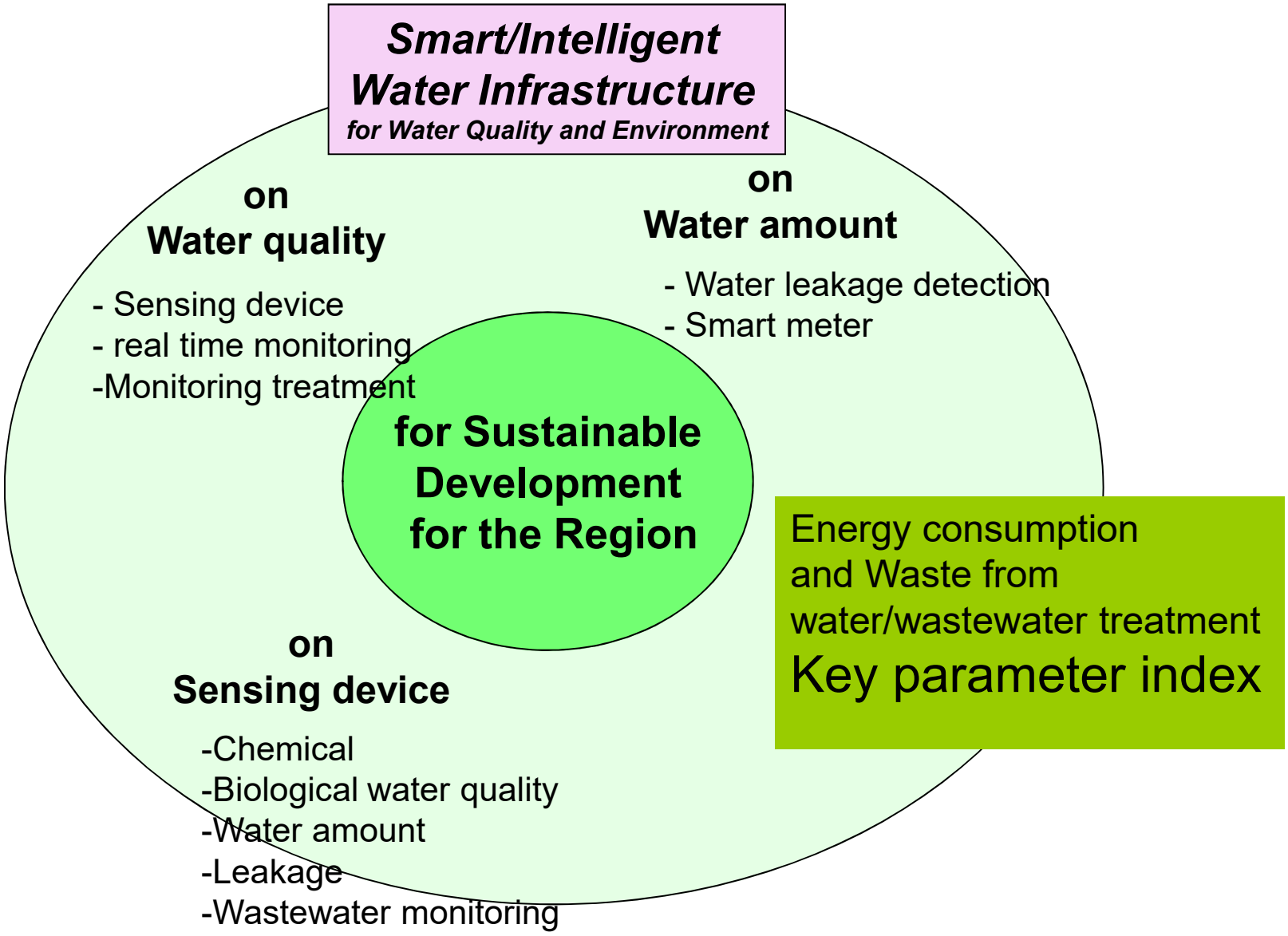
Expanding society

- Shortage of water
- Sensing water quality
  Drinkable sign
- Pricing by time zone

Water leakage

- Sensing distribution pipeline
- Digital elevation mapping
- Pipeline information

Prospective Players in the Research Field



Proposed Research Themes and Partners (1)
(Session 2)

Proposed Themes:

Decentralized wastewater treatment technology
Supported by challenging sensing devices

Prospective Partners:

- **Country Philippines**
- **Country Vietnam**
- **Country Japan**

Other countries are also welcome

Proposed Research Themes and Partners (2)
(Session 2)

Please try to identify / propose a few potential collaborative research topics.

Water treatment technology with support of sensing device

What can be expected from e-ASIA JRP Collaboration in Session 2

- Synergistic, supplemental and leveraged effects by multilateral cooperation through joint funding
- Novel knowledge and competitive technology
- Genuine Partnerships for mutual contribution
- Nurturing human resources through research collaboration and researchers' exchange

→ Safety and Sustainability of the region

Overview of the Outcomes from

e-ASIA JRP International Workshop on Intelligent Infrastructure for Water

Session 3: Smart/Intelligent Infrastructure for Management and operation

February 21 and 22, 2019

Chairs: Prof. Takanori Nagano, Kobe University
and
Prof. Le Thi Kim, DWR

IWRP Office, Hanoi, Vietnam

Towards Multilateral Collaboration on Session 3

Common research interest

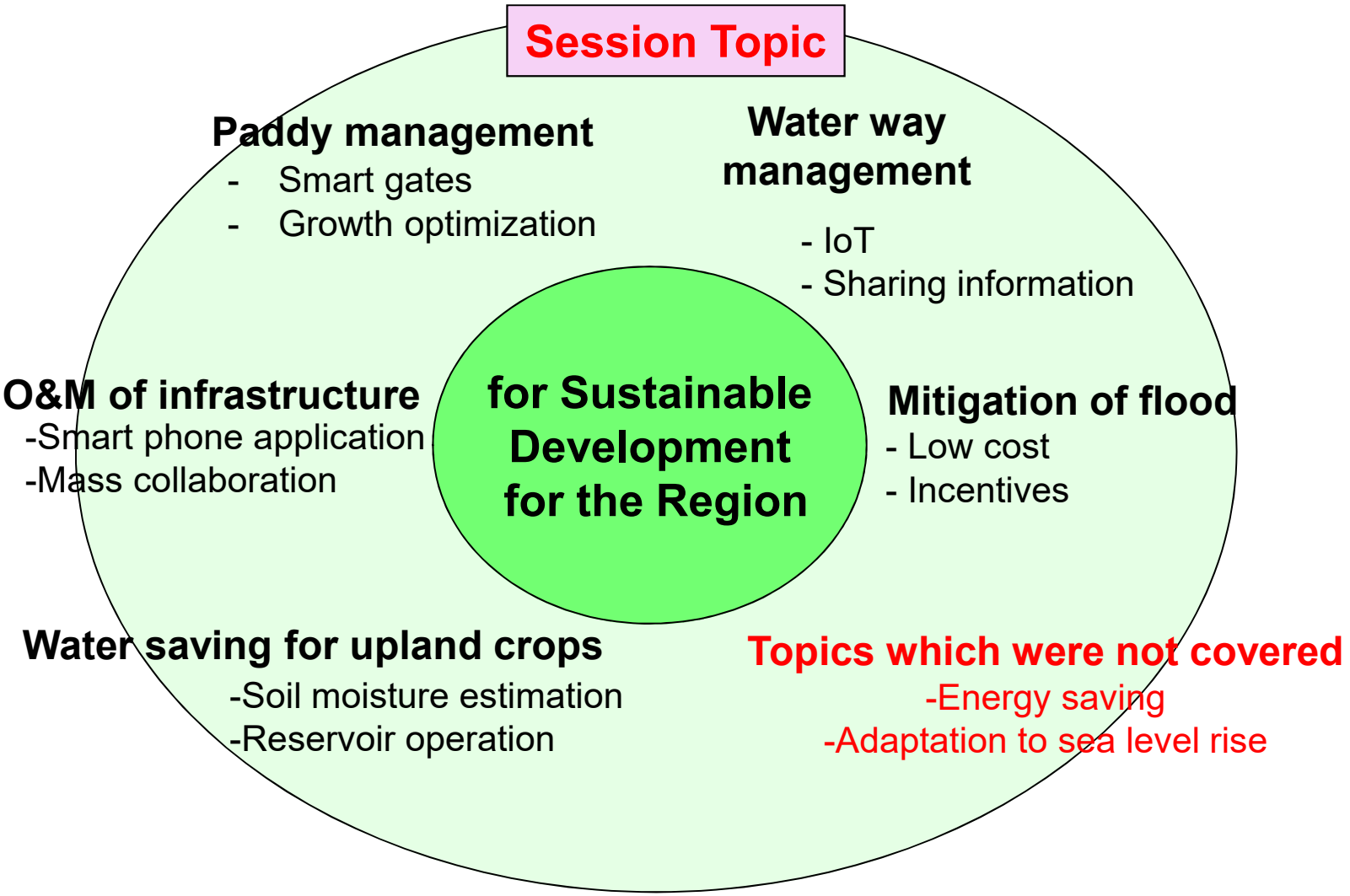
1) Adaptive management (change of management based on monitoring)
2) Improving agricultural productivity (land and labor)
3) Groundwater management
4) Water saving for adaptation to drought
5) Flood risk mitigation
6) Operation and maintenance of infrastructure
7) Irrigation water pricing
8) Mass collaboration
9) Communication among stakeholders
10) Harmonization of ICT and stakeholder satisfaction
11) Optimization of cost-sharing
12) Protocols for communication

Towards Multilateral Collaboration on Session 3

Limitations and challenges (due to nature of rural area)

- Large areal coverage
- Low stakeholder intensity
- Small land holds
- Economic state of farmers
- Communication
- Diverse design and specification of irrigation systems
- Theft of equipments

Prospective Players in the Research Field



Proposed Research Themes and Partners (1)
(Session 3)

Proposed Themes:

Smart paddy management for
1) rational water distribution, 2) water saving,
3) labor saving, 4) mitigating flood damage

Prospective Partners:

- All Asian countries relying on rice

Proposed Research Themes and Partners (2)
(Session 3)

Proposed Themes:

Adaptive management of water distribution for mitigating impacts of

1) water shortage during dry season
2) water logging
3) salt water intrusion in alluvial plains
4) energy and water saving for upland irrigation

Prospective Partners:

- All Asian countries

Proposed Research Themes and Partners (3)
(Session 3)

Proposed Themes:

Smart infrastructure management

1) for enhancing communication among stakeholders
2) prioritizing O&M
3) clarifying management indicators
4) internalizing externalities (e.g. ecological service)

Prospective Partners:

- All Asian countries

What can be expected from e-ASIA JRP Collaboration in Session 3

Promotion of Asia-specific technologies by understanding the similarities and diffrences of different participating countries

Clarifying target and options for countries at different economic state

Lowering cost of new technologies by broader participation

Thank you for your attention