Kyoto University Global COE Program
Global Center for Education and Research
on Human Security Engineering for Asia Megacities

Aims and Scopes

Hirokazu Tatano
Disaster Prevention Research Institute
Kyoto University, Japan

Before talking about the story of the "Human Security Engineering", we had better define it tentatively

What is the "Human Security Engineering" ?

Tentative definition:

HSE is "***A system of technologies (techniques) for designing and managing cities/regions and groups of cities/regions that enable inhabitants to live better sanitation and health conditions in day-to-day urban living, and also live free from occasional threats of large-scale disasters and environmental destruction, so that individuals can have respectful and comfortable lives***".

Working assumption:

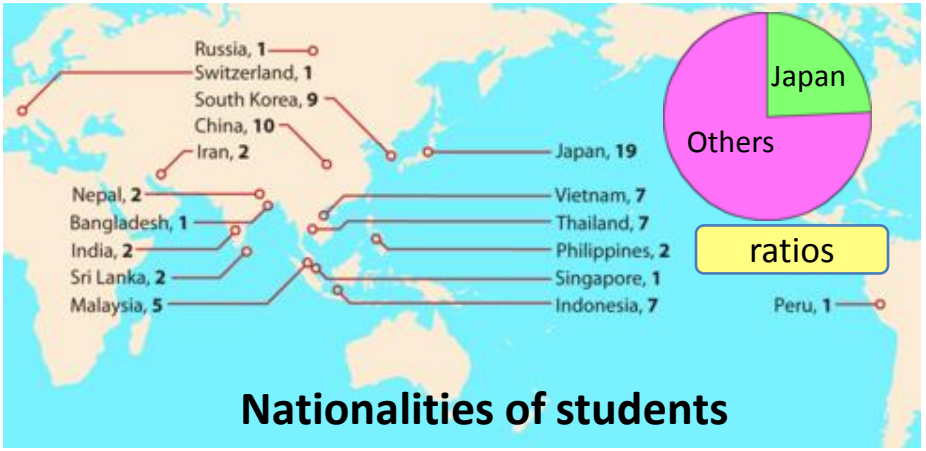
HSE is created as ***"an integration of related discipline towards ensuring human security with pragmatic scientific/engineering approach."***

What we did

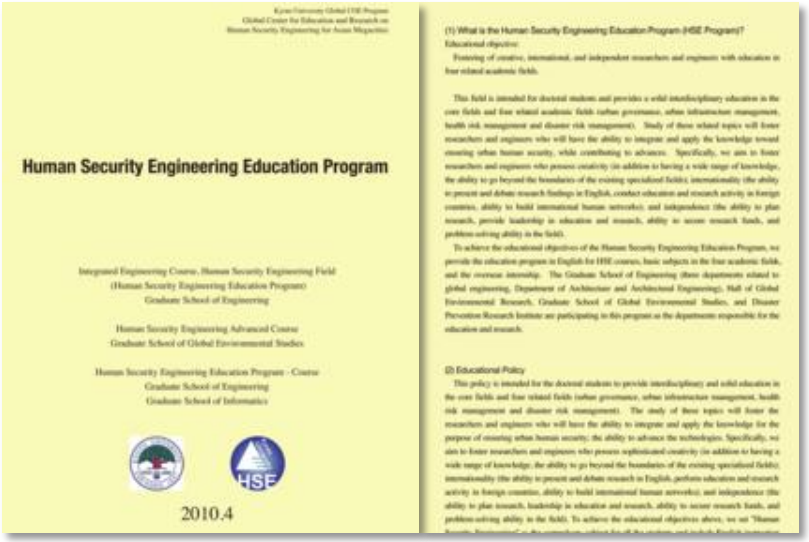
Establishment of ”Urban Human Security Engineering”	Carrying out education/research discussion aimed at “Urban Human Security Engineering" intensively and feeding back to research projects, Symposia, English textbooks, etc.
Deployment of Overseas bases	Two overseas bases with resident professors, five overseas cooperation bases with resident PDs were established, conducting intensive education and research activities over many sites of Asia.
Education of Human Security Engineering	On site and problem-oriented type doctoral degree research. A doctoral course with long-term internship, class lectures, and class works (79 students, FY 2010)
Implementation of key joint research projects etc.	Joint studies, actively incorporating strong local orientation and suitable local characteristics in Asian region (55 projects, FY2009)
Symposia, various activity reports and newsletters	94 international and domestic symposia, 99 volumes of activity reports. Disclosed via homepage, 5 volumes of newsletters, etc. to all over the world.
Support of young researchers	4 program specific professors, 14 PDs and 22 RA/TAs. Various COE Grants

“Human Security Engineering Educational Program” Doctoral course program

- Straddling Graduate Schools of Engineering, Global Environment Study, and Informatics
- Enforcement of education systems, e.g. intensive ORT classes, full introduction of portfolio system, operation of remote simultaneous class with Asian main universities, etc.
- Now 79 students are enrolling



Nationalities of students



- 19 lectures and 2 ORT classes
- All in English, now publishing English textbooks for lectures

Overseas internship (requirement)

- Short-term: over two weeks, long-term: more than two-month, 300,000 yen assistance per student
- Fostering their capability of field and international problem-solving and personal networks

Maintenance of a Overseas bases

- **HSE center (KU central bases, with 2 program specific professors, 3 assistants and several PDs)**
- **7 core overseas bases with resident professors and/or PDs**
- **Several overseas bases with temporally students.**

- Site specific research projects (over 50 projects, always)
- Setting up of student's recruiting and the entrance examination systems in overseas for the educational program
- Preparation/opening classes of Human Security Engineering in Asian domestic universities
- In FY 2009, dispatching 630 researchers and students to Asian countries (students: 170, young researchers: 136), invited 64 overseas researchers. These are 36%, 28%, and 64% increase compared with FY2008
- Training workshops for local graduate students and a working members: 9 times, 171 persons

Site specific research projects

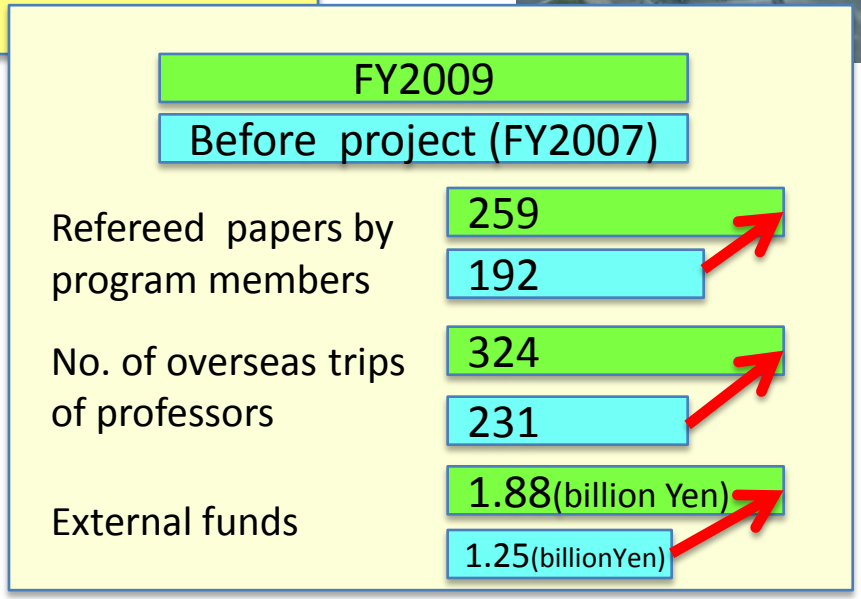
(Contribution to resolve real world problems)

Carrying out projects having strong local orientation and suitable local characteristics:
55 projects in FY2009, in order to support human security policies in the Asia region

Significant social contribution: Joint research with World Bank, JICA, Indonesian government, Malaysian government, Bombay city, etc.

Establishment of an international academic society:
IDRiM Society established with support by our GCOE

Publication of an international scientific journal : Journal of Integrated Disaster Risk Management



Impacts to research activities of departments

Integrated Disaster Risk Management

- What should be integrated in DRM?
  - Multiple hazards and risks:
    - Human, Social Security: We are facing with not only natural hazards but also other hazards like, economic recession, losing jobs, etc.
  - Countermeasures:
    - Structural and Non structural measures
    - Prevention, Mitigation, Risk-sharing, Retention/Preparation
  - Decision Makers/ Stake Holders:
    - Policymakers (International, national, local), NGOs, Citizens, academics, practitioners,
  - Disciplines:
    - Science(Natural, Social, Human), Arts: Engineering, Economics, Psychology, etc.

An example of key joint research projects: Evaluation and Management of health risks by Environmental Pollution in rapid-growth cities, Shenzhen base

Chinese cities are becoming increasingly rapid economic growth and population concentration. In order to overcome environmental problems faced by urban growth, Shenzhen base will be established as International education and research-based center for management of health risks by environmental pollution.

Health risk is the bases of "Human Security"

Environmental Engineering Approach

- Understanding of environmental problems faced by urban growth
- Development of health risk assessment methodology
- Establishment of health risk control management

Approach based on Urban Science

- To solve environmental problems faced by urban growth.
- Design of institutional framework towards sustainable urban environments and responding to global environmental issues

- Workshops
- Understanding China's urban environmental problems through field survey

- Officials Workshop
- Symposia
- Input to the Twelve's Five-Year National Development Plan

Establishment of technology roadmaps for policy formulation to solve environmental problems faced by urban growth

International collaboration

- Shenzhen city, Changzhou city
- Tsinghua University
- Japan-China Environmental Research Center operated by KU and TU

An example of key joint research projects: Establishment of Asian water security, Hanoi base

In developing countries, how to secure access to safe water is as important as economic issues. With aspects of technology and institutions, to resolve the issues, Hanoi bases serves as a hub of the research, to expand its activities in the Megacities of Asia.

Water security is one of the most important component of "Human Security"

Sanitary Engineering Approach

- Analysis of current status of water environment in developing countries
- Development of Risk Reduction and Control of Water Environment
- Establishment of systems for ensuring the security of the water environment

Approach from Social Development Study

- Analysis of the constraints against to secure water security in Asian Megacities
- Institutional design to ensure water security
- Development of water security action plan

- Identification of problems related to individual water environment
- Construction of the water environmental database

Establishment of systems of technologies and institutions to maintain water security in developing countries

- Creating diagnostic table of urban sanitation and water environment for each city
- Officials Workshops

International collaboration

- Hanoi University of Technology, Da Nang University of Technology, Hue University
- Hanoi Environmental Corporation, Hanoi Water Resources Department
- Tsinghua University
- Mahidol University, AIT (Asian Institute of Technology), Khulna University, University of Peradeniya

An example of key joint research projects: Risk management policy for global city logistics considering pirate and terror risks, Singapore base

Increasing interdependency among countries requests global policy to keep safety and stability of maritime global critical infrastructure. Establishing countermeasures against pirate risk around Strait of Malacca, and against terror risk on Singapore seaports have a primary importance in South and South East Asian Countries。Singapore base aims at establishing risk management policy for global logistics.

Global Critical Infrastructure supporting Human Security

Singapore Seaports

- Hub port connecting with 600 seaports in 123 countries
- Strategic Spot of Energy Supply for Asian Megacities (basic human needs, basic urban needs)
- Intensive Indirect damage on Asian economies by its dysfunction

Risk Management for Global City Logistics

- Calculation method of robust tracking route
- Quantification of spillover damage by its dysfunction
- Database arrangement for City Logistics among Asian regions

Singapore Seaport as Maritime Global Critical Infrastructure

International Collaboration

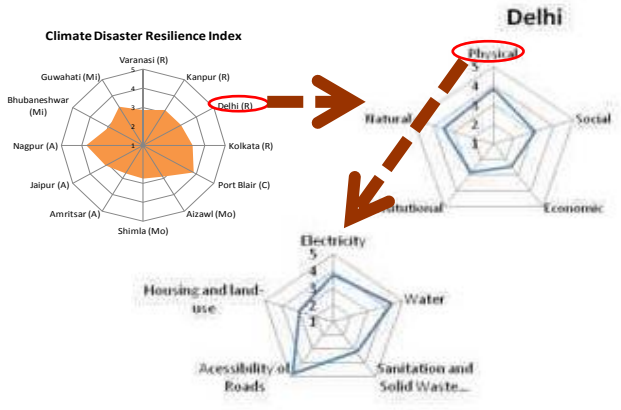
- National University of Singapore (Center for Maritime Studies)

Key Project of IRGC(International Risk Governance Council)

A example of key project: Capacity development and urban diagnosis using Disaster-Climate Resilience Index/all bases

Rapid urbanization in Asian countries generates serious environmental problems and increases urban vulnerabilities to disasters. Confronting multiple social risks, this project develops the techniques to diagnose a current status of city as a whole on the basis of human security, and develop comprehensive capacity of practitioners to see and make plans for urban policy through training courses

Development of Climate-Disaster Resilience Index



Multi-hierarchical index with respect to "social", "economic", "natural", "physical", "Institutional".

Urban Diagnosis and Capacity Building

Training Workshops in the six bases (until May 2010)

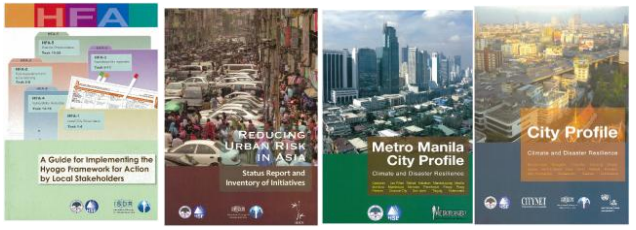
Acquisition of techniques to index urban environmental and disastrous vulnerabilities

⇒ Capacity Development to overview urban policy for human security

Workshop in Kuala Lumpur（2009.10 ）

International Collaboration

- **World Bank, Tokyo Development Learning Center**
- **CITYNET** (The Regional Network of Local Authorities for the Management of Human Settlements)
- **NGO SEEDS**
- **United Nations/International Strategy for Disaster Reduction**



Textbooks using in training workshops

An example of key joint research projects: Development and implementation of disaster risk communication techniques in slum areas, Mumbai base

In Mumbai, one of the largest slum areas in the world is widespread nearby urbanized areas. In a great deal of complexity in social context, related with economic disparity, status hierarchy, and political situation, how can the local government help residents in slums recognize disaster risks and share the threat of disasters? As the core research of Mumbai base, we aim at developing flood risk communication technologies/ techniques integrating social survey about risk perception with flood and evacuee simulation model.

- **Integration of Engineering Technologies/Techniques and Social Science**
- **Establishment of Implementation Science**

Engineering Approach → Slum areas in flood plain

- **Development of Flood Simulation Model**
- **Evacuee Model**
- **Mass Evacuee Simulation Model**
- **Political scenario-based Simulation**

essential for implementation

Social Science Approach

- **Massive questionnaire survey considering social context**
- **Approach to fill in the gap between Cognitive Bias of Risks**

Interview Survey in Mumbai (H20.10)

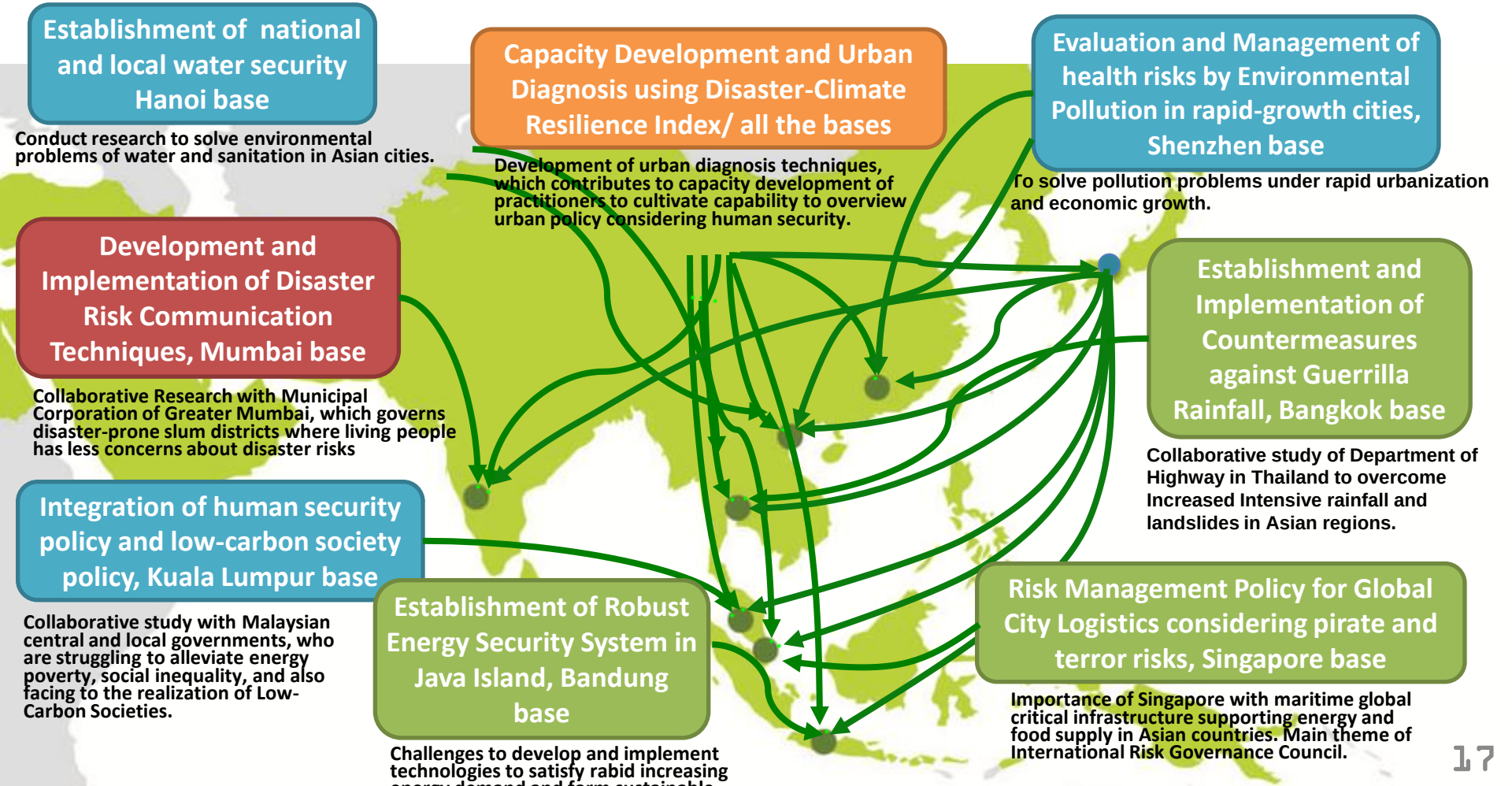
Discussions for research plan in MCGM (H20.2)

Collaborative Research

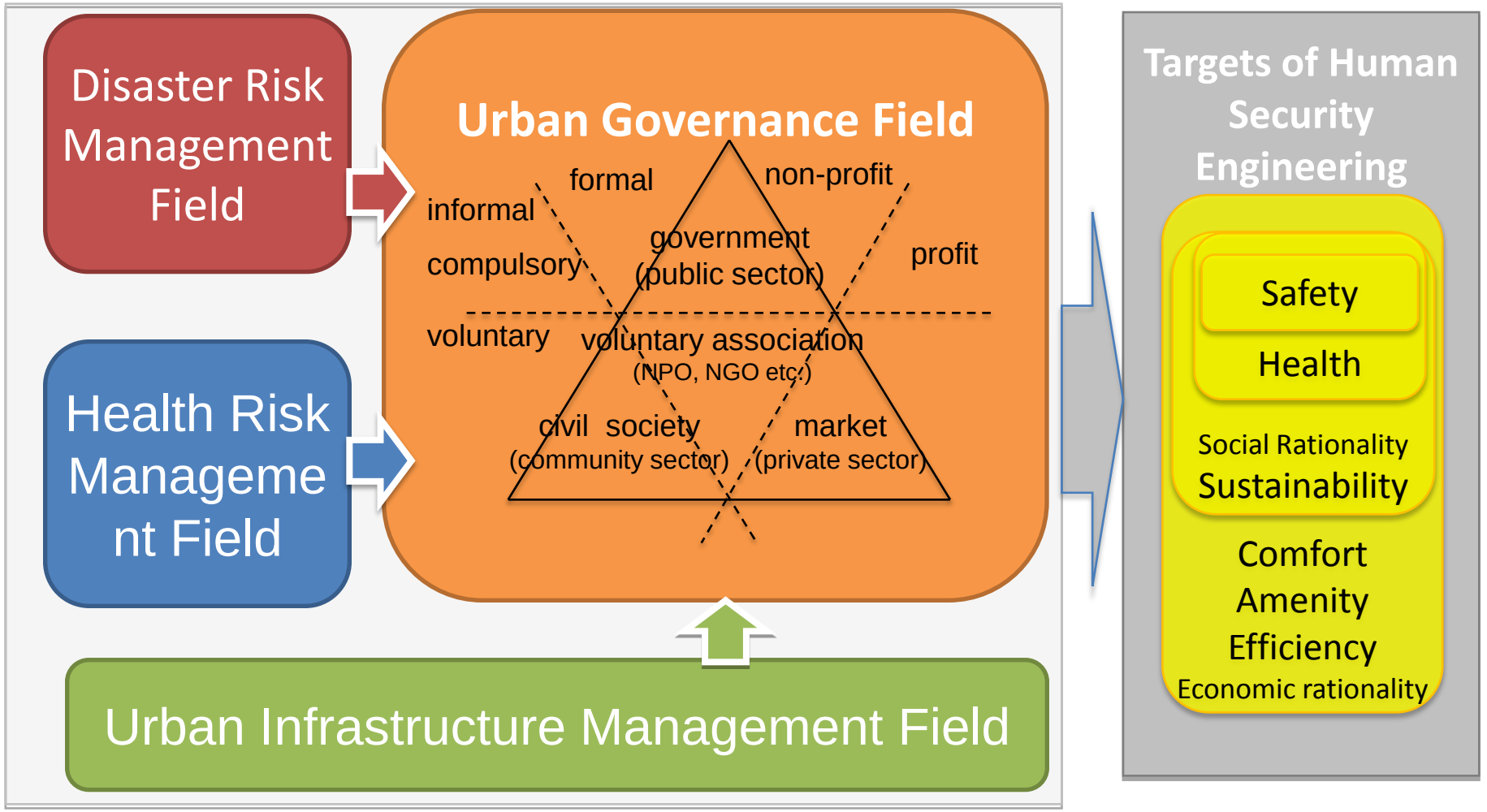
- **Mumbai Corporation of Greater Mumbai (MCGM)**
- **School of Planning and Architecture (SPA Delhi)**
- **Tata Institute of Social Science**

Examples of nexus among some key joint projects and overseas bases

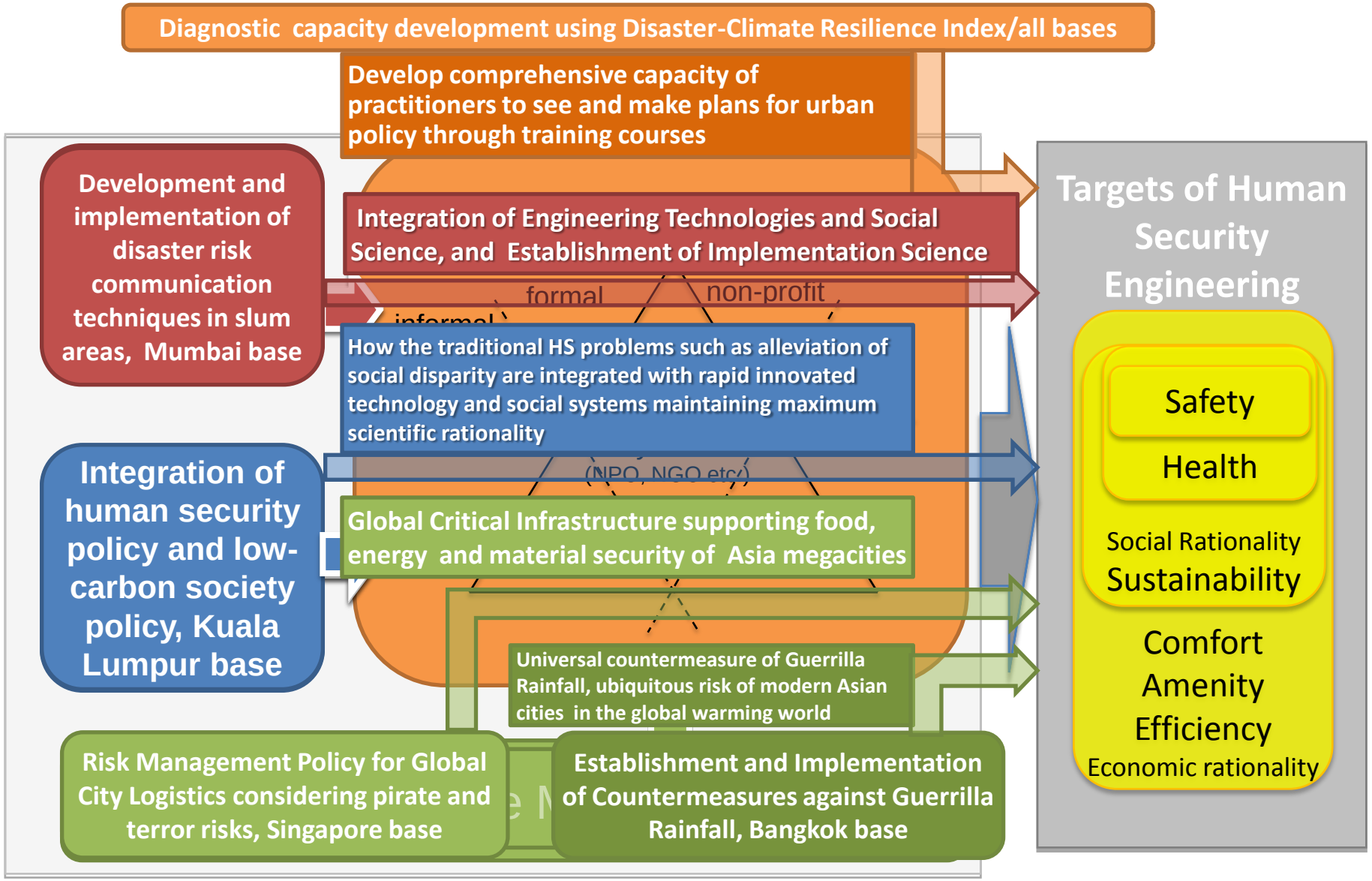
- The aim of key joint research projects is to specify human security concepts in accordance with local characteristics, verify the issues to overcome, and promote common awareness of the need for cooperation.
- In this presentation, eight projects are illustrated as examples of key joint research projects.



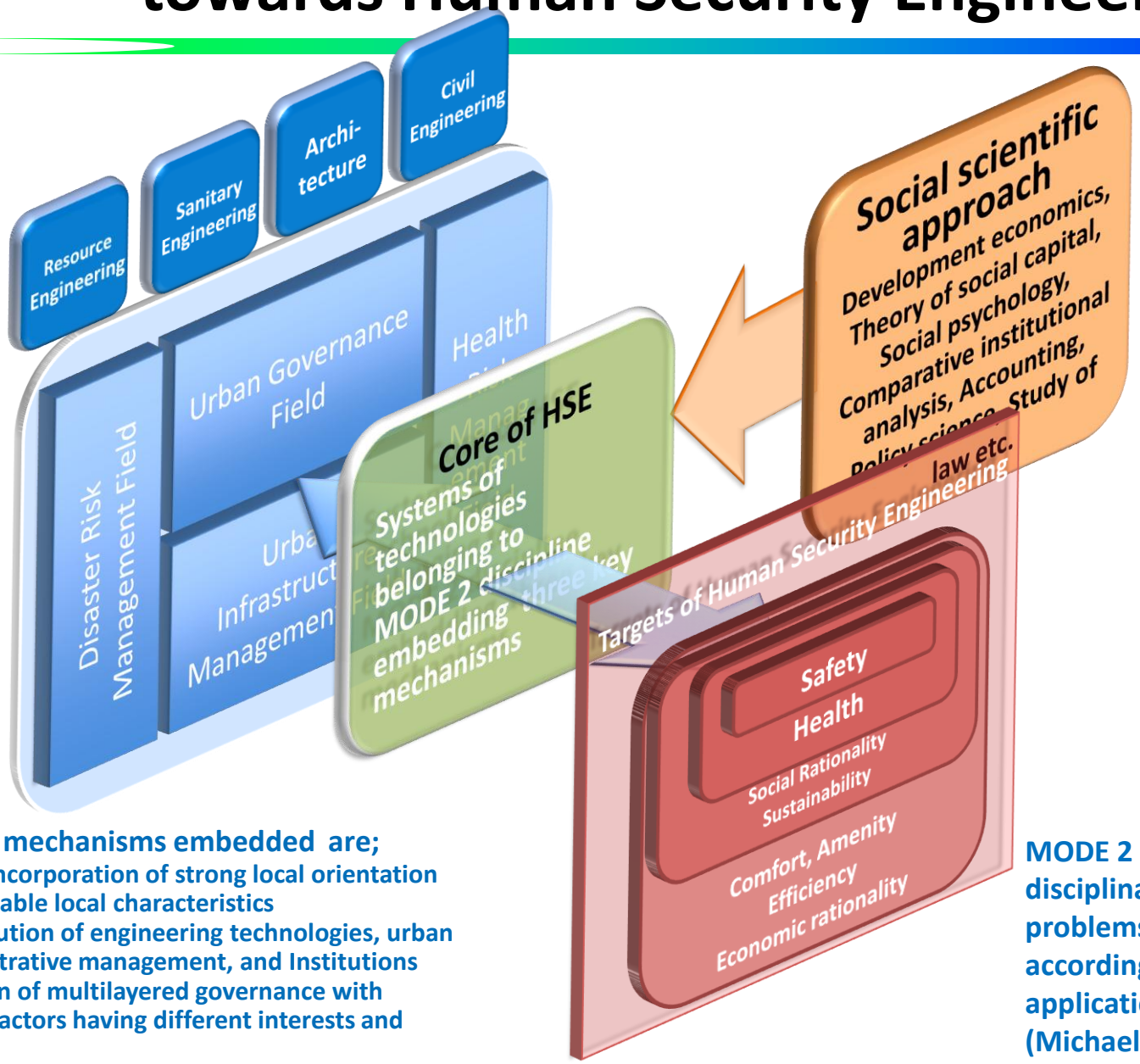
How these projects are projected in the constellation of HSE field ?



How these projects are projected in the constellation of HSE field ?



How to spin our academic disciplines towards Human Security Engineering



Three key mechanisms embedded are;

(1) Active incorporation of strong local orientation and suitable local characteristics
(2) Co-evolution of engineering technologies, urban administrative management, and Institutions
(3) Inclusion of multilayered governance with various actors having different interests and values.

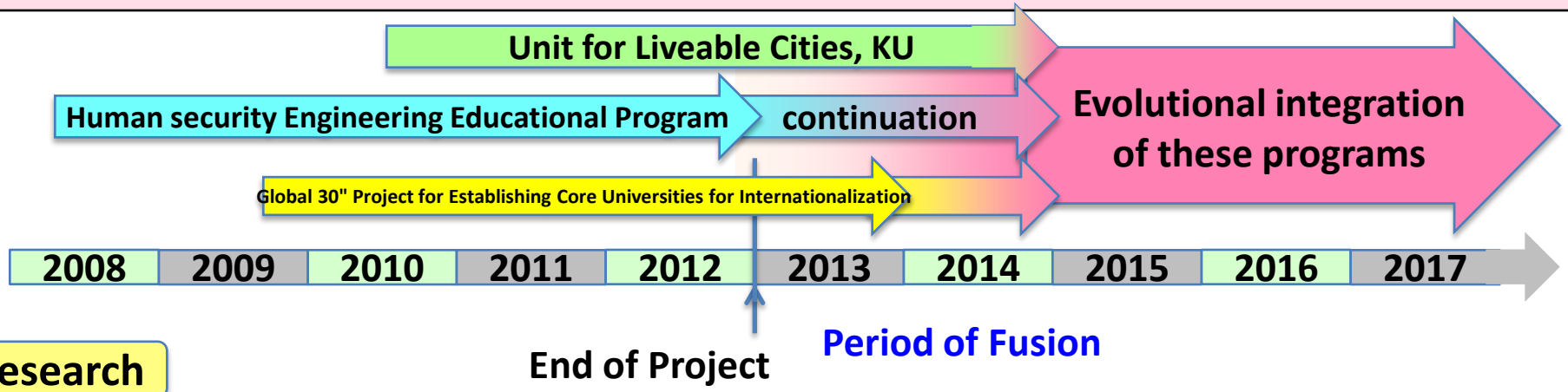
MODE 2 discipline is a trans-disciplinary science, where problems are defined according to social application (Michael Gibbons, 1997)

Short-term Prospects

Education

During project period : Starting MC, Publishing of Textbook series, Continuation of field training courses

After project: Continuation of educational program, coordination and integration with related activities such as “Liveable Cities” project, “Global 30” project and so on.



Research

During project period: Continuation, review and reorganization of research projects, disclosing outputs with e-Text, HP, Symposia, Workshops, and Newsletters.

After project : Expanding research projects cooperated with Asian universities, governments, international organizations, and private sectors

Overseas bases

During project period: Base’s symposia, recruiting of new overseas collaboration bases, improvement of ICT systems for more intensive communication

After project: Acquiring external funds, supported by overseas universities, governments, international organizations and private sectors. Some of them are already committed

Long-term Prospects/Targets

The followings are crucial elements in order to establish HSE….

A. How much will our HSE be accepted in Asian society?

1. Will HSE paradigm be a major school in Asian urban management?
2. ・・・・・・・・・

B. Verification of the discipline as "MODE II" science

1. How much does our HSE approach contribute to the enhancement of real-world urban human security?
2. ・・・・・・・・・

Establishment of Urban Human Security Engineering

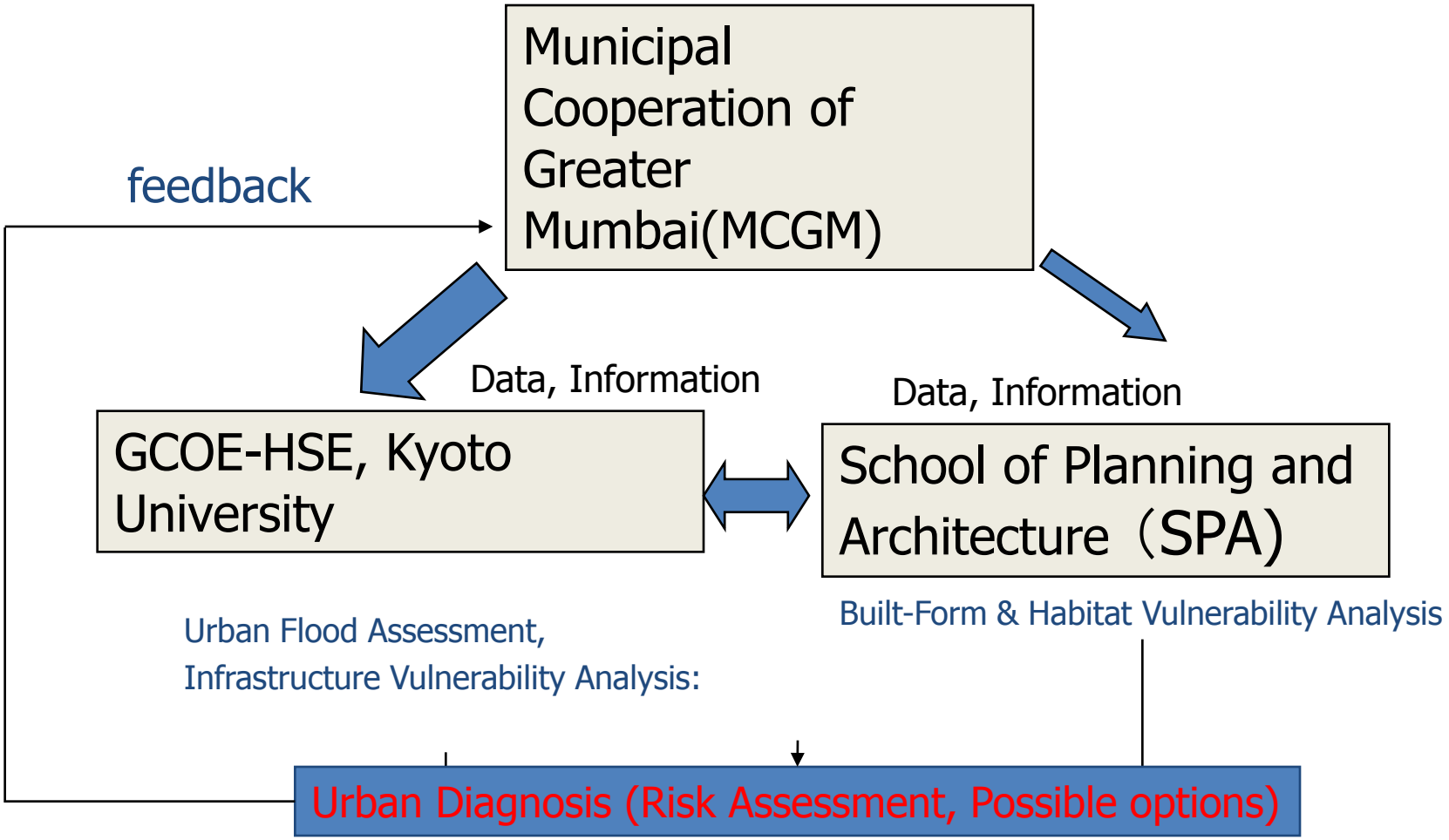
C. Institutionalization of "Urban Human Security Engineering"

1. Establishment of HSE courses in Asian universities as major reproductive system of human resources for urban design/construction/management.
2. ・・・・

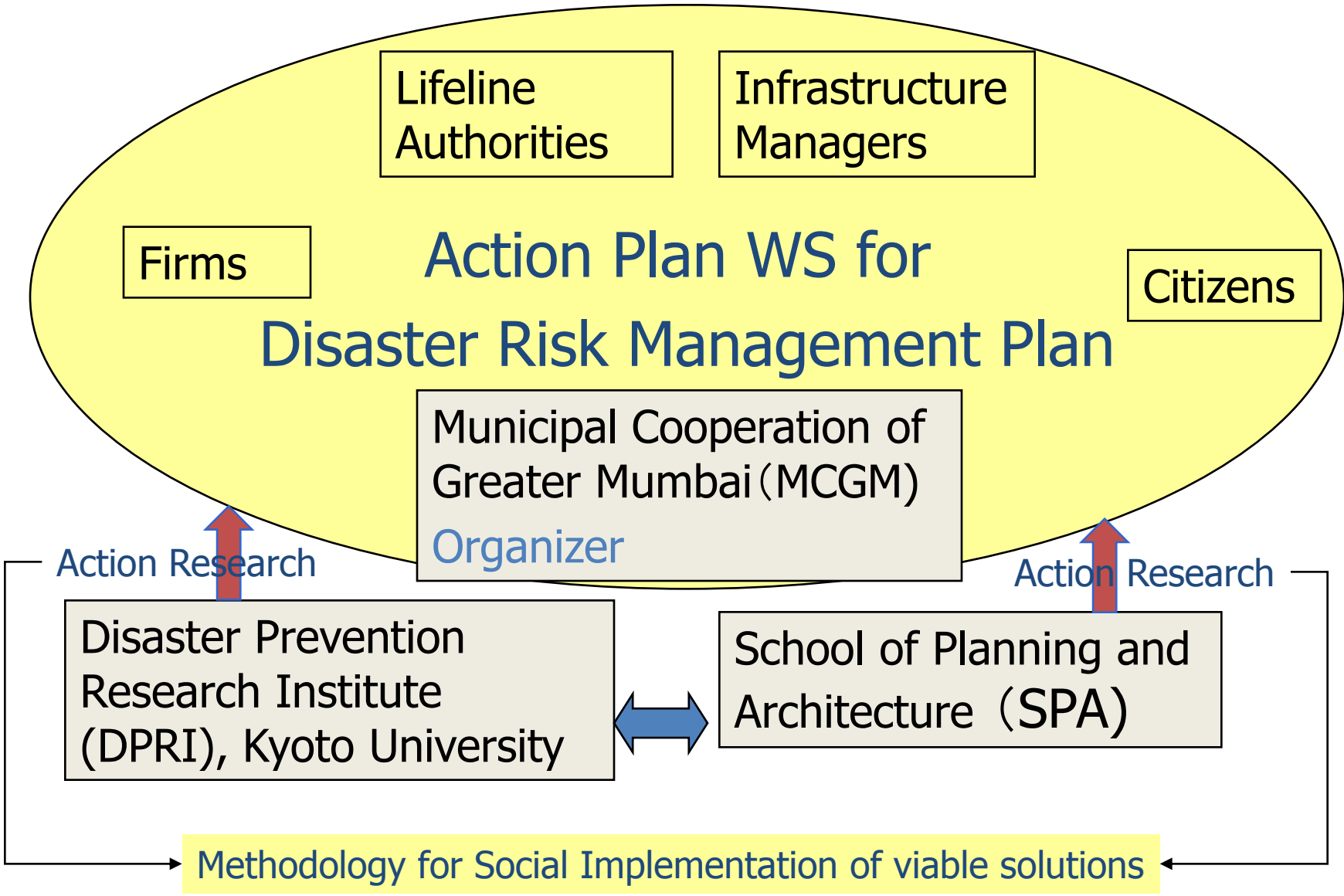
Integrated Disaster Risk Management

- What should be integrated in DRM?
  - Multiple hazards and risks:
    - Human, Social Security: We are facing with not only natural hazards but also other hazards like, economic recession, losing jobs, etc.
  - Countermeasures:
    - Structural and Non structural measures
    - Prevention, Mitigation, Risk-sharing, Retention/Preparation
  - Decision Makers/ Stake Holders:
    - Policymakers (International, national, local), NGOs, Citizens, academics, practitioners,
  - Disciplines:
    - Science(Natural, Social, Human), Arts: Engineering, Economics, Psychology, etc.

Phase 1: Urban Diagnosis
2009-2011



Phase 2: Action Plan Development



Contents

Mumbai Base, GCOE-HSE, Kyoto University and DPRI is Focusing on

Integrated Flood Risk Assessment

- Data is needed: elevation, precipitation , run-off, river flows, water logging area and time in the past events, drawings of Mihti river, drainage channels, and etc.
- Record of events are necessary

1) Social Vulnerability Assessment
   1) Background Risks
   2) Coping capacities

How to Increase Coping Capacity of local Citizen?

2) Modeling urban flood in Mihti river basin and development of Integrated Flood Risk Communication Support System (IFRiCSS)

Thank you for your gathering!

Let’s us discuss further collaboration!!