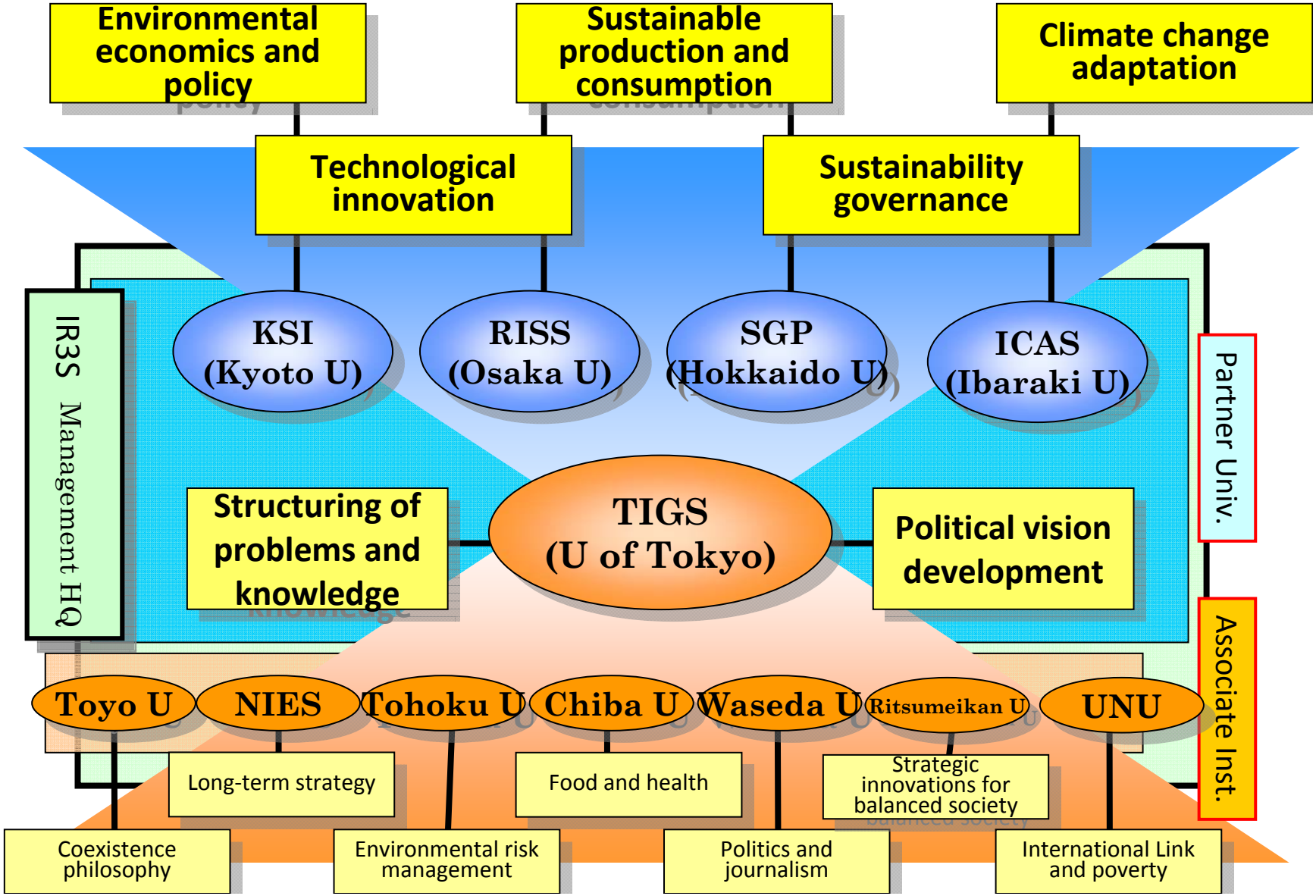
Technology Governance for Sustainability – Potential Role of Redefined Technology Assessment as a Tool in Japan

Hideaki Shiroyama
Graduate School of Law and Politics
Graduate School of Public Policy
The University of Tokyo
siroyama@j.u-tokyo.ac.jp

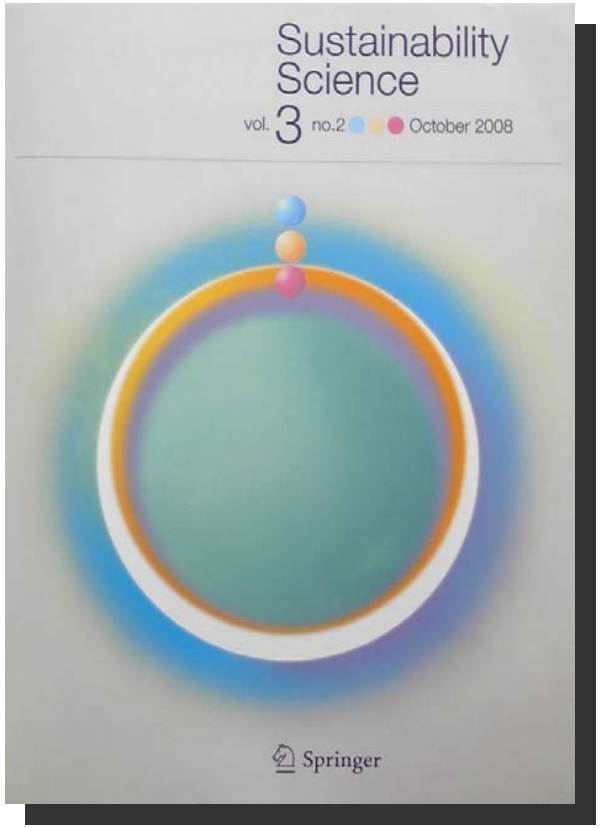
Institutional Background

Integrated Research System for Sustainability Science (IR3S)



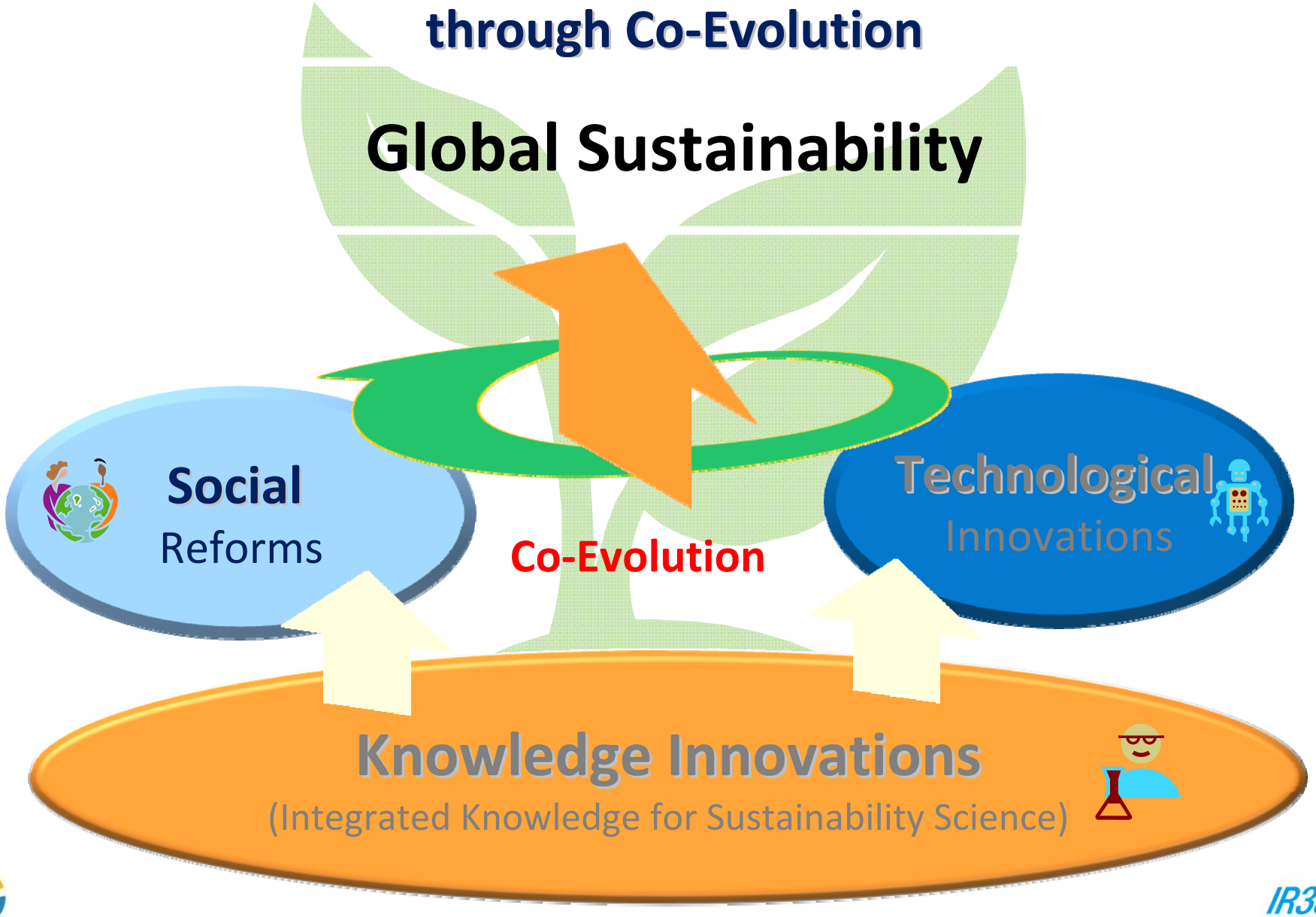
Need for Sustainability Science

- Fragmentation in academia makes it difficult to develop a comprehensive image of a sustainable society
- New discipline that comprehensively deals with complex problems and leads to integrated solutions is needed
- “Integrated Research System for Sustainability Science (IR3S**)**", an alliance comprising the University of Tokyo (headquarters), and 11 other universities and research institutes in Japan, was established
- IR3S publishes an international journal “Sustainability Science” and promotes flagship projects
- Developing educational programs, in cooperation with the 5 allied universities on sustainability science

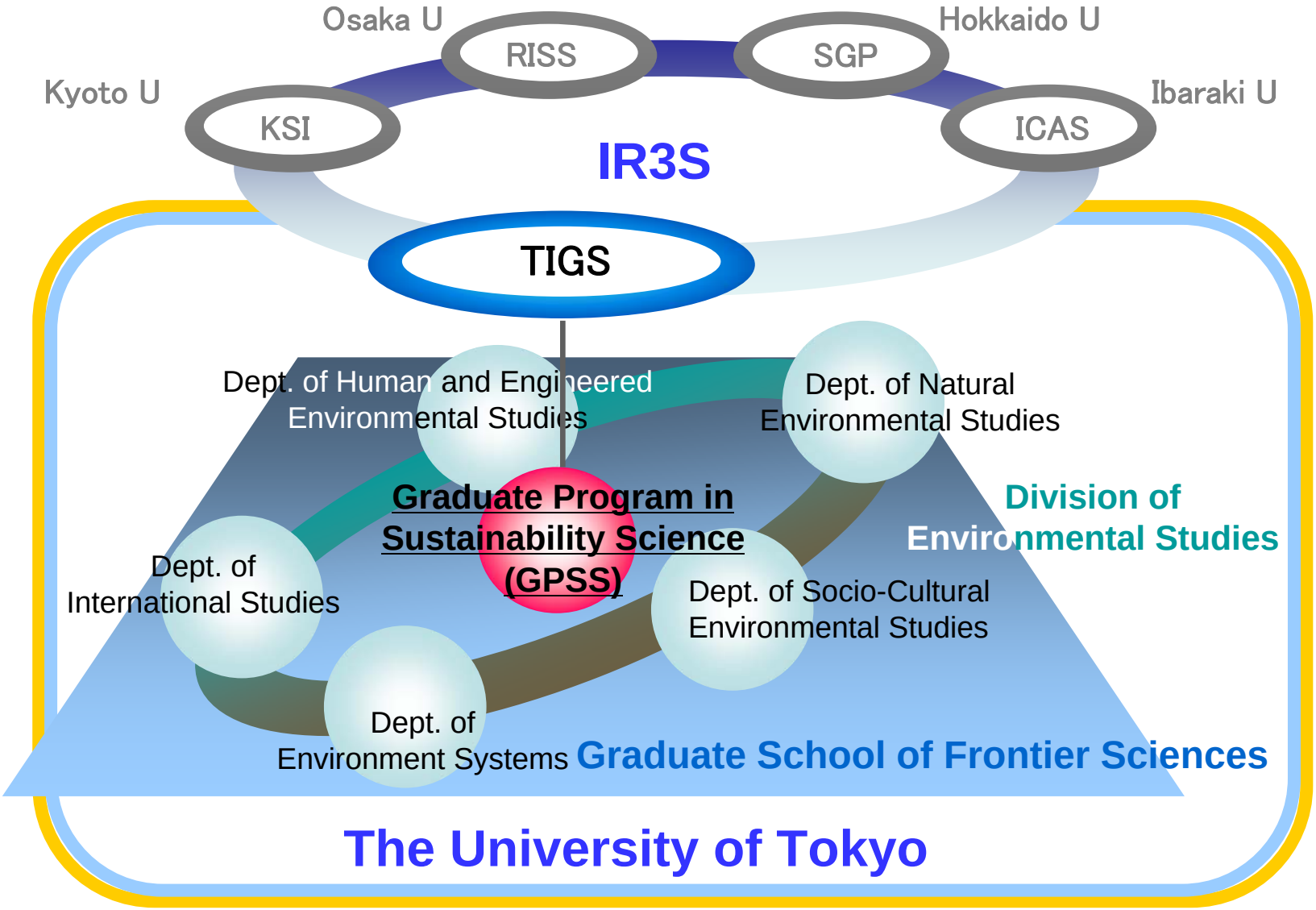


- Creating research meta-networks on sustainability science worldwide (Tyndall Center, Stockholm Resilience Centre, CIRPS, etc.)
- IR3S aims to propose visions for building sustainable societies in Asia, including Japan

Pathway toward Global Sustainability through Co-Evolution



Graduate Program in Sustainability Science (GPSS)



GraSPP (Graduate School of Public Policy)

- Professional School for Public Policy established 2004 as joint program between Faculty of Economics and Faculty of Law
- Focus on Education - Master Program
- Policy Research Unit - Interdisciplinary Research Program involving practitioners – Air Transport Policy, Risk Management, Housing Market, ScieTePP (Science, Technology and Public Policy)

SciTePP

(Science, Technology and Public Policy Research Unit)

- SEPP (Sustainable Energy/Environment and Public Policy) supported by group of companies
- I2TA (Innovation and Institutionalization of Technology Assessment) supported by a government related agency
- PADIT (Public Administration and Information Technology) supported by a company
- (Marine Science and Technology Policy supported by a foundation)
- Technology Governance Research Unit - Link with Policy Alternative Research Institute

Technology Governance for Sustainability

Potential Role of Redefined Technology Assessment as a Tool in Japan

Introduction

- The development and diffusion of innovative technologies is indispensable for sustainable development
- The development of technology is accompanied by various risks and social problems, as well as benefits
- There is a need for systems throughout society for the decision making and management of the development and utilization of technology incorporating various risks and benefits and involving various stakeholders= technology governance

Low Carbon Society?

- Calls for low carbon society, eco-recycling society, zero-emission society or biodiversity….
- A concept of a specific form of society for sustainability?
- Sustainability has many dimensions including low carbon emission, bio-diversity, human health and security, animal welfare
- Those diverse perspectives have to be accommodated as far as possible in society
- Technology governance is the function required for accommodation of various perspectives relating to technology in society for sustainability, which can be characterized as unchanging requirements for changing societies.

Clarifying Risks and Benefits

- Risk management= the activity of deciding where to draw the line and what level of risk to allow—based on the risk assessment
- It is necessary to consider how the risks are balanced by the benefits of the technology concerned: the case of car
- When the benefits are assessed, the question of distributive implications (that is, to whom do the benefits accrue) is also important. Society may reject a certain technology, even if the overall benefits are considerable, if the benefits are directed mainly towards a certain sector – the case of nuclear power and the genetically modified foods

Clarifying Risks and Benefits

- Some risks are ignored or exaggerated. When a company engages in technological development, it is possible that it will not publicly disclose the relevant risk information. On the other hand, competitor in the area of a particular technology may exaggerate some of the risks. Perceived risks vary among different experts.
- Benefits too can be inadequately presented or exaggerated. Technology developers are discontented, because the risks alone are addressed while the benefits are not. On the other hand, technology developers overemphasize the effectiveness of a technology to obtain research funding.
- There is uncertainty over both risks and benefits- uncertainty over scientific understanding and uncertainty over utilization of the technology.

The Multi−faceted Nature of Risks and Benefits

- Both risks and benefits are multi−faceted- the same technology entails different risks and benefits by adding international dimension
- Ex. Nuclear technology: cheap energy supply and safety risks→ energy security and risk of nuclear proliferation on the international level.
- The benefits of technology have changed due to society's changing objectives.
- Ex. Coal−fired power generation technology: risk entailed in its high levels of CO2 emissions→ energy security benefits, since the regions for production of the coal on which it relies are relatively spread out throughout the world.

Assessment of Trade−Offs

- Risk trade−off refers to the fact that the efforts made to reduce specific risks conversely end up increasing other risks.
- Ex. If car bodies are made lighter in order to improve gas mileage, they become less collision−resistant and safety levels fall.
- Ex. Wind power technology has benefits in reducing CO2 emission and from the perspective of energy security in its decentralized nature, but, it has risk and negative effect concerning supply stability, bird strikes and landscape values.
- Ex. Bio fuel has benefits of energy security and possible CO2 reduction, on the other hand, it has possible risk of food insecurity especially in developing countries.

Assessing Issues of Values

- When a comprehensive societal assessment is carried out, there is an important factor to be considered that will function as a “special trump card” whatever the other risks and benefits- the issue of values, as they relate to individual human rights and human dignity
- Ex. Population growth is an issue closely related to sustainability, but population issue tends to be treated separately from sustainability issues partly because of religious and value related issues involved

Promoting the Generation of Knowledge

- The existence of knowledge and technology is not self−evident. For these to emerge, society must foster scientists and technologists, and must stimulate their research activities.
- It is necessary to try and revisit the role of the legal concepts of “academic freedom” and “freedom of research” which could instead be reinterpreted as the organizing principles for stimulating the generation of knowledge.
- By enabling numerous trials and experiments in a bottom−up fashion, academic freedom and freedom of research have the function of stimulating intellectual innovation, which contributes to society
- Risks arising from experiments have to be accommodated in a flexible way in a society

Promoting the Generation of Knowledge

- Promoting the generation of knowledge is essential even for risk assessment. A system of laws on experimentation that will allow various types of experiments is essential to produce information needed for risk assessment. .
- It cannot be said that academic freedom and freedom of research command universal respect. It is necessary to come to a decision on whether risks to safety ought to be considered or whether shortsightedly placing the emphasis on safety and restricting research reduces the possibility of long−term innovation and increases society's vulnerability.
- Trade offs between innovation and security: whether the publication of research ought to be stopped when there are fears that research results might be applied by terrorists.

Summary-1

- It is noteworthy that different actors within society hold different viewpoints. There then has to be a platform where the multiple viewpoints are shared.
- It is not necessary for all the actors involved in the decision−making to share a common vision. The notion of “sharing the same bed, but dreaming different dreams (Doushouimu：同床異夢)” is an important one.
- It is rare for visions of the various actors to be in accord −ex. nuclear power or bio−mass as measures to combat global warming or energy security
- In these instances, although the perspectives that inform the concerns of the actors differ, they will be able to form a united front in support of a particular technology choice. Or there can be possibility of finding new technology option accommodating diverse points of views.

Summary-2

- Brundtland Commission report "Our Common Future“ - sustainability requires achievement of policy objectives of many dimensions, such as, population and human resources, food security, species and ecosystem, energy, industry, and the urban challenge.
- Achievement of one objective may have negative impact on other objective, as the increase of food production for food security has possibility of damaging ecosystem.
- Finding the common framework for simultaneous achievement of various policy objective is necessary for sustainable development- for which the notion of “same bed, different dreams” has some roles, even though some "dreams" (“nightmare”?) need to be adjusted as a result of value judgment.
- Sustainability management requires the system of systems

TA as a Tool for Process Management for Sustainability

- Technology assessment (TA) refers to institutions and practices which support problem-definition (agenda setting) or decision-making for the development of technology and society by anticipating societal impacts of emerging technologies that are difficult to be governed by conventional research, innovation and legal systems at an early stage of the technology development.

Structure of I2TA Project

(3.5 years Project until 2011.3)

Ⅱ. Development of an innovative TA methodology

New methodology

Ⅰ. Historical Analysis of so-called “TA” activities in Japan cf. comparison

Ⅲ. Practices of TA: Dealing with Nanotechnologies

Conditions for “institutionalizing TA” in Japan

Lessons learned from Implementation of TA

Ⅳ. Recommendations for new TA methodologies and Institutionalization of TA in Japan

Background: The 3rd Science and Technology Basic Plan in Japan

- ST Basic Law initiated by bipartisan group in mid 1990's (but the idea of PTA was not adopted)
- One of basic idea: Science and technology for society
- Responsible actions for ethical, legal and social issues (ELSI) on science and technology (Ch. 4-1)
- Promoting active public participation in science and technology (Ch. 4-4)
- Need for inputs into 4th planning (2011-)

Attempts of Institutionalization TA as System Management (early 1970s)

- Japan Techno-Economics Society (JATES) members visited the US and found TA
- Eight-Members Committee (1970): Image of ‘Spaceship Earth’ - TA as a part of closed-circular technological system
- Business sector: CSR for environmental deterioration, consumer movement and speculative activity
- Obsessed with total systems (engineering) approach
- Partial institutionalization of NPO, IFTEC (Institute for Future Technology) supported by NTT and interdepartmental quasi-governmental organization, NIRA (National Institute for Research Advancement)

TA as Project Evaluation / Technology Foresight

- STA (1971-78) and MITI (1971-84) conducted TA case studies, but targets of the subjects limited

Project Evaluation

- STA: Sectional TA activities by planning bureau led to project-based evaluation (not covering jurisdiction of nuclear and space)
- MITI: TA as ex ante R&D evaluation

Technology Foresight

- STA: Focusing on the development of Delphi method
- MITI: “Industrial Technology Development Long-Term Strategy”

Food
Explicit TA Experience in Food

- The 1970s: Some experimental cases were carried out by STA and MITI (not by Ministry of Agriculture)
- TA on pesticides by STA (1971): carried out by the Agricultural Chemicals Subcommittee within the STA TA Committee, comprehensive assessment of pesticide including the social aspects (society, culture, minds etc)
- TA on Microwave oven by MITI (1974): contracted out to external body
- The 1980s to the 1990s: The blanc period of TA
- No comprehensive TA performed. Fragmentary assessments carried out by authorities' own mandates.
- EX. Risk analysis (including Other Legitimate Factors) framework by FSC, MHLW and MAFF
- Ex. Assessment for R&D purpose by MAFF

Participatory TA experiments in 2000s

- The 2000s: Social controversy over food issues (BSE, GM), increased interest in Participatory TA
- STAFF (Society for Techno-Innovation in Agriculture) Consensus Conference (2000) and Citizens' Conference on GM crops (2001, 2002, 2003): funded by MAFF, under the *Research Responding to Citizen's Proposal Project.*
- Hokkaido Government Office's Consensus Conference on GM: held in order to reflect stakeholders' and citizen's views to the re-examination of the GM ordinance (link to Hokkaido GM policy explicitly)

  cf. risk of competition v.s. risk of succession

Health
The rise and fall of MTA in Japan

- White Papers

In 1974 white paper on science and technology, the word "technology assessment" appeared.

In 1990 white paper on health, the word "medical technology assessment" was used, it pointed to need broad-based discussion including ethical and economical issues.

- Academic Discussion

In 1985 Medical technology assessment society was established.

Members; healthcare economist, doctors, anthropologist....

→They aimed institutionalization of MTA in Japan

Fragmented TA Activities in Japan

- Economical assessment - decision process in medical insurance system
  - societal aspects included (effectiveness, safety, diffusion, ethics/ social acceptability, financial impact, comparison with other technologies)
- But some medicines and medical techniques are not insured by unclear reasons
- Bio-ethical assessment by Council for Science and Technology Policy (Cabinet Office) - rigid and limited agenda setting
- Parliament - Act on Organ Transplantation in 1997 – lead by legislator Taro Nakayama - Bill sponsored by bipartisan group

Energy
Explicit Energy TA

- Most experimental cases were sponsored by MITI, and a few cases by private firms themselves (e.g. Tokyo/Osaka Gas, Mitsubishi Electric)
- MITI started with TA exercises on nuclear technologies (iron making, FBR)
- TA for Sunshine Programme (PV)
- Implicit TA on nuclear power by National Institute for Research Advancement (NIRA) est. 1974 as a semi-governmental organization- Analysis and evaluation of nuclear power system in collaboration with Atomic Energy Society of Japan (AESJ) from 1974-1979 – emphasis on PWR/ BWR than FBR (by MITI)

METI's Advisory Councils

- Wider societal aspects such as energy security, environment and cost are incorporated formally…
- ACNRE (Advisory Committee on Natural Resources and Energy): basic plans (2003, 2007), forecast for energy supply and demand (2005, 2008), national energy strategy (2006), energy technology strategy (2007, 2008), innovative energy technology plan (2008), technology roadmap (2008)
- Ultra long-term energy technology vision (2005)
- Still limited roles for nuclear power (informal role of local government for siting and restart) and less emphasis on societal vision of renewable

Future Direction: TA Methodology

- Product of TA: Identification of multiple societal impacts (benefits and risks including unintended consequences) or weighting among societal impacts? – answers depending on the nature of politics pursuit – possibility of “Doshoimu” (sharing same bed with different dreams) or value politics?
- Need for comprehensiveness (systemic perspective) or flexibility of framing (beyond ministerial jurisdictions)?
- Controllability of autonomous technology development cf. Reverse adaptation = difficulty of forecasting before embedding

Future Direction: Institutional Design

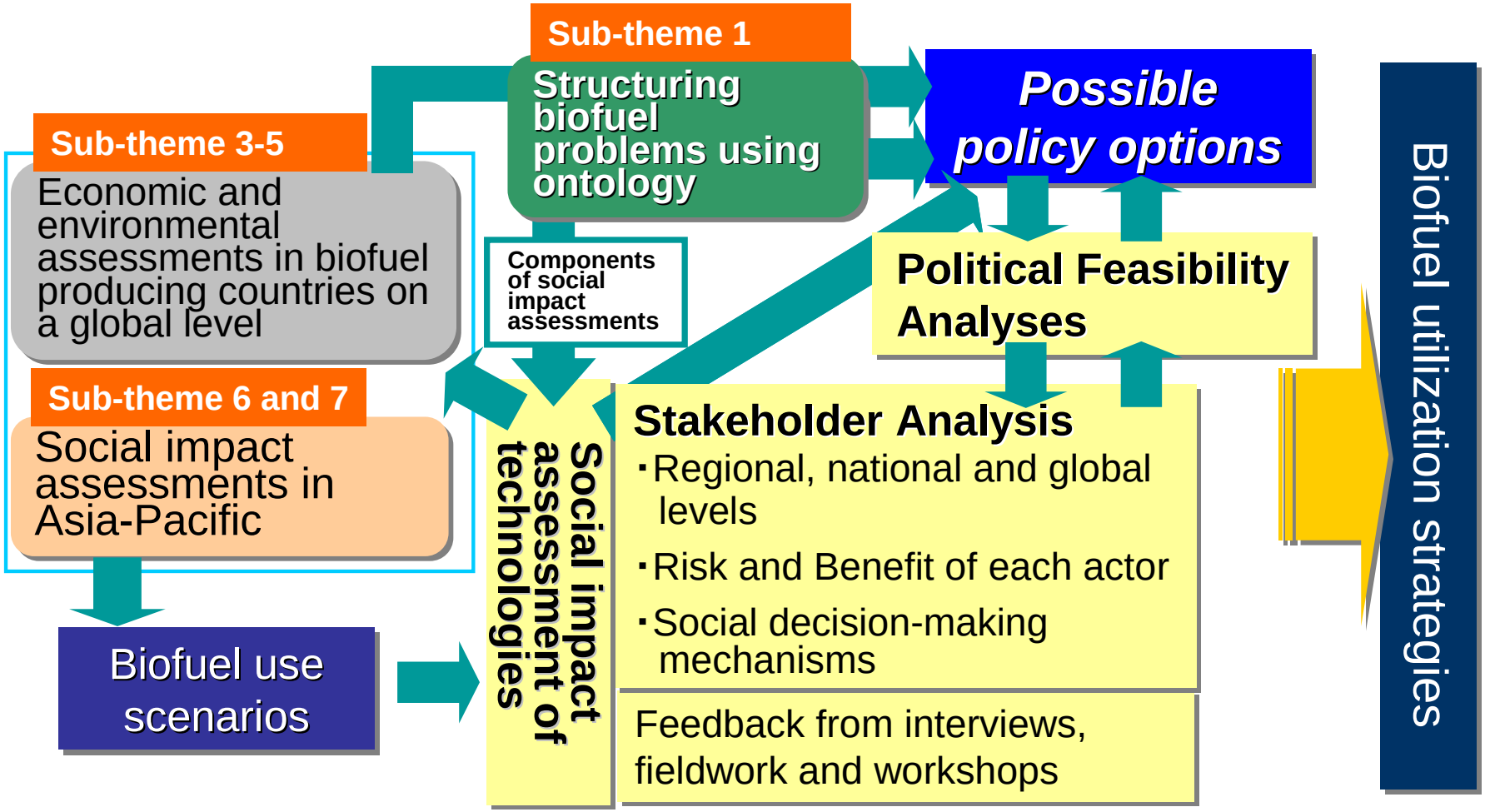
- Who are clients (or addressees)? - Is it favorable to identify multi clients?
- What "independence" required? – independence from sectoral ministries, from cabinet/ruling parties = bipartisan, from government (including parliament)
- Need for review and restructuring of existing governmental and quasi-governmental fragmented TA like organizations – NIRA and IFTEC/ Others (supported by public utilities)- now declining under privatization pressures
- Necessity for combination and division of labor for institutionalization – ex. General TA can support establishment of HTA (the case of US)

Future Direction: Institutional Options

- Parliamentary Organization (including reorganization of Diet Library)
- Governmental Agency (CSTP or Sector Ministries)
- University
- SCJ (Science Council of Japan)
- Quasi-Government or Independent Admin. Agency – lost model or restructuring of RISTEX and JST related funding
- Business Association
- Local government
- Possibility of international TA?- Collaboration with international framework
- Network of fragmented TA

Ex. Collaboration with IR3S

Stakeholder Assessment on Biofuel Use



Case of Brazil－Tentative Findings: Stakeholders

- Firms
  - UNICA (Association of Producers): Concern on surplus capacity
  - New investors: Petrobras (existing oil firm), Toyota, enginerring firms in Brazil, etc.
  - Manufacturer: DEDINI: Internal sales and export
- Government
  - Ministry of Science and Technology: R&D (small size), international cooperation
  - Ministry of Agriculture: Licensing of production firms
  - Research Institute - EMBRAPA－R&D (large), preparation for zoning regulation
  - Ministry of Mine and Energy: quality of biofuel, standardization
  - President: Committment for biofuel, emphasis on cooperation with LA countries
  - BNDES: Concerned about profitability of new investments
- Society
  - NGO
  - Labour Union: Concern about employment
- Overseas
  - US: Internal requirement of blending, customs policy
  - Central America: Production base for bypassing US custon
  - Africa: Potential for development
  - Indonesia: Possibility of cooperation in Asia (not yet except DEDINI)
  - Japan: Import, Possibility of Technical Cooperation (Institute in Tsukuba?)

Tentative Findings: Issues

- Economic Issues
  - Domestic surplus capacity
  - New investment from foreign and new kinds of domestic firms
  - Implementation: Colalboration between energy sector and agricultural sectors
- Social Issues
  - Distribution to poor people
  - Employment：Issues arising from automation
  - Prohibition of burning – labour safety implications (from snakes and scorpion)
  - Possilbe collaboration with African countries
- Environmental Issues
  - Relative size
  - Argument about indirect impacts
  - Zoning issue
  - Environmental impact of burning
- Political Issues
  - Attention to existing producers
  - Resposnes to international anti-bio politics
    - SDG（Sugarcane Discussion Group）
    - 2008.11 World Conference