

# Project”Science for all Japanese” Designing 21st Century

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# Science Literacy Movement

- Science Council of Japan (SCJ) set up Special Committee for Promotion of Science Capacity in 2003 *Why fewer and fewer Japanese are studying science?*
- SCJ: Association of 210 members of humanity, social science, natural science, medical science, engineering + 2000 associate members
- Council Statement in April 2004 to call all scientists to have contact with society especially with children.

# Towards Dialogue with Society April 20, 2004

## Science Council of Japan

The Science Council of Japan (SCJ) We, Science Council of Japan, recognize that scientific endeavors pursued by scientists cannot sustain the vivacious world unless scientists and a wider society collaborate with mutual awareness and confidence. We also recognize that both positive and negative sides of scientific endeavors, bringing about fruits to be shared and enjoyed by a wider society and causing negative consequences suffered by a wider society need to be clearly understood by both scientists and a wider society. Thus we believe that it is important for scientists to have dialogue with a wider society, especially with children, who bear the future of mankind, to nurture their science dream. We, Science Council of Japan, will launch engagement between scientists and a wider society: Firstly, Science Council of Japan will call all scientists to talk about science with a wider society, especially, with children. Secondly, Science Council of Japan itself will launch any feasible actions for development of public awareness and confidence in science.

# Special Committee for Science Capacity of Youth(2003-04)

- After one-year survey, we recognized that goals of science and technology education is not well defined in Japan.
- Survey on “Science for all Americans”.
- Launching of “Research for science literacy” in 2005: ICU(International Christian University), NIER(National Research institute of Education Policy), Ochanomizu Women’s University and Science Council of Japan

# “Research for Science Literacy”

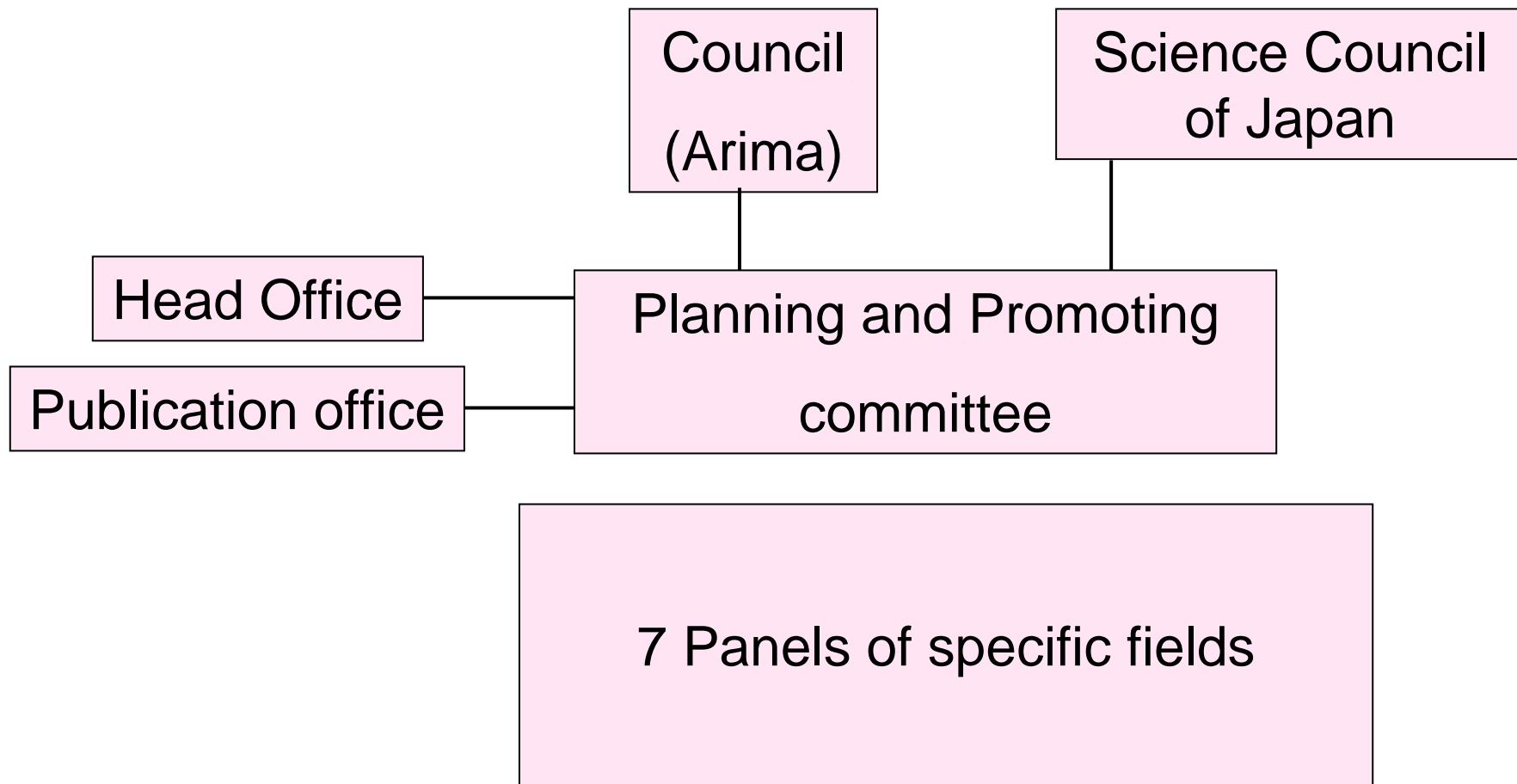
- Survey of past research (NIER)
- Public opinion survey (Ochamomizu U.)
- Future action planning (ICU)

Proposal for “Science for all Japanese project” in FY 2005

# Project Organization: Panels

- 7 Panels : Mathematical science, Life Science, Material Science, Information Science, Space/Earth/Environment Science, Human/Social Science, Technology
- 10-15 members in each committee
- Scientists, Pedagogy , Engineers, Media, Administrators, NGO

# Organization



# Human and social science included

- We consider phenomena of human and society as phenomena of Homo sapiens in the view point of science
- What are the origin of society, economy, politics, ethics etc. on the basis of the history of the earth and life? We may give a scientific frame of consideration when we are faced to human and social problems.

# “Science for all Japanese” Goals

- “Science literacy”, which go beyond the traditional framework of academic fields in order to provide average adults with basic understanding of science and technology for building and participating in a **sustainable democratic society**.
- “**Science Literacy**” here is understood as basic knowledge and skills relating science, mathematics and technology.

# Why Sustainable Democratic Society?

- A democratic society, which we aim at, is a society in which **dignity of each individual** is fully respected as a member of the society. **Freedom from fear and want was proclaimed as the highest aspiration of mankind.** (Human Rights Declaration in 1948 )
- It has been 60 years since then but our aspiration has not been fulfilled.

# Global and demographic problems

- Sustainability of global environment is at risk: Kyoto Protocol in 1997, Science Council of Japan “Joint science academies’ statements on global response to climate change” (June 8, 2005), on energy sustainability and security(June 14, 2006) and on growth and responsibility: sustainability, energy efficiency” (May 16,2007)
- Demographical imbalance of the world for human security has increased.

Individuals and society should understand precisely environmental and social situation around us to make collaboration for the solution of challenging issues .

# Science and technology as Culture

Human being has acquired scientific mind during evolution by looking at phenomena, imagining about unseen mechanism and deciding steps forward by logics. Thus science gives imagination and logics and also high morality and ethics.

In Japanese tradition, science and technology have been combined with arts and life.

## Needs of “Science for All Japanese” in Promotion of Science Literacy

- For the judgment of science and technology issues
- For transfer of science and technology knowledge between generations
- For long-term planning of school education
- For life-long education

# Expectation for the project

- As a guide: general public, scientific institutions, museums schools, media, policy makers
- As the basis of developing educational materials for general public to have knowledge, educators at schools for teaching, scientists for communication
- As driving force for promotion of public understanding and cooperation

# Science Literacy and Japanese culture

- Consideration of sensibilities and traditions of Japanese
- Current global interest specifically related to Japan, environment, food, etc. relevant to everyday life
- Attention to technology due to tradition of strong combination of science and technology.
- Average Japanese adults as our targets

# Japanese cultural tradition

- Life concepts, relational classification ( man, mammals, birds, fish, and Mushi( others) compared to structural modern taxonomy.
- Japanese language ambiguous? It can be a precise language if we use properly
- Japanese culture and traditions: harmony with nature, sustainability, circular usage of resources
- Not much for principles but for more empirical knowledge

- For Japanese, human is a part of Nature, developing technology skillfully using Nature without destroying it.
- Highly symbolic world with limited resources.

# Panel Activities

## (2006.10-2007.8)

- To survey all items of basic knowledge in each of scientific fields in the seven committees, which include not only field experts but also journalists, industry and policy makers.
- Search for key concepts and for logics connecting these concepts
- Disregard the present traditional sections of disciplines
- Interaction among the seven committee by inter-panel peer review of panel reports

# Second Strategy (2007.9-2008.3)

- Integration of seven-committee reports into “Knowledge of Science and Technology” by March 2008
- Public Report Meeting on August 27 at Science Council of Japan
  1. Basic principle for integration
  2. Strategy for implementation of Science Literacy among all Japanese
  3. International Collaboration

# Implementation: Science Literacy Pub

Discussion with citizens what we should know for a safe, healthy and sustainable society

- One a month in Mitaka, evening with snack and drink <https://www.kouza.mitaka-univ.org/kouza/B0751501.php>
- What is heat? What is life? How to be logical? Is the earth always friendly?

# International Collaboration

UK: Symposium “National values of science education”(2007.9)

# Report of Mathematical Science Panel

- Essence of mathematics: Numbers and shapes, Logical process on abstract concepts and on generalized language, universal structure
- Statistics: certain numbers and uncertain numbers
- Logical thinking
- Algorithm: formal mechanical process for problem solving
- Modeling for unseen mechanisms and worlds such as from Euclid to Riemannian

# Report of Material Science Panel

- Matter and energy for civilization and life
- Basic Constituents of matter
- Natural matter and artificial matter ( materials )
- Material and life: life as material systems, material for life and health, environment and material
- Energy and material:energy resources
- Observation, measurement and modeling

# Life Science Panel

## Essence

- 1) Diversity but only within a limited area of the earth
- 2) Universal phenomena
- 3) Historical development
- 4) System of life and globe
- 5) Ethics responsibility of homo sapiens

# Report of Information Science Panel

## Essence of information processing

- 1) All data can be expressed as combination of 0 and 1
- 2) Processing, transfer and generation of information can be done mostly by electronic circuits
- 3) Information processing can be automatic and with high speed
- 4) Information processing is unseen and quickly evolving

# Space, Earth and Environment Panel

## Essence

- 1) Spatial scales from universe to atom
- 2) Time scales from universe to everyday life
- 3) Complex systems
- 4) Closely related to sustainability of human existence

# Report of Human and Social Science Panel

- Human science: Position of homo sapiens in Nature, Human development, science of mind, development of mind and individuality, science of language
- Social Science: Social phenomena and intention, ethics in modern times, Culture from anthropological view point
- What is Science as human endeavor

# Technology Panel

## Essence

- 1) Technology assumes users
- 2) Technology produces artifacts, expands human capacity and evolves with society.
- 3) Technology becomes complex but systematized.
- 4) Assessment is required

# New panel

## “Structure of nature and laws”

- 1) Scientific methods: modeling, selection of theories (Occam's razor)
- 2) Hierarchie of the world ( time, space, laws and structures )
- 3) Reversibility and irreversibility
- 4) Method of physics vs method of natural history ( Universality and diversity, Confirmation of laws and confirmation of evolution
- 5) Uncertainty in science: quantum mechanics, statistics and chaos)

# Expected summary report

- The most fundamental question, which should be shared by all, “Where mankind comes from and where we shall go?” Our present existence, including environment, whether natural or artificial, around us.
- The knowledge to be shared consists of the basic structure and roles of matters, history of biological, anthropological and geological evolution, problem-solving nature of mathematics and informatics, technology as meeting place of science and conscience.
- History of human intellects as series of paradigm jumps.
- Articles on “Water”, “Food” and “Energy” will be included.

<http://www.science-for-all.jp/>