Redesigning Science & Innovation System and Nanotechnology

March 28, 2012
International Symposium on Assessing the Economic Impact of nanotechnology
OECD,USNNI and AAAS

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Research Institute of S&T for Society (RISTEX) &
Center for Research and Development Strategy (CRDS),
Japan Science & Technology Agency (JST)

Contents

Since 1989

Now 2012

End of the Cold-War
ICT revolution

Globalization ⇒
The Conditions is Changing Rapidly ...

- Sustainable development
- Climate change, Energy & Natural resources
- Water, Health,Food, Biodiversity
- Natural/Artificial Disasters
- Knowledge & Aging society

Disasters

Climate change

Economic & Financial Crises

Since 1989

Nov. 2012

End of th…

The great transformation

Rules of games are changing !!

Shaping the new values and leadership

Changing social norms

Technological and social innovation

Innovation & entrepreneurship

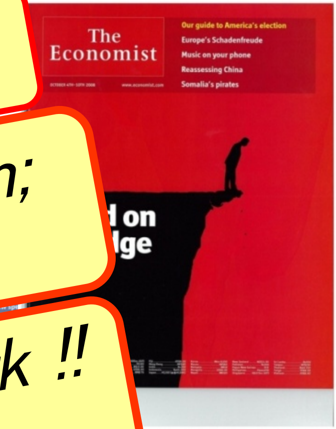
Green new deal & smart ageing society

Redesigning governance of ST and Innovation;

Global, regional, national & local

Breaking the conventional thought framework !!

Shaping new models



- Cl…
- N…
- W…
- Na…
- Kn… & Aging society

…mate change

Economic & Financial Crises

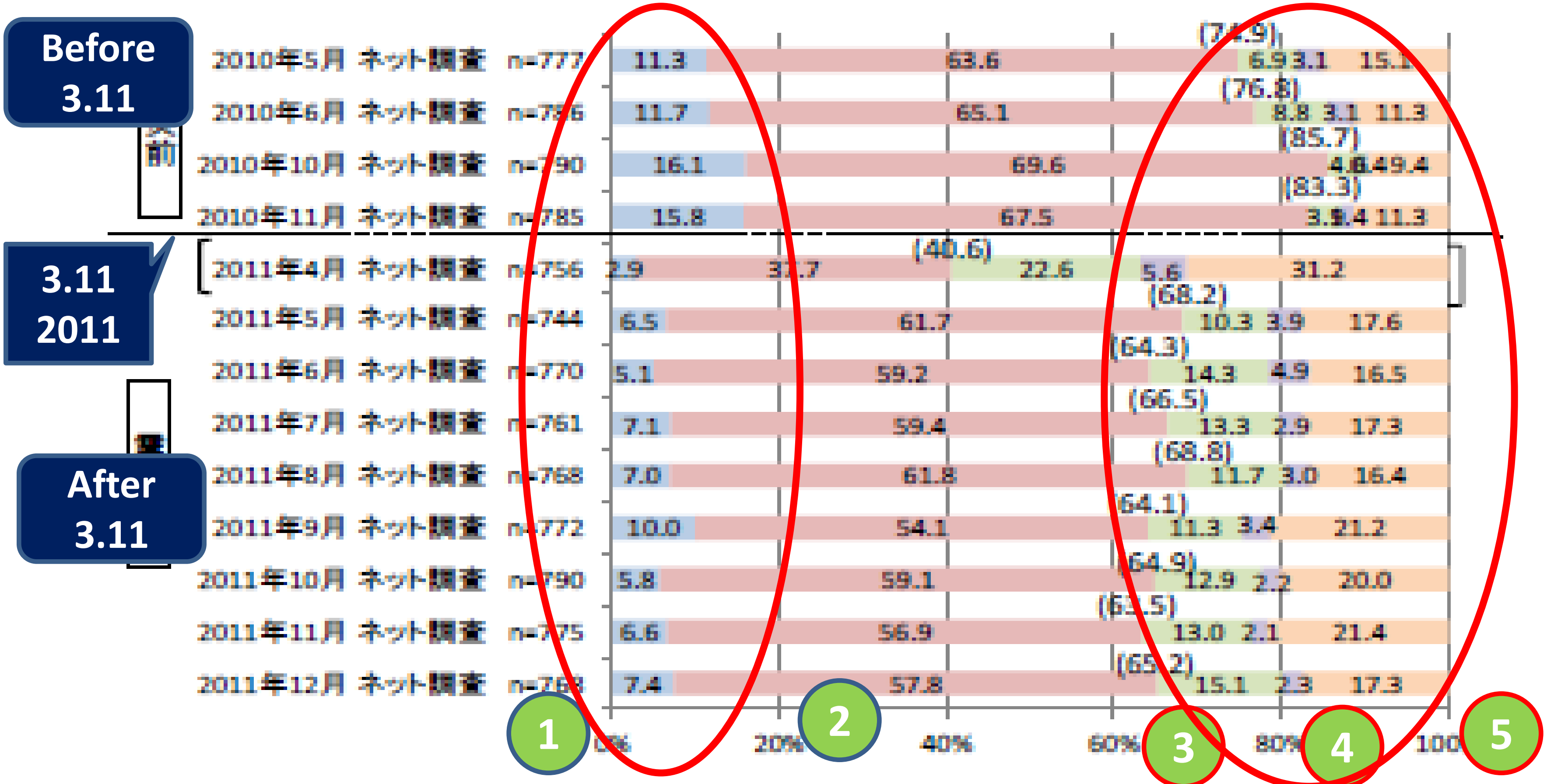
S & T and Innovation in the 21st century

- STI for Profit
- STI for Competitiveness
- STI for Growth
- STI for Employment
- STI for Wellbeing & quality of life
- STI for Safety, security & social cohesion
- STI for Sustainability & resilience

Innovation horizon is expanding.
Redesigning science & innovation system ;
locally, nationally, regionally and globally
Science and technology policy is changing.
"Science of STI policy"

People's distrust of science is growing after 3.11.

National Institute of Science and technology Policy



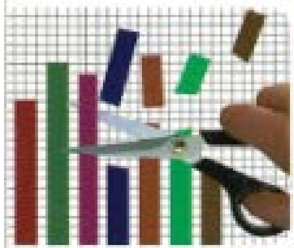
I trust scientists; ①yes, ②rather than.
I distrust scientists ; ③rather than, ④yes. ⑤no response

EDITORIAL

Alan I. Leshner is the chief executive officer of the American Association for the Advancement of Science and executive publisher of *Science*.

Rethinking the Science System

AS THE U.S. BUDGET ENVIRONMENT FOR SCIENCE AND TECHNOLOGY (S&T) THREATENS TO GET WORSE, it is essential for the scientific community to go beyond just advocating for special consideration. There is a strong case for maintaining investments in S&T as a foundation for long-term economic growth and social well-being. But when resources are constrained, it is essential that they be used effectively and efficiently to avoid losing scientific momentum and to ensure that society will benefit maximally from S&T's potential. The scientific community cannot afford to simply adapt passively to reduced budgets. The impact of impending cuts can be at least partially mitigated by some fundamental rethinking of the ways in which S&T are both funded and conducted. Although the United States is used as the example here, the same issues will apply in many other parts of the world.



Some relatively inexpensive process and policy changes could make a big difference. For example, the Federal Demonstration Partnership has reported that 42% of an American scientist's research time is spent on administrative tasks. Much of that burden comes from redundant reporting and assurance requirements that vary across granting agencies and universities. The National Science and Technology Council, which represents all of the U.S. research funding agencies, should intensify its efforts to harmonize funding and reporting policies across granting agencies to reduce wasted effort. As another example, in the face of potentially lower success rates that could end up generating even more proposals to review, new forms of shorter grant proposals or the use of preliminary proposals might help greatly in reducing the burden on funding agency program officers, on already overworked peer reviewers, and on project investigators. New models of streamlined or batch-processed peer review might also substantially improve efficiencies.

Another long-discussed issue that should be addressed at this time concerns funding grants based on detailed project descriptions versus grants based primarily on the accomplishments of the investigator. In a time of very constrained funding, it is not the best use of an established investigator's time to require yet another detailed project description when a simpler approach might suffice for renewal funding decisions. The National Science Foundation's Accomplishment-Based Renewal is one such example, where the decision on whether to renew a grant is based on recent success, rather than on projects yet to come. In considering this kind of approach, it would be important to include mechanisms that avoid skewing review decisions so heavily in the direction of established investigators that young investigators see little opportunity in the system for them. In that context, another approach that should be considered involves putting limits on the number of grants and/or the amount of funding awarded to any single investigator. This would make more funds available for young investigators or those new to the field.

The time is right for a fundamental re-envisioning of the system. Crisis can breed opportunity as well as hardship. Some in-depth analyses of the U.S. S&T enterprise are already under way and can provide excellent starting points for continued discussion. For example, the President's Council of Advisors on Science and Technology is currently studying the U.S. S&T enterprise and writing a report. The National Research Council is nearing completion of a study on the future of research universities. The difficult decisions will, of course, ultimately be made by policy-makers, but these decisions must be informed by a broadly inclusive conversation among all the stakeholders—government agencies and other policy-makers, industry, academia, patient groups, and researchers. The National Institutes of Health has recently sought broad input on its efforts to manage in fiscally challenged times (http://nexus.od.nih.gov/all/rock-talk/), and the S&T community should respond. Although consensus on the specifics may not be possible, the participants in the S&T system must all be willing to entertain truly bold and innovative ideas for moving forward in the new budget climate.

– Alan I. Leshner

10.1126/science.1216286

Science, Nov.11,2011

THIS WEEK

EDITORIALS

Tough choices

Scientists must find ways to make more efficient use of funds — or politicians may do it for them.

Scientists in the United States can find plenty of good news as they page through President Barack Obama's 2013 budget proposal. Despite substantial cuts elsewhere — and fierce pressure from Republicans to cut more — Obama called for healthy overall increases in both fundamental research and science education (see page 283).

But the good news, of course, is tempered by reality. Obama's budget document is one long struggle to balance two contradictory goals: to stimulate the lagging US economy and to curb the annual budget deficit, which is more than US$1 trillion. Science and science education are widely viewed as helping with the first, and will doubtless continue to be seen as such no matter who wins November's presidential election.

The idea that science is a driver of prosperity is one of the few things on which the United States' bitterly divided political parties still agree. But the science funding agencies themselves are by no means immune to the second goal. The harder the cuts bite, the more those agencies will have to streamline their operations and merge or terminate programmes.

This week's budget proposal, which contains many references to "tough choices", shows that this process is already well under way. The Department of Energy (DOE), for example, wants to discontinue funding of several dozen projects that have not met their research milestones, or that seem otherwise unpromising. The National Science Foundation (NSF) is likewise cutting back on some $66 million in lower-priority education, outreach and research programmes. The National Institutes of Health (NIH) has been ordered to pursue "new grant management policies" to increase the number of new grants by 7%. And NASA is being obliged to make drastic cuts to its Mars exploration programme so as to finish building its flagship James Webb Space Telescope.

Conceivably, this process could get even more drastic. Last month, Obama asked Congress to give him the authority to consolidate and streamline agencies on his own initiative — and suggested that one early application would be to transfer the National Oceanic and Atmospheric Administration from the Department of Commerce to the Department of the Interior. If Congress were to give Obama that power, it is possible to imagine him — or some future Republican president — sending all of the NSF's science-education programmes to the Department of Education, or merging the DOE's particle and nuclear physics research into the NSF, under the guise of making management of science more efficient.

White House officials insist that no one in the administration is even contemplating such a wholesale restructuring. But the arithmetic of the deficit is unavoidable. Individual researchers, scientific societies and science funding agencies can no longer afford to be purely reactive, responding to each cut as it comes along. They need to be part of the debate, thinking systematically about how programmes and even whole agencies could be restructured to make them more efficient at using the scarce funds available, and more effective at promoting the best science.

"Researchers, societies and funding agencies can no longer afford to be purely reactive."

To do that, and to address the increasing demands from politicians and voters for evidence that fundamental research is useful, scientists must also find better ways to measure the effectiveness of the nation's investments in science. The usual technique is to insist that principal investigators produce more and more reports, which tends to be a waste of everyone's time. A consortium of six universities called Star Metrics, launched in 2010 and headquartered at the NIH, has shown that it is possible to do better by using natural language processing and other tools to mine the data and reports that the agencies already collect. But even that is just a beginning. Researchers and research institutions need to help to devise still better measures — because if they don't do it themselves, politicians and others who know much less about science may very well do it for them. And who knows where that would end. ■

Nature, Feb.16,2012

Contents

New Perspectives of STI (No.1)

- Gravity of Scientific Activities Moving to Developing Countries

  "Silent Sputnik" (Obama, Rita Colwell);

  - AAAS2010 : "Bridging Science and Society"
  - AAAS2011 : "Science without Borders"
  - AAAS2012 : "Flattering the world : Building the 21st C. Global Knowledge Society"
  - WSF2011: "The Changing Landscape of Science : Challenges & Opportunities"

- Globalization and Localization

  Climate change, energy problems, economic & financial crises, disasters, unemployment, poverty, aging society etc.

  Reshaping the values and leadership principles

- Global and regional governance of science, Science diplomacy

  Bridging science and society

  Scientific integrity, ethics and resilience to risk

- New Innovation Models;

  "Disruptive" Innovation,

  "Reverse" and "Frugal" Innovation

New Perspectives of STI (No.2)

◆Policy

- Breaking the conventional thought framework of traditional science policy
- Issue-driven S&T policy,

◆System

- Redesigning STI and evaluation system
- Network, platform & connectivity for innovation

  NOE(Network of Excellences), Open innovation,

  Beyond the boundaries; disciplines, organizations, nations

  Non-traditional players and partnership

  System of systems; global/regional/national/local

◆Human capital

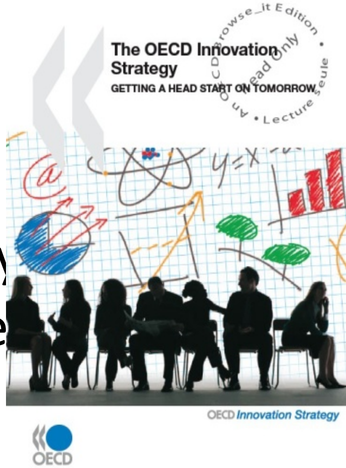
Design and system thinking, non-traditional skills and sense,
diversity and inclusiveness, collective intelligence,
foresight under the complex and uncertain world

➡ **Redesigning governance of STI system**
Science of science, technology & innovation policy

The OECD Innovation Strategy : *Getting A Head Start On Tomorrow , May 2010*

In the post-crisis world, and with a still fragile recovery, we are facing significant economic, environmental and social challenges. While no single policy instrument holds all the answers, innovation is the key ingredient of any effort to improve people's quality of life. It is also essential for addressing some of society's most pressing issues, such as climate change, health and poverty.

Innovation today is a pervasive phenomenon and involves a wide range of actors than ever before. Once largely carried out by research and university laboratories in the private and government sectors, it is now also the domain of civil society, philanthropic organizations and indeed individuals. Therefore, policies to promote it should be adapted to today's environment and equip a wide variety of actors to undertake innovative actions and benefit from its results. Effective mechanisms for international co-operation in science, technology and innovation will also need to be put in place in order to make innovation an engine for development and growth.



The OECD Innovation Strategy

The last few years have seen a burst of interest in steering research and innovation to address social challenges. This interest reflects the rise of "**social innovation**", the use of innovation to address social problems. Many of today's social challenges, such as those associated with ageing populations and environmental sustainability, as well as longstanding problems such as poverty, education and migration, **have resisted conventional government or market solutions.** ....

.......They can in fact be complementary, but this will require changes to the way policy makers promote innovation, for example **by involving stakeholders so as to link social demands with research agendas.**

...... Given **the multidisciplinary nature of many social problems**, research to address them must **bring together the natural and social sciences.**

"The Age of Trans-Science"

" Many of the issues which arise in the course of the <u>interaction between science or technology and society</u>---*e.g.,* the deleterious side effects of technology, or the attempts to deal with social problems through the procedures of science---hang on the answers to <u>questions which can be asked science and yet, *which cannot be answered by science*</u>*.* I propose the term <u>*trans-scientific*</u> for these questions since, though they are, epistemologically speaking, questions of fact and can be stated in the language of science, <u>they are unanswerable by science; they transcend science</u>."

Alvin M. Weinberg,
"Science and Trans-Science" (1972)

Contents

1. Evolution of Nanotechnology

1980 1990 2000 2010 2020

ERATO(1981) JRCAT(1992) | *NNI and national nanotech projects*

Progress Nano (1st generation)

Progress of Nano-world (1-100nm) in each independent discipline via top-down, bottom-up or combination process

TEM,STM,ALE,lithography, CNT, computer science, omics

Fusion Nano (2nd generation)

Interdisciplinary fusion of nano-worlds of different disciplines, producing new function of material, process or device

low-k material via block-copolymer process, chemical biology

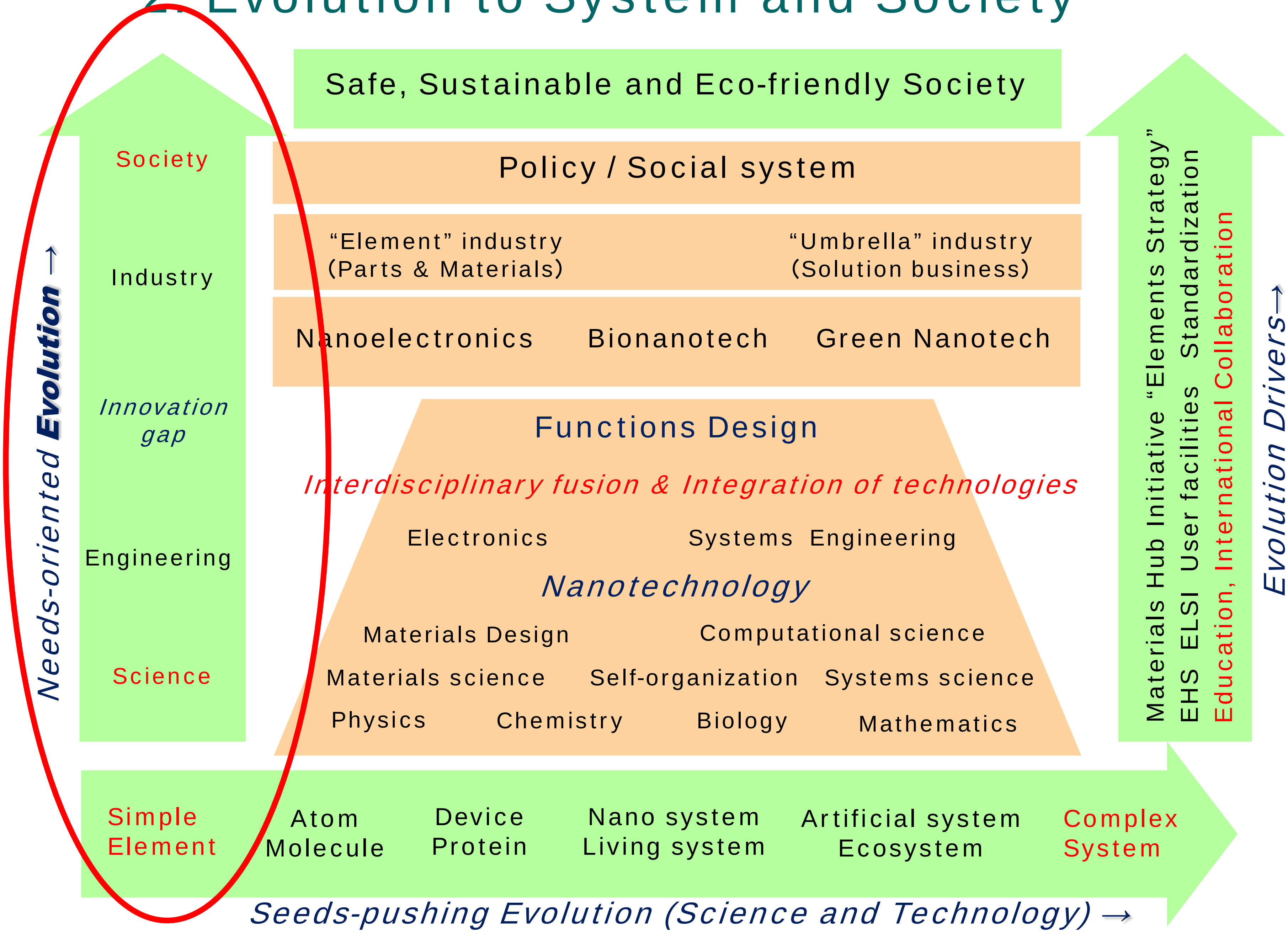
Systems Nano

Integration of various nano-worlds into functional systems

materials design, molecular electronics, ceranostic medicine, hierarchical self-assembly of systems (→innovative products)

Engine for Innovation

2. Evolution to System and Society



The 4th Basic Plan for Science and Technology, Government of Japan, August 2011 after the March 11

I. Basic Concept

1. Unprecedented Crises of Japan and Change of the World
2. 1st-3rd Basic Plans' achievements and problems
3. S&T policy to S&T and innovation policy; Issue-driven beyond discipline-based innovation

Issue-driven STI policy

II. Realization of Sustainable Growth into the Future and Social Development

1. Realization of **Recovery and Reconstruction** from the Disasters
2. Promotion of **green innovation**
3. Promotion of **life innovation**
4. System reforms: **Innovation platforms**

…nd

…and infrastructure

III. A… …nges facing Japan

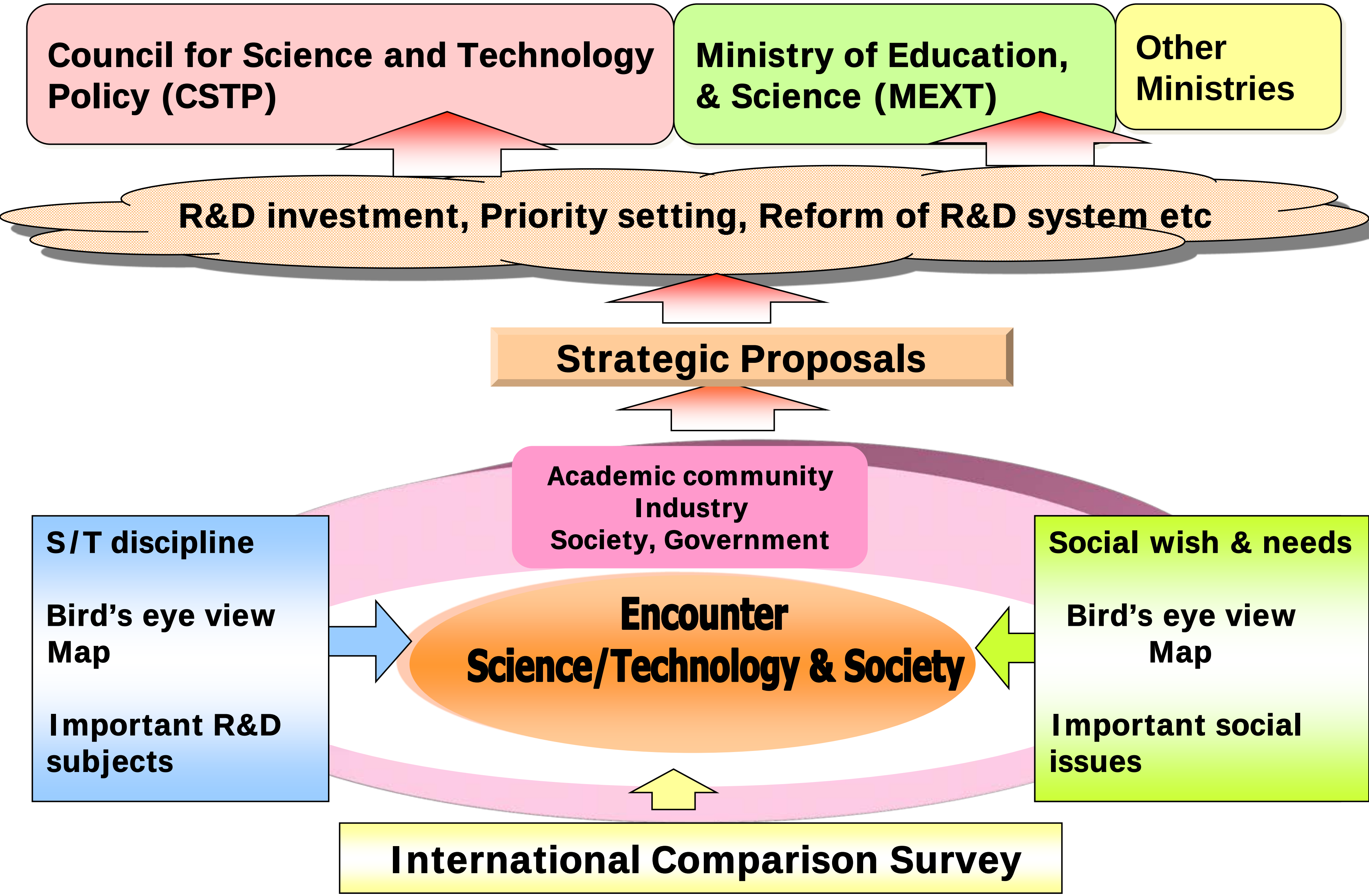
1. Basic…
2. Promotion of measures to attain key challenges
3. System reforms to attain key challenges (same as II.5)
4. Strategic development of globally integrated activities "East Asian Science and Innovation Area (e-ASIA)"

***Bridging science & society**
***Promoting Science of STI Policy**
***Public participation**
***Addressing ethical, legal and social issues(ELSI) & technology assessment (TA)**
***Science communication**

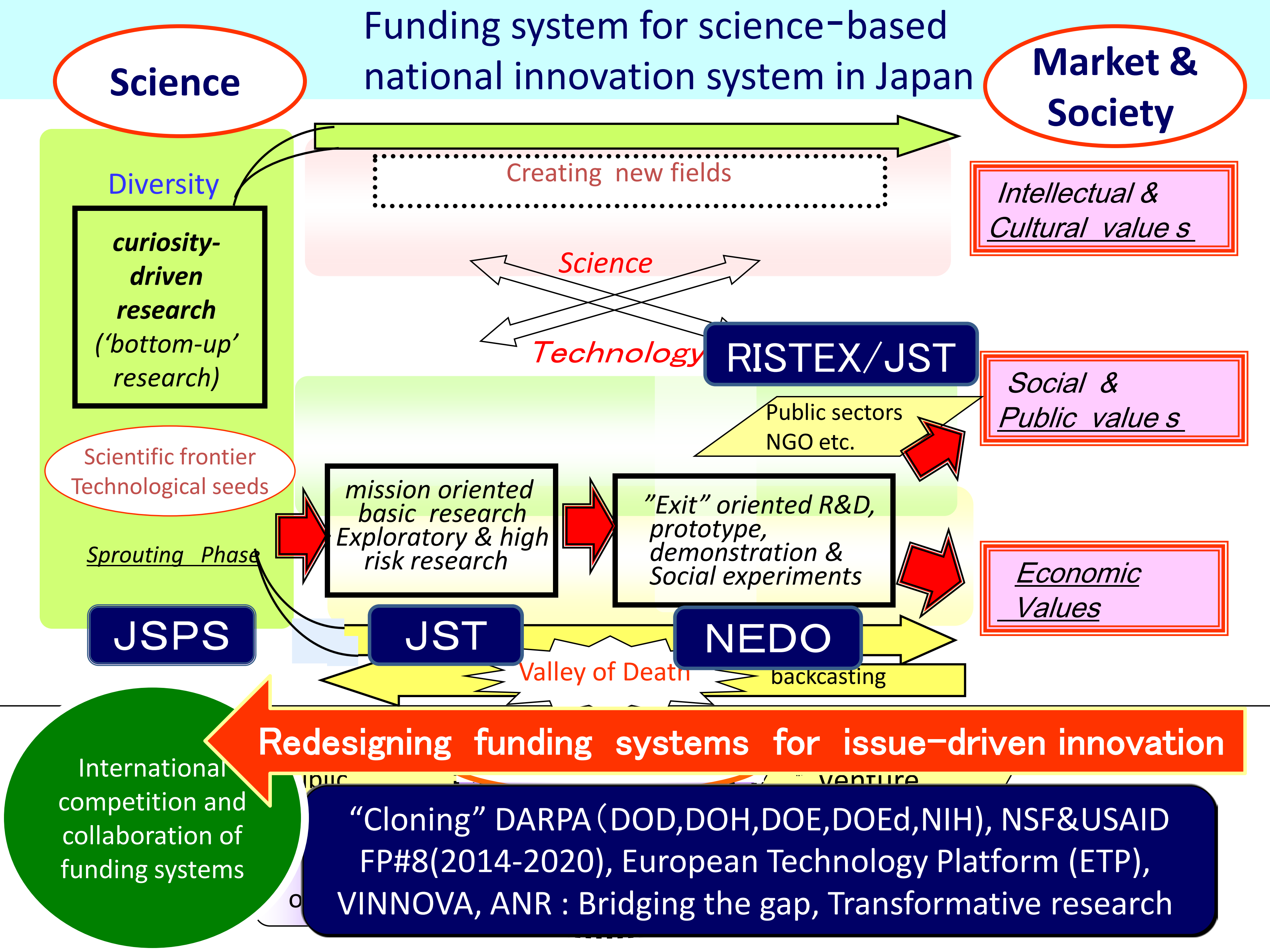
V. Science and society

…elopment of policies together with society -

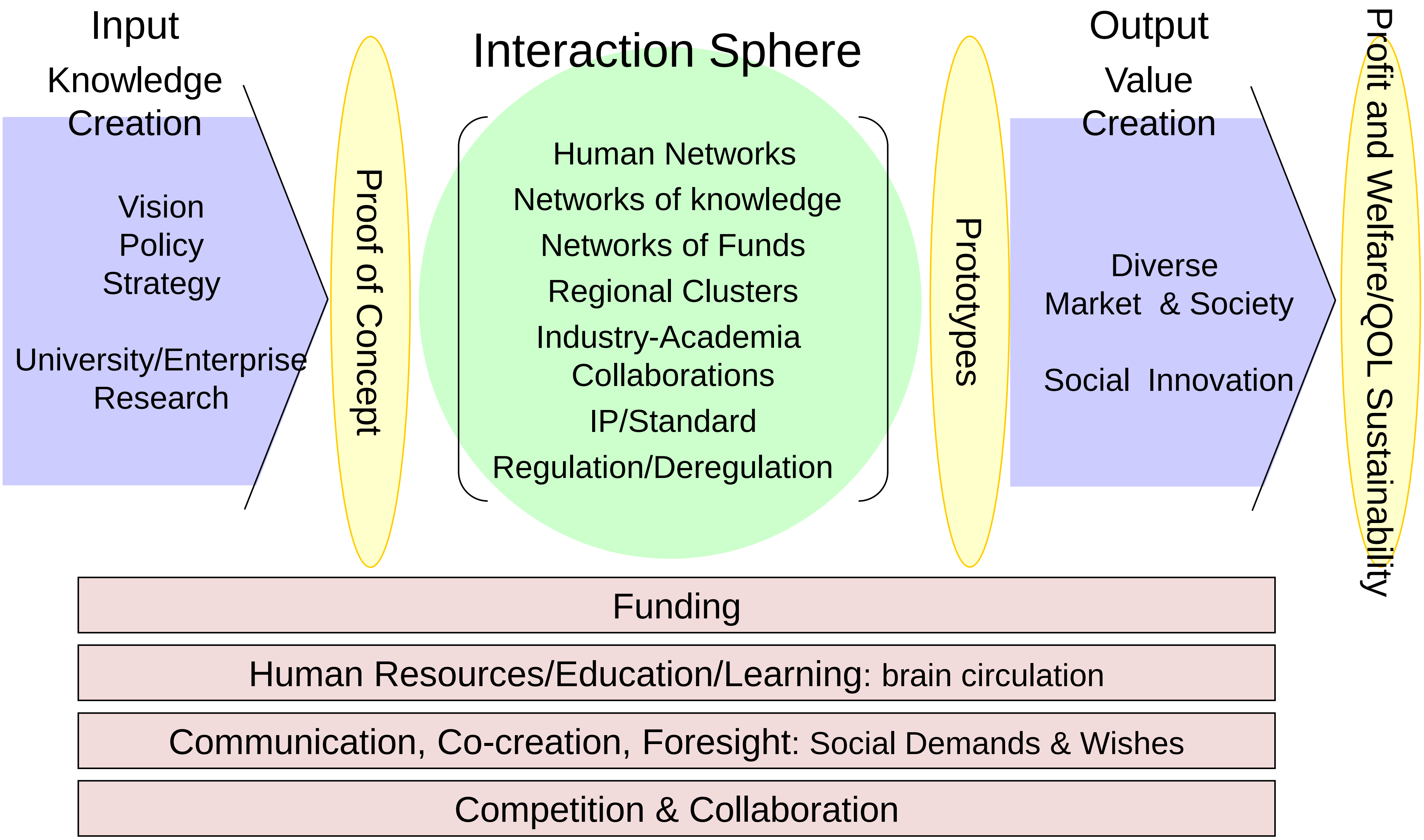
1. Basic principle
2. Deepening relations between society and science/technology innovation
3. Promoting effective STI policy
4. Expanding R&D investment



Center for R&D Strategy/JST


Funding system for science-based national innovation system in Japan
Science
Market & Society
Diversity
curiosity-driven research
('bottom-up' research)
Creating new fields
Science
Technology
RISTEX/JST
Intellectual & Cultural value s
Social & Public value s
Public sectors
NGO etc.
Scientific frontier
Technological seeds
Sprouting Phase
mission oriented basic research
Exploratory & high risk research
"Exit" oriented R&D, prototype, demonstration & Social experiments
Economic Values
JSPS
JST
NEDO
Valley of Death
backcasting
Redesigning funding systems for issue-driven innovation
International competition and collaboration of funding systems
"Cloning" DARPA (DOD,DOH,DOE,DOEd,NIH), NSF&USAID
FP#8(2014-2020), European Technology Platform (ETP),
VINNOVA, ANR : Bridging the gap, Transformative research

Innovation Ecosystem; [Global, Regional, National & Local]



Contents

Japan's Science of STI Policy :Rationale and Objective

○ Growing expectations for Science, Technology and Innovation (STI) to cope with societal challenges, in responding appropriately to economic and social structural changes.

Multifaceted understanding and analyzing the economic and social conditions, societal challenges, and the present states and potential of science and technology which is necessary to cope with the challenges.

Evidence-based policy-formation through more rational process is required.

○ Deepening the understanding the processes among Science, Technology and Innovation, and visualizing the social and economic impact of STI policy.
The results must be utilized in the actual policy-formation, ensuring transparency in decision-making in order to meet accountability to the public.

○ Making use of evidence as shared social resources, which servers as a foundation for public participation in policy-formation.

Developing "Science of STI Policy" to realize evidence-based policy-formation.

Rationale and Objective（Contd.）

<u>After the Great East Japan Earthquake</u>

〇 <u>Demand for policy reappraisal</u> for the realization of a safe and secure society, stable energy supplies and dissemination of renewable energy.

〇 Renewed <u>awareness of the limits of Science and Technology</u>, which require for reappraisal of previous policies.

〇 <u>High expectations for the role of Science and Technology</u> to contribute to address social issues facing Japan for the recovery from the disaster and promote the sustainable growth and development of social economy.

〇 Need to conduct serious and objective reviews of previous policies to rethink <u>the proper role of Science and Technology</u>, and to find <u>a vision and strategy of how science and technology can contribute to the society</u>.

Now is the time to promote "Science of STI Policy" to advance evidence-based policy-formation.

Philosophy of Design

The Science of STI policy should be designed based on the following philosophies:

1. Forming policy with scientific rationality and scientific integrity

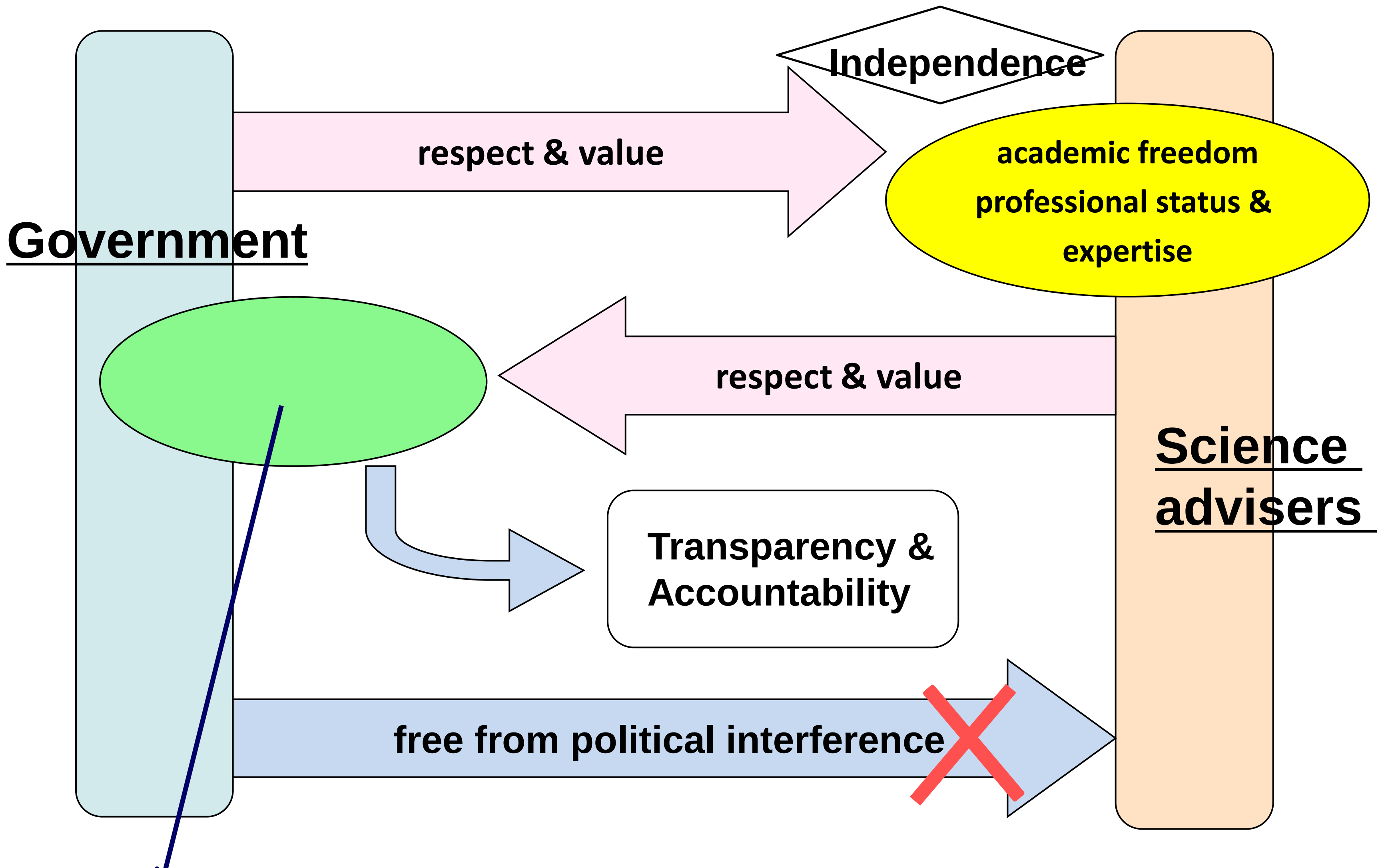
2. Realizing rational policy-forming process

3. Increasing transparency of policy-forming process and assure accountability for the public

4. Making knowledge obtained from the Science of STI policy available to the public

5. Establishing collaborations among stakeholders, to engage appropriately in policy-formation, under the defined functional roles and responsibilities

"Principles of Scientific Advice to Government"（March 24, 2010）,
UK Department of Business, Innovation, and Skills.



“ Scientific advisers should respect the democratic mandate of the Government to take decisions based on a wide range of factors and recognize that science is only part of the evidence that Government must consider in developing policy.”

Guiding Principle

The guiding principles to realize the philosophy are as follows:

1. Realize co-evolution of policy-formation mechanism and the Science of STI Policy

2. Facilitate public participation in policy-formation process by presenting evidence-based alternative policy menu (*)

3. Develop the Science of STI policy through collaborations among various natural and social scientific fields. Use the knowledge which is collected, accumulated and structuralized from the Science of STI policy, as common assets of the society, to inform and guide policy-formation.

4. Define functional roles and responsibilities of government, science community, industries and the public in policy-formation, to collaborate appropriately. Then establish code of conduct for each party.

5. Foster human resources who take leading roles in innovative policy-formation process and the Science of STI policy. Build communities and networks for them. Improve environments that enable them to be active across organizations and internationally.

(*) "policy menu" is defined as combination of alternative policy instruments with description of its estimated social and economic impacts.

Japan's "Science of Science, Technology and Innovation Policy" Program

Rationales

Draft Budget for FY2012: 1,077 million yen
Budget for FY2011: 802 million yen)

○Measuring and showing impacts and effects of public R&D investment scientifically is necessary for gaining public understanding for "advance investment in the future".
○ Development of systematic and international comparable STI data infrastructure is inevitable for evidence-based policy-making.
○ Vigorous investment in human resource development and enhancing the diversity of career path among sectors are essential for securing and capacity-building of personnel for evidence-based policy-making, who can handle the wide-range of STI policy field.

"Science of Science, Technology and Innovation Policy" Program

The ultimate goal is to realize "policy formation based on objective evidence", which tries to make Policy more effective to address policy challenges, based on observations and analysis of social and economic states from various aspects.

Comprehensive management system

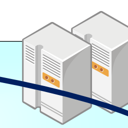
・Set up a steering committee to design and supervise the entire program.
・Set up an office responsible for supporting the steering committee at MEX

Administration

Mission-oriented investigation and research

・Conduct investigations and researches in response to short- and mid-term policy issues.
(Focusing on Measuring the impacts of R&D investment for the time being)

Active collaboration Building a community

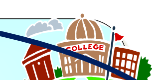


Data-infrastructure

・Create data infrastructure systematically and continuously to develop "Science of STI Policy"
・Enhance environment s for utilizing data

Competitive Research Grant Program

・Develop Methodologies, tools and Models for Science of STI Policy, expected to contribute in the medium and long terms.
(The MEXT gives the basic policy for the grant program.)

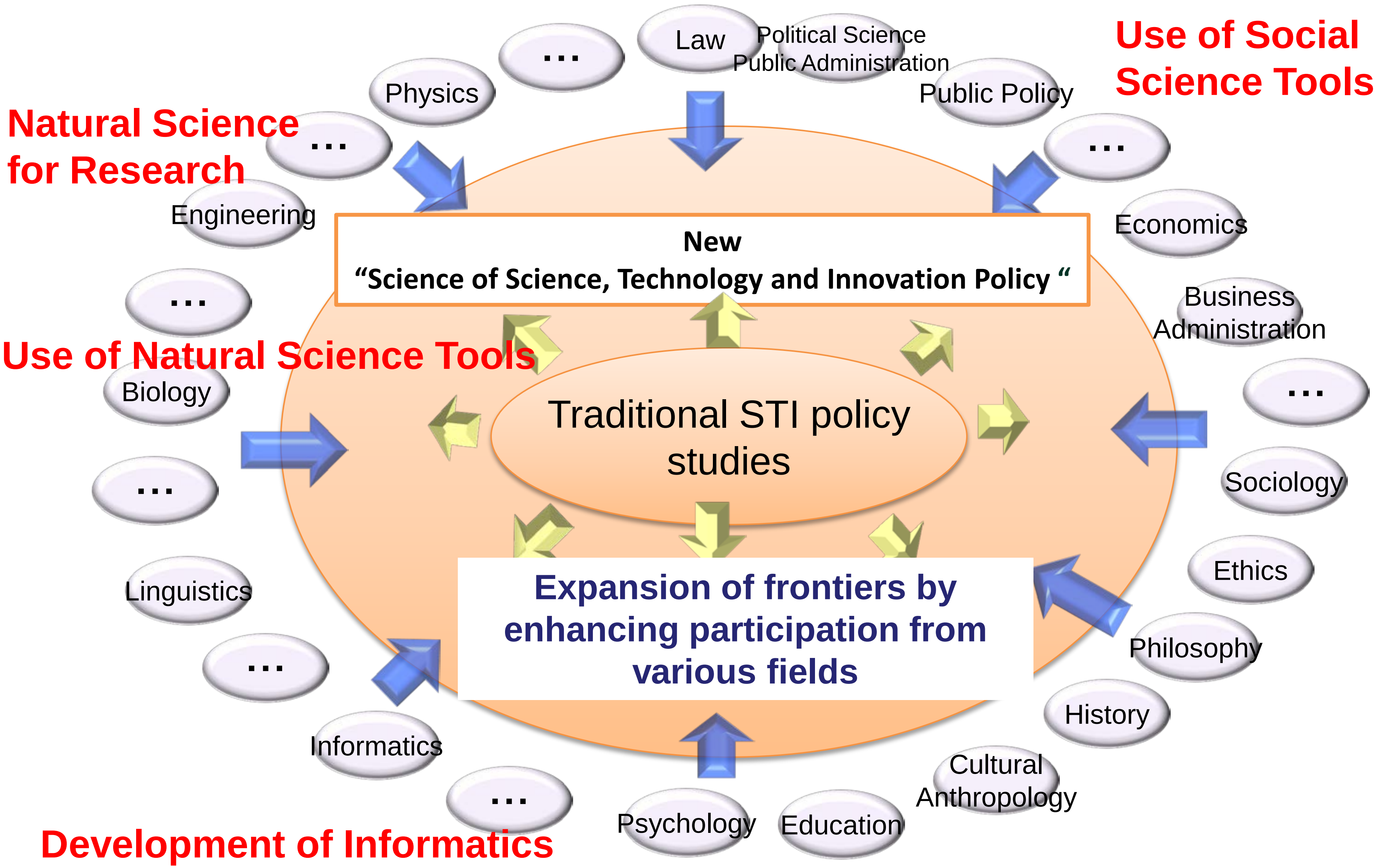


Universities and networks for human resources development

・Foster policy-makers and researchers promoting "Science of STI policy"
・Build Networks among hubs and with other institutions

Academy

"Science of Science, Technology and Innovation Policy" : Expansion of frontier by participation from related fields



(Note) Academic fields in outer circles are for illustrative purpose.

The "Science of STI Policy" Needs to Answer Important Questions

Society

Science, Technology and Innovation (STI) System

Policy Formation Process

Cultivating community of practice on SciSIP across academia, industry and the public

Understanding the Social and Economic Impacts of STI Policy

- **How can we evaluate the impacts of STI Policy?**
  - What is the outcome? How to evaluate economic and social value **?**
- **What are the differences in outcomes among alternative policy instruments? How can we measure them?** etc.

Understanding the Dynamics of STI System

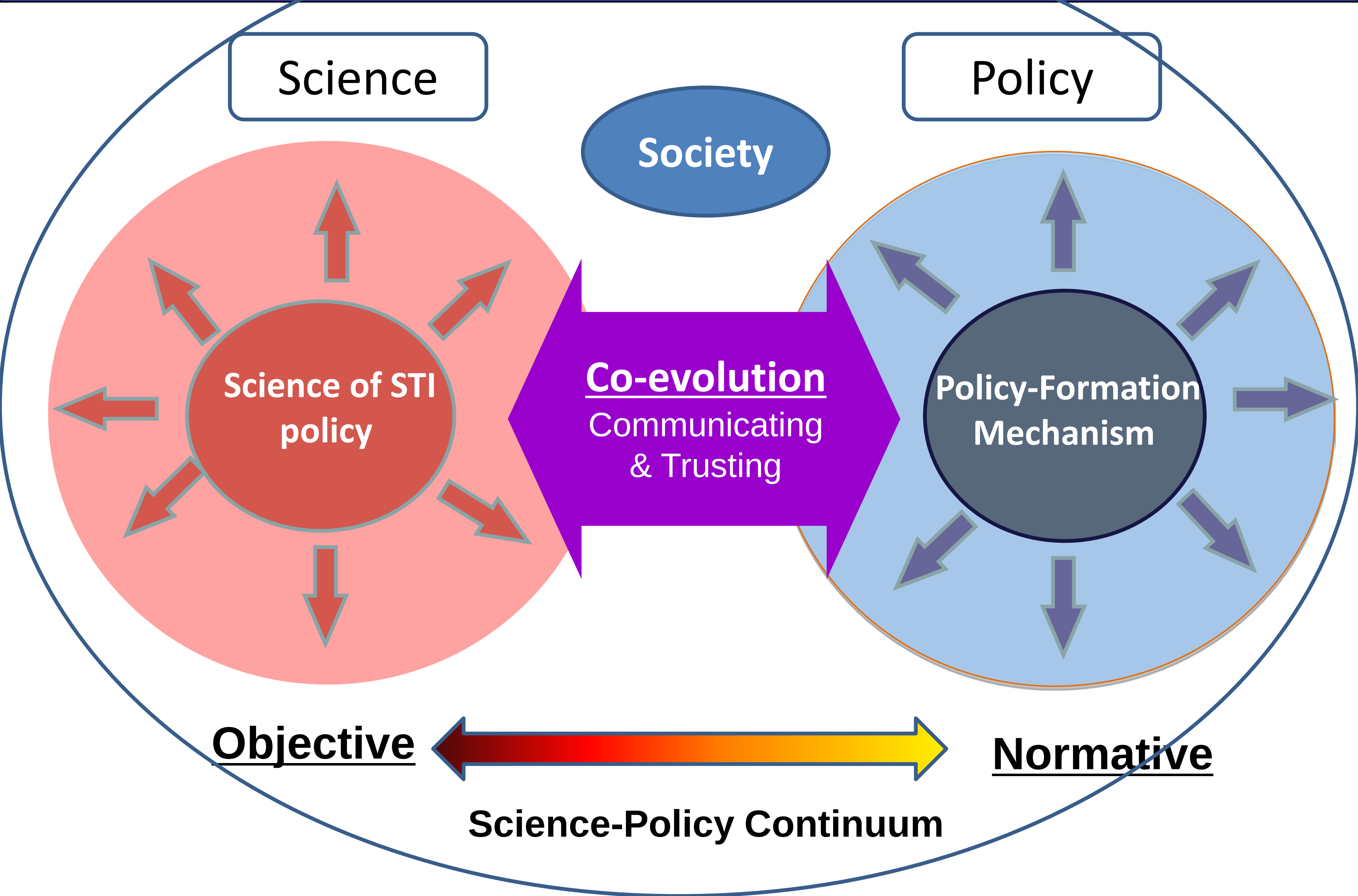
- **What is the process involved in STI?**
  - Who are the main actors?
  - What is needed ? (Finance, HR, Infrastructure, Management)?
  - Diffusion and adoption process of ST
  - Barriers to STI
  - Interaction with other types of innovation (ex. Social innovation) etc.
- **What is the government role in STI Process?**

Understanding Policy Formation Process and its Interaction with Society

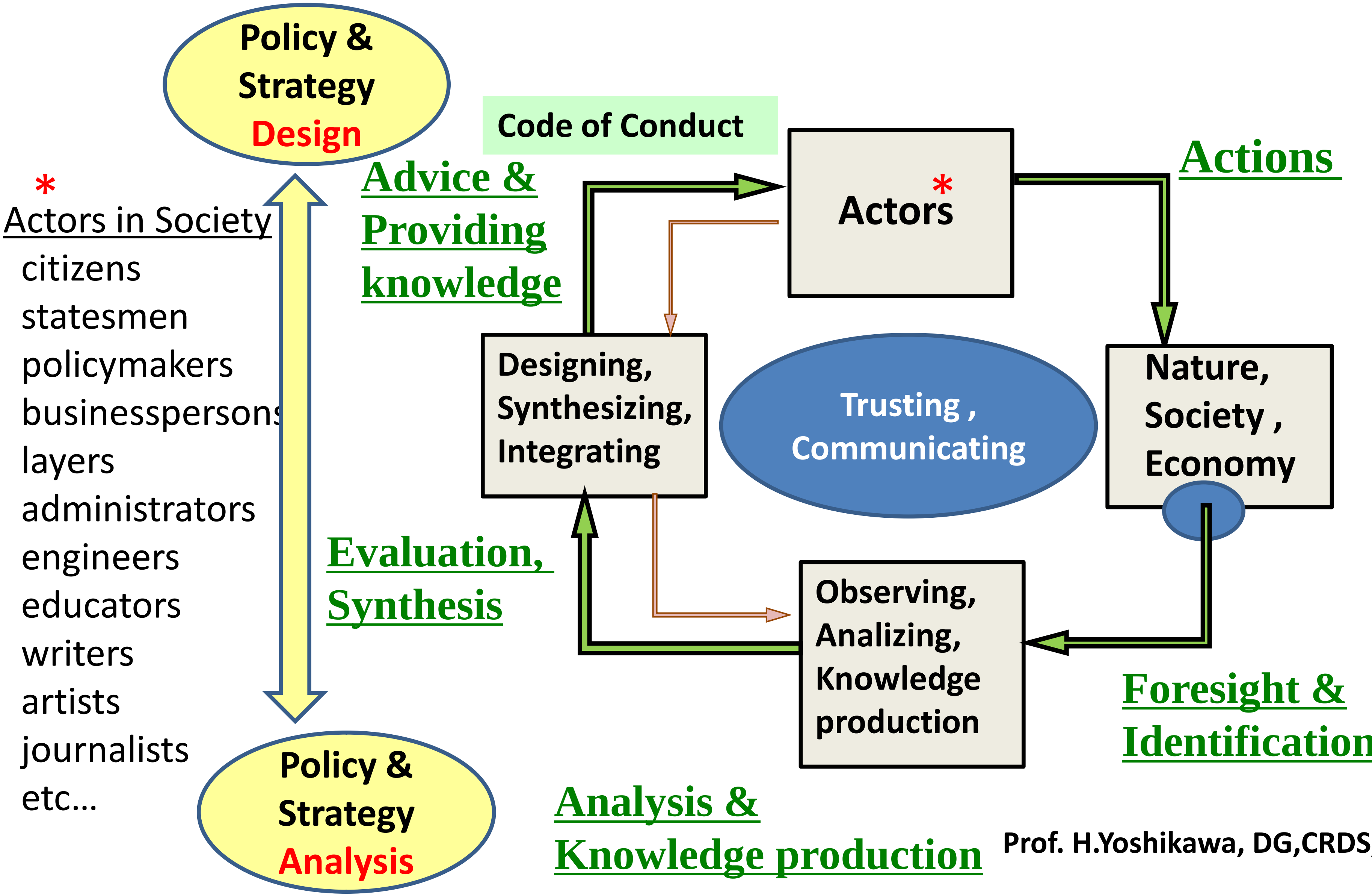
- **What is the objective of STI Policy?**
- **How do we identify and select societal challenges to be addressed by STI Policy ?**
- **What is the process of STI Policy Formation? Who are involved?**
- **How is it possible to build consensus in STI policy formation?**
- **What is the relationship between STI Policy and other policy areas? Any synergetic effects or impediments?** etc.

Contents

Co-evolutionary development of "Science of STI Policy" and "Policy Formation Mechanism"



Basic Loop for Sustainable & Resilient Society
－ Role of Scientists and Actors in Society －



Prof. H.Yoshikawa, DG,CRDS/JST

New Social Contract for Nanotechnology in next decades

- ○Nanotechnology for Knowledge
- ○Nanotechnology for Peace
- ○Nanotechnology for Sustainability
- ○Nanotechnology in Society and for Society

*Be Socially Trusted
*Be Socially Embedded
*Shaping New Values and Social Transformation
*Beyond the Boundaries
*Fuse Intellectual Disciplines
*Enabling young students success

World Science Conference
(UNESCO/ICSU)
'Declaration on Science and
the Use of Scientific Knowledge'
- Science for the 21st Century
A New Commitment -

20th Century	21st Century
☆ Science for knowledge	☆ Science for knowledge
Knowledge for progress	☆ Science for peace
	☆ Science for Development
	☆ Science in society & Science for society

"Budapest Declaration"
World Science Forum 1999 - 2011

Thank you very much for your attention!!

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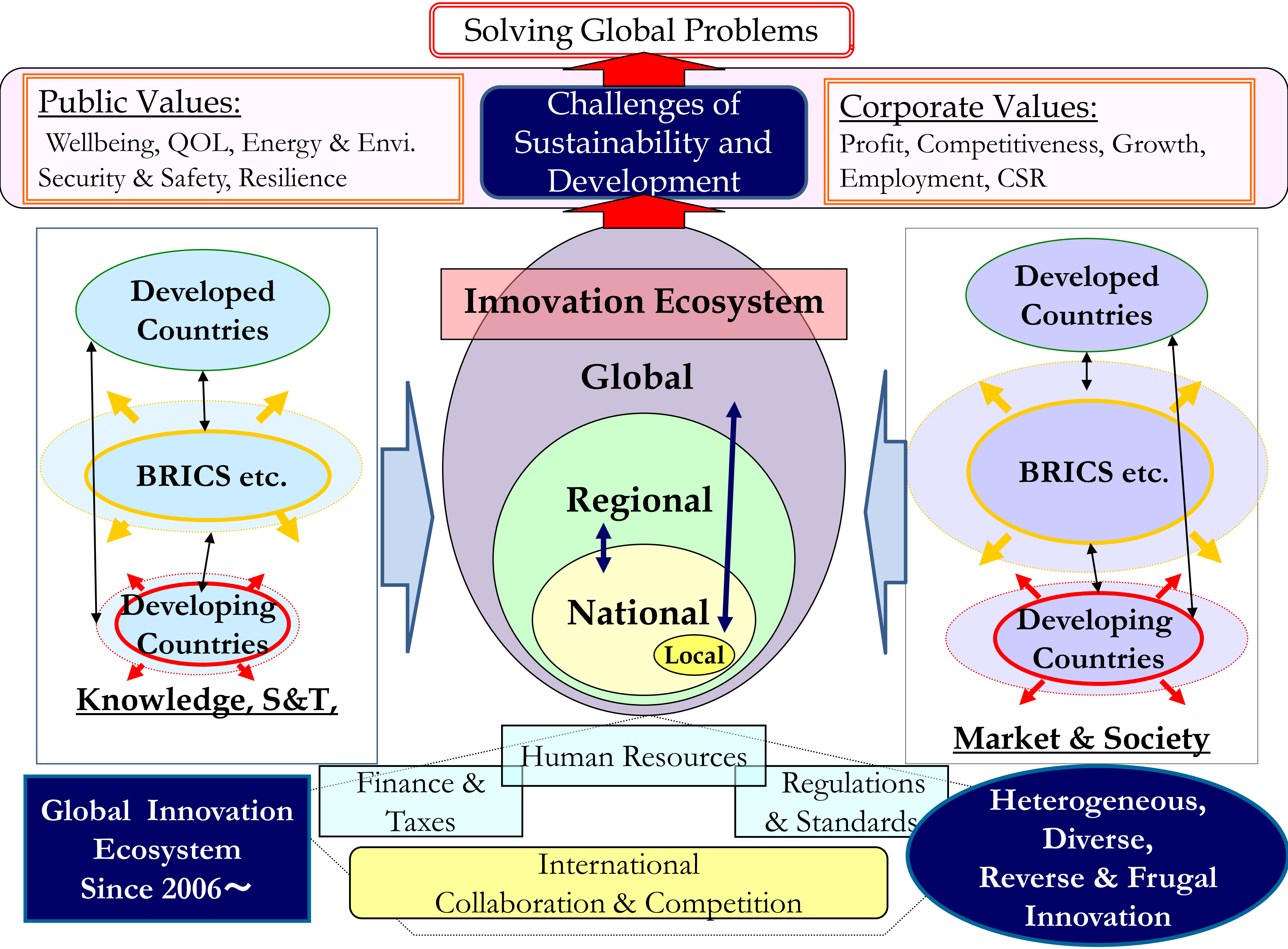
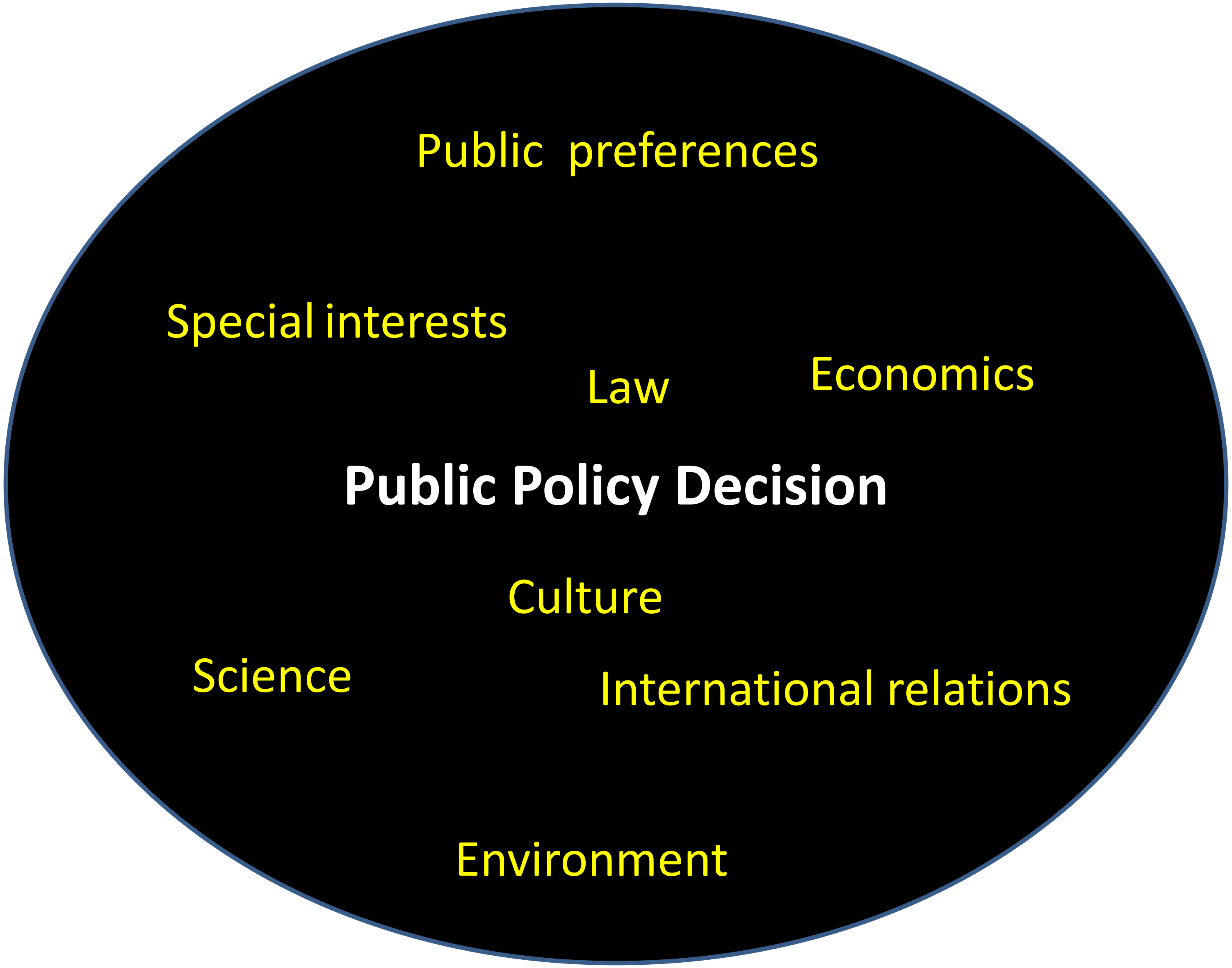

Solving Global Problems
Public Values:
Wellbeing, QOL, Energy & Envi.
Security & Safety, Resilience
Challenges of Sustainability and Development
Corporate Values:
Profit, Competitiveness, Growth,
Employment, CSR
Developed Countries
BRICS etc.
Developing Countries
Knowledge, S&T,
Innovation Ecosystem
Global
Regional
National
Local
Developed Countries
BRICS etc.
Developing Countries
Market & Society
Human Resources
Finance & Taxes
Regulations & Standards
International Collaboration & Competition
Global Innovation Ecosystem Since 2006～
Heterogeneous, Diverse, Reverse & Frugal Innovation


Public preferences
Special interests
Law
Economics
Public Policy Decision
Culture
Science
International relations
Environment

"Hub Institutions for Fundamental Research and Human Resource Development Program" - Japan's "Science of STI Policy"-

GRIPS
National Graduate Institute for Policy Studies

▪Establish a master's program and doctoral program in the "Science of STI policy"
▪Guide inter-hub collaboration and promote the development of the academic discipline and community

The University of Tokyo

•Focused area: Public policy and engineering
•Establish an interdepartmental education program within existing postgraduate program

Osaka University (Jointly with Kyoto University)

•Focused area: Ethical, legal and social issues (ELSI) in science and technology
•Establish a minor specialization as a part of existing master's programs

Joint Program

- Provide opportunities for gatherings : Seminars, summer-camps, etc.,
- Share characteristic curriculums of each institution etc.,

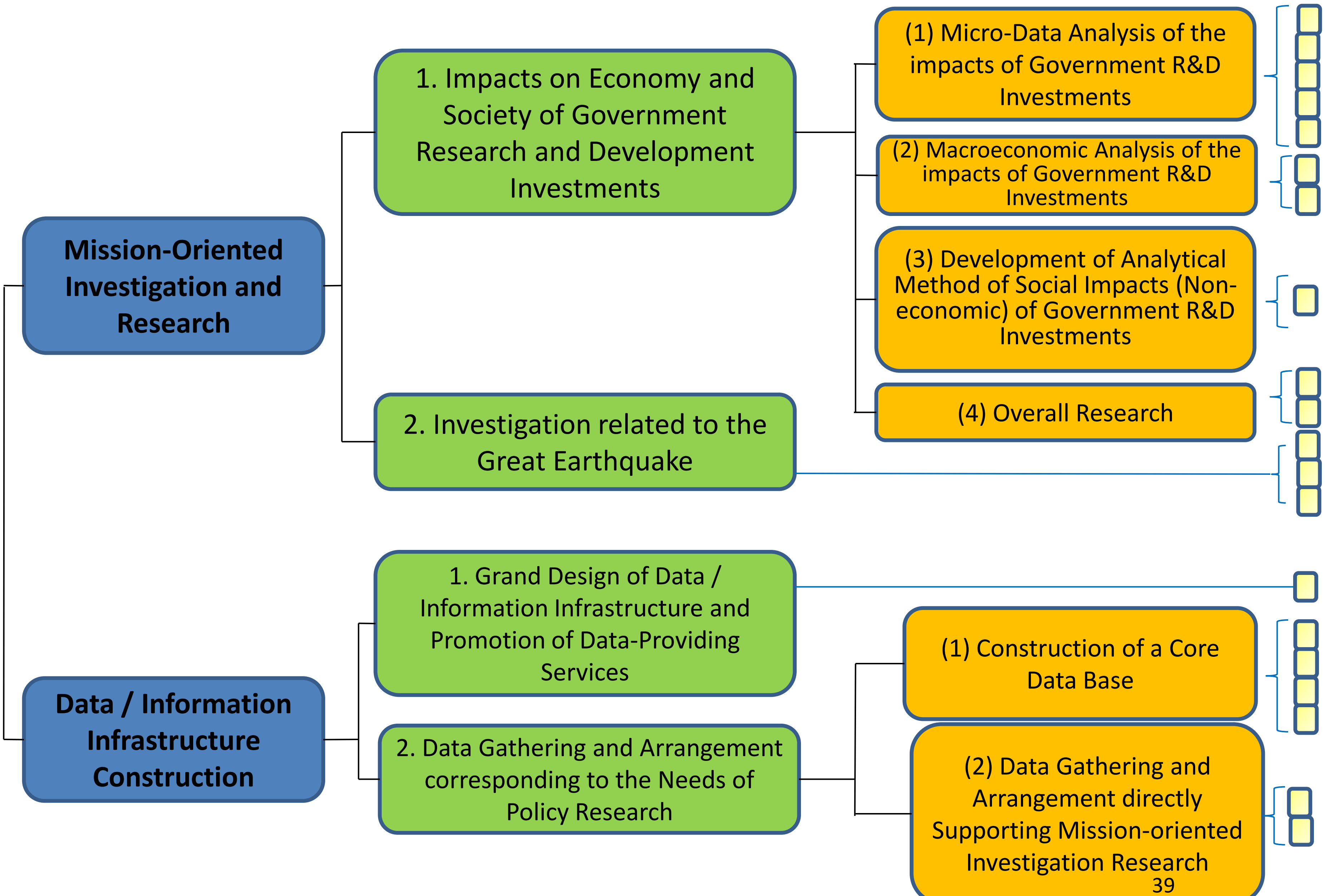
Hitotsubashi University

▪Focused area: Interdisciplinary innovation research with a foundation in social sciences including management and economics
▪Establish a doctoral-level certificate course

Kyushu University

•Focused area: East Asian and regional innovation,
•Establish a specialized course consisting of interdisciplinary postgraduate subjects

NISTEP: Structure of NISTEP SciSIP Research, “Mission-oriented investigation & research, and Data-infrastructure”



NISTEP(1)Themes of the Mission-oriented Investigation Research

1. Impacts on Economy and Society of Government Research and Development Investments	(1) Micro-Data Analysis of the Impacts of Government R&D Investments	①Micro-data Analysis of Immaterial Assets, Innovation, and Productivity
		②Investigation on Innovation: Following up the 2nd Investigation and Conducting the 3rd Investigation
		③Analysis of R&D Investment and Economic Impacts in Specific Fields, Areas, or Polices [FS]*
		④Investigation Research of Knowledge Transfer between Universities or Institutes and Businesses
		⑤Analysis of the Impacts of Knowhow or Trade Secrets on Innovation Outcomes of Businesses
	(2) Macroeconomic Analysis of the Impacts of Government R&D Investments	①Improvement of the Macro-Economic Model developed in NISTEP
		②Analysis and Prediction of the Effects of Government R&D Investment using Dynamic General Equilibrium Macro Model
	(3) Development of Analytical Method of Social Impacts (Non-economic) of Government R&D Investments	①Extraction of Quantitative Indices of Social Impacts of Innovations given by Government R&D Investments, and Case Studies [FS]*
	(4) Overall Research	①Overall Analysis of Economic and Social Impacts of Government R&D Investments
		②Investigation and Analysis on Trends in Economic and Social Impacts of Government R&D Investments in the World.
2. Investigation related to the Great Earthquake		①Questionnaires to the Expert Community
		②National Awareness Survey
		③Others

*In this FY, a few case studies and preliminary discussions are to be conducted as feasibility studies, and the full survey will be done in the next FY based on the outcomes of this FY.

NISTEP(2) Action Items in Data / Information Infrastructure Construction

1. Grand Design of Data / Information Infrastructure and Promotion of Data Providing Services		① Grand Design of Data / Information Infrastructure and Promotion of Data Providing Services
2. Data Gathering and Arrangement corresponding to the Needs of Policy Research	(1) Construction of a Core Data Base	① Data Gathering on Scientific Knowledge Production in Government Research Systems
		②Data Gathering on Innovations in Industries
		③Time-series Observations of Scientific and Technology Systems and its Application
		④Construction of a Tracking-system and Data Base of Doctor Course Graduates
	(2) Data Gathering and Arrangement directly Supporting Mission-oriented Investigation Research	①Construction of a Data Base on Immaterial Assets, Productivity and Policies, and Growth Accounting Analysis
		②Construction of a Data Base on Government R&D Budget by Fields and Objectives

JST-RISTEX(1) : **Competitive Research Grant Program**

Program Director
Akira Morita
Professor, Graduate School for Law and Politics, The University of Tokyo

1. Objective

•Promoting R&D projects on new analytic methodologies, models, data-systematization tools and aggregate indicators that can be used in actual policy

•Increasing the number of researchers who work on this challenge in a wide range of disciplines and interdisciplinary fields, and expanding the community network through public relations and dialogue on the activities

2. Period

Total of seven years from FY 2011 to 2017 (New R&D projects will be accepted for the first four years)

3. Targeted R&D Projects

•Designing and implementation of a strategic framework for forming overall STI policy

•Determination of the social and the economic impact of public investment in R&D

•Assessment of optimal system (organization, framework, etc) for promoting STI policy, and the impact of the system on the STI process

•Development of designs for frameworks to promote the participation of members of society in STI policy formation, creation of related methodologies, and use of them in actual policy formation

Outcomes will be sought that can be used in the actual formulation of the Fifth Science and Technology Basic Plan to be adopted for FY 2016-2020 and other medium- to long-term policy-forming process.

4. Approaches needed

•Promotion of multidisciplinary R&D that harnesses expertise in the natural sciences as well as the humanities and social sciences

•On-site activities or simulations of the use of R&D outputs

•Collaboration by researchers, policy-makers and other parties at the appropriate stages of the R&D

•Development of cooperation with other related programs, keeping in mind international trends

JST-RISTEX(2) :Themes(FY'2011) of Competitive Research Grant Program

5. R&D projects

- Length of Individual R&D Projects ： 1.5 to 3 years
- R&D Expenses per Project ： Appox.15 to 20 million yen annually
- Number of Projects to be Accepted ： Several up to ten projects annually

＜Projects accepted in FY2011＞

Project Name	Length	Project Director	Affiliation
Development of Methods for Impact Assessment of Electric Power Innovation and R&D Network Evaluation	3yrs.	Taro AKIYAMA	Director, Center for Economic Growth Strategy Professor, Faculty of Economics Yokohama National University
Scientometrics Conducive to Management of Funding Programs	3yrs.	Masashi SHIRABE	Associate Professor, Graduate School of Engineering, Tokyo Institute of Technology
Methodology Development for Visualization and Quantification of Social Expectation to Science Technology	3yrs.	Masatoshi TAMAMURA	Associate Professor, Faculty of Policy Management, Keio University
Research on Scientific Sources of Innovations and Economic Impacts of Science	3yrs.	Sadao NAGAOKA	Professor, Institute of Innovation Research, Hitotsubashi University
Integrating Joint Fact-Finding into Policy-Making Processes (IJFF)	3yrs.	Masahiro MATSUURA	The University of Tokyo, Graduate School of Public Policy
Study of Innovation Strategies Conducive to Creating Future Industries	3yrs.	Eiichi YAMAGUCHI	Professor, Graduate School of Policy and Management, Doshisha University

Original basic researches have great social and economic impacts through interactions of various elements.

Nobel laureate Prof.Shirakawa's accomplishment (Conductive polymers)

1967, First Discovery

2000, Nobel Prize

Basic expenses, Grant-in-aid, support from industry

Nobel laureate Prof.Noyori's accomplishment (Chiral Catalization)

1966, First Discovery

2001, Nobel Prize

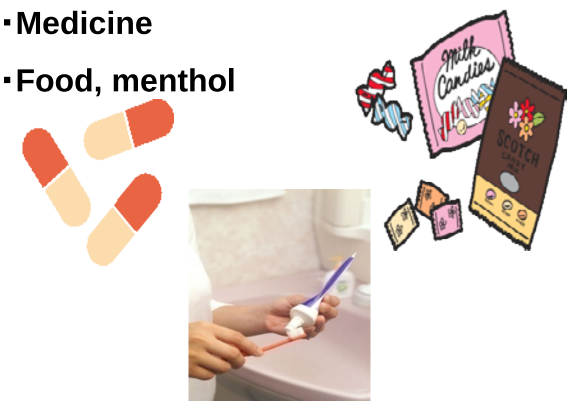
Basic expenses, Grant-in-aid, ERATO, technology transfer to industry

1970 **1980** **1990** **2000**

Social and Economic Impacts

- **cell of mobile phone**
- **touch panel for ATM**
- **display and electric devices for PC and digital camera etc.**

- **Medicine**
- **Food, menthol**



Integration of disciplines for innovation

☆Theory
☆Experiment
☆Computer modeling & simulation : "third pillar"
- Modeling
- Prediction
- Visualization