

Collaboration between Universities and Society, Business & Industry in Research and Innovation

Masuo Aizawa

***Counselor to the President, Japan Science and Technology
Agency (JST)***

***Professor Emeritus and Former President, Tokyo Institute of
Technology (Tokyo Tech)***

***Former Executive Member, Council for S&T Policy, Cabinet
Office (CSTP), Government of Japan***

***German-Japan Symposium on Education, Research and
Innovation, JANU, Tokyo, April 26, 2018***

1. Introduction

Where do we come from?

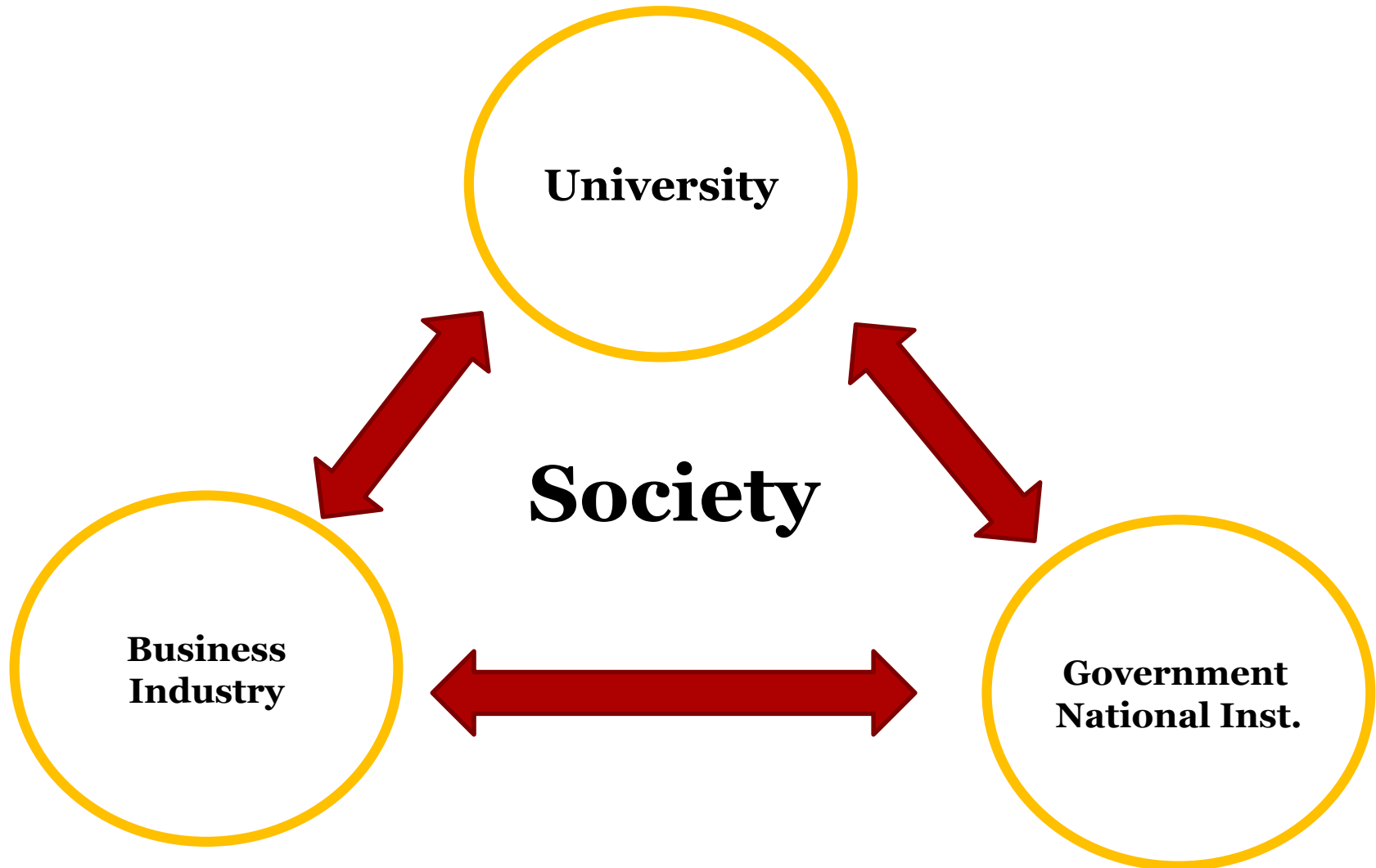
What are we?

Where are we going?

(P. Gauguin)

- ◆ **Despite the multiple challenges we face, the world is dramatically changing with accelerating ever in history.**
- ◆ **We are enforced to reshape the future beyond the multiple challenges.**
- ◆ **Universities have a huge role to play on creating a brighter future by collaboration with society, business & industry.**

Collaboration between Universities and Society, Business & Industry



2. What We Are Challenged

Revolutionary Challenges

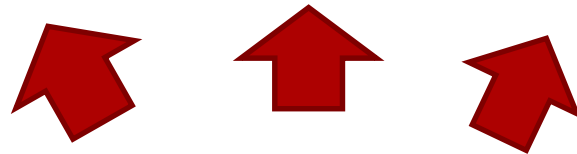
Digital Revolution

Altering the Way We Live, Work, and Relate to Others in the Entire Domains

Connectivity

AI

Convergence



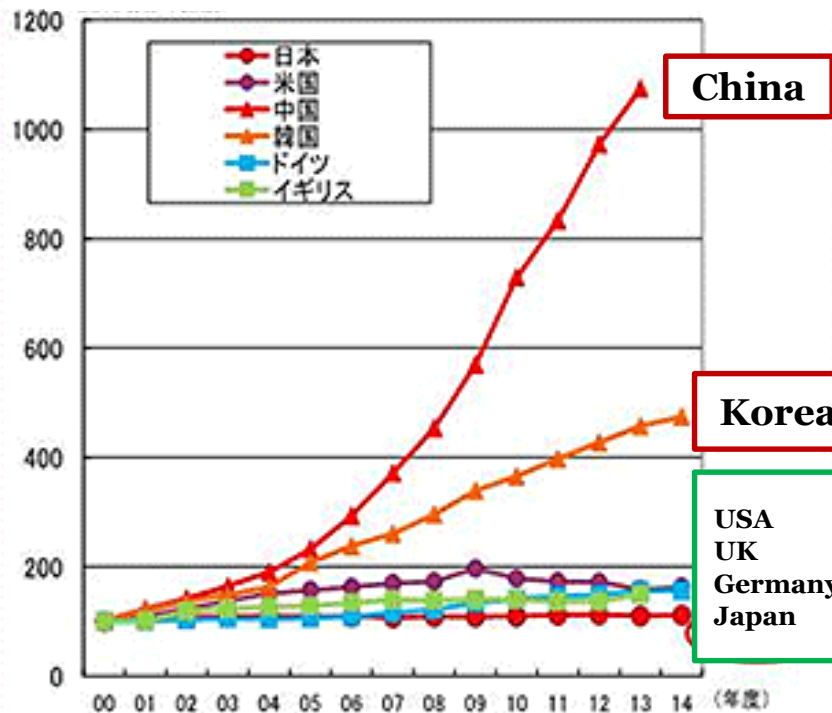
Disruptions in 2007 !

- iPhone (Apple)
- GitHub: **Open Source Platform**
- Android (Google): **Open-standards Platform**
- Kindle (Amazon): **e-Book**
- Watson (IBM): **Artificial Intelligence (AI)**
- Hadoop: **Big Data**
- Twitter: **Social Networking**
- Airbnb: **Uber, Alibaba**



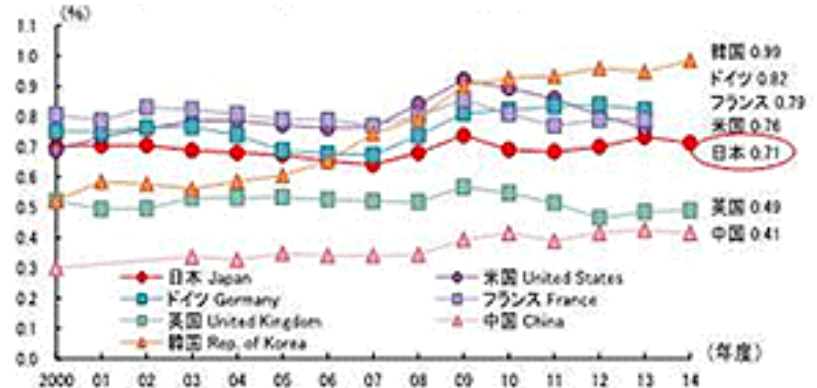
R&D Investment Challenge

Referring 100 in year 2000



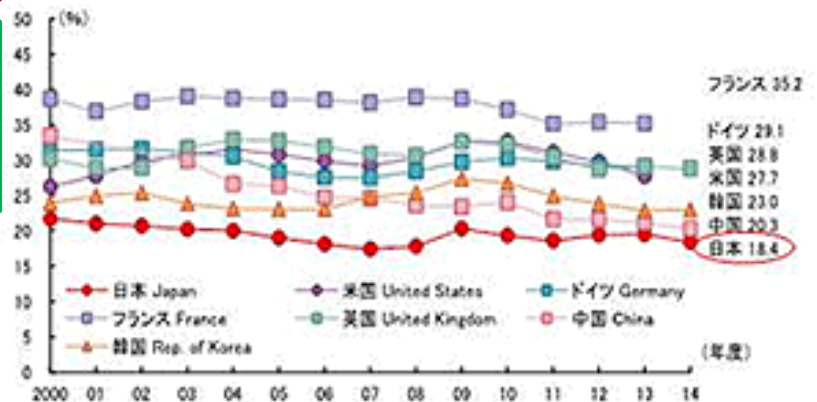
Data from MEXT

GDP % of R&D Investment



資料) 日本: 政府府内研究費: 総務省「科学技術研究費」、(GDP)内閣府「国民経済計算速報」
EU: 研究費、国内総生産「Eurostat database」
その他: OECD「Main Science and Technology Indicators」

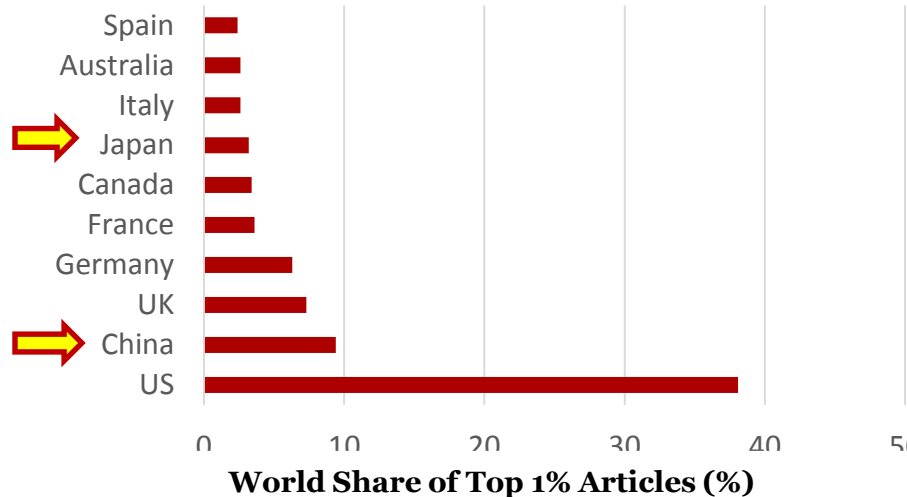
Government % of Total R&D Investment



資料) 日本: 総務省「科学技術研究費」、その他: OECD「Main Science and Technology Indicators」

S&T Research Challenge

World Share of Top 1% S&T Articles



Significant Increase in Asian Share of S&T Articles

International Collaboration Becomes the Norm in S&T Research.

Despite Asian Rise, Japan suffers from declining!

World Share of S&T Articles (%)

Other Countries

Germany: 5.2%

UK: 4.7%

France: 3.7%

Italy: 3.3%

Spain: 2.8%

China: 11.8%

Japan: 5.4%

India: 3.4%

Korea: 3.2%

Taiwan: 1.8%

USA: 21.6%

Canada: 3.1%

Data from NISTEP (2014)

Innovation Challenges

Global Innovation Index (GII) 2016 INSEAD

1	Switzerland	14	Hong Kong (China)
2	Sweden	15	Canada
3	UK	16	Japan
4	USA	17	New Zealand
5	Finland	18	France
6	Singapore	19	Australia
7	Ireland	20	Austria
8	Denmark	21	Israel
9	Netherland	22	Norway
10	Germany	23	Belgium
11	Korea	24	Estonia
12	Luxemburg	25	China
13	Iceland	26	Malta

- ◆ **New Innovation Power with Global Connectivity**
- ◆ **Tremendous Increase in R&D Investment by China and Korea**
- ◆ **Asian Rise in Innovation, while Japan Is Declining.**

Sustainability Challenges



SDGs

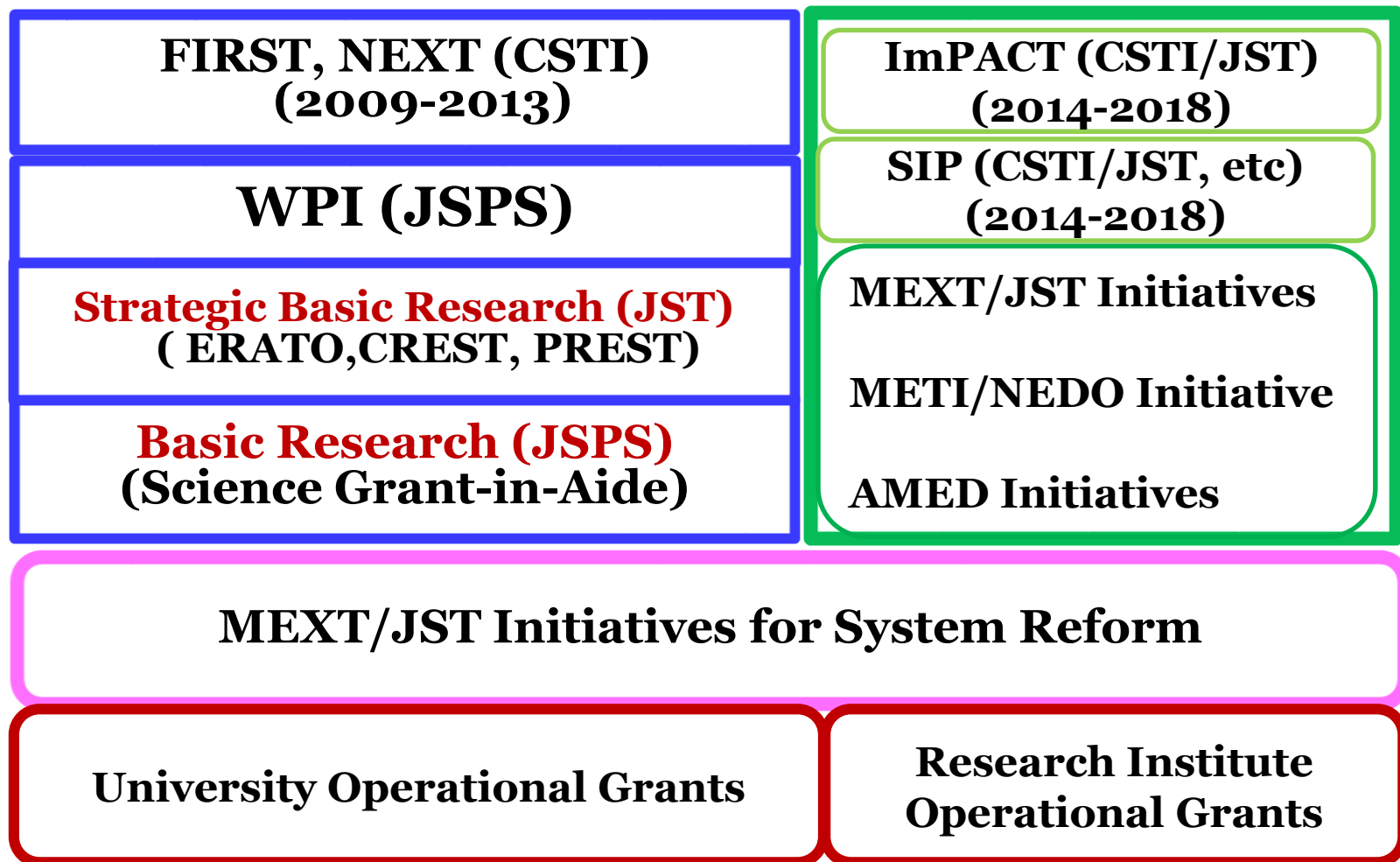


- Inclusive
- Universal
- Trans-sectorial
- Global Partnership

- ◆ The world shifted to commit SDGs toward building a brighter future.
- ◆ World Economic Forum promotes the Fourth Industrial Revolution with balance of SDGs.

Government Funding Challenges

Government Funding for S&T and Innovation



3. Transforming University to Enhance Core Competence

Core Competence of University

Why?

- ◆ **Toward a Brighter Future, Define the University Role for Collaboration with Society, Business & Industry in Education, Research, and Innovation.**
- ◆ **For Taking a Leadership in Collaboration, Enhance University Core Competence to Attract Society, Business & Industry in Education and Research.**
- ◆ **Transform University to Empower Research and Innovation over the Silo Effects that Diversity and Convergence are hindered.**

Transforming University Beyond the Silo Effects

- ◆ **Open to the World**
- ◆ **Enrich Diversity**
- ◆ **Encourage Transdisciplinary Research**
- ◆ **Enhance Connectivity and Convergence**

Explore the Frontier Science

World Premier International Research Center Initiative (WPI)

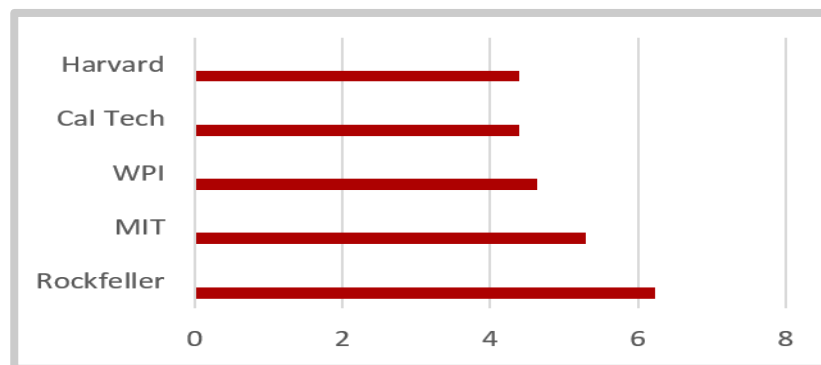
MEXT/JSPS, (2007 -)

Explore the Frontier
Science by
Fusion Research

Open to the World

Attract the World

Reform the Institutional
Systems



**Evaluated as the World-top Level
Research Institute from the Research
Performance of 5 WPIs**

Nine WPI Research Centers

Origin of
Universe/Earth/Life

KAVLI
IPMU
Adopted in FY 2007

ELSI
EARTH-LIFE SCIENCE INSTITUTE
TOKYO INSTITUTE OF TECHNOLOGY
Adopted in FY 2012

Life Science

WPI Osaka University
iFReC
Adopted in FY 2007

IIS
INTERNATIONAL INSTITUTE FOR INTEGRATIVE
SLEEP MEDICINE
Adopted in FY 2012

Materials/Energy

AIMR
Adopted in FY 2007

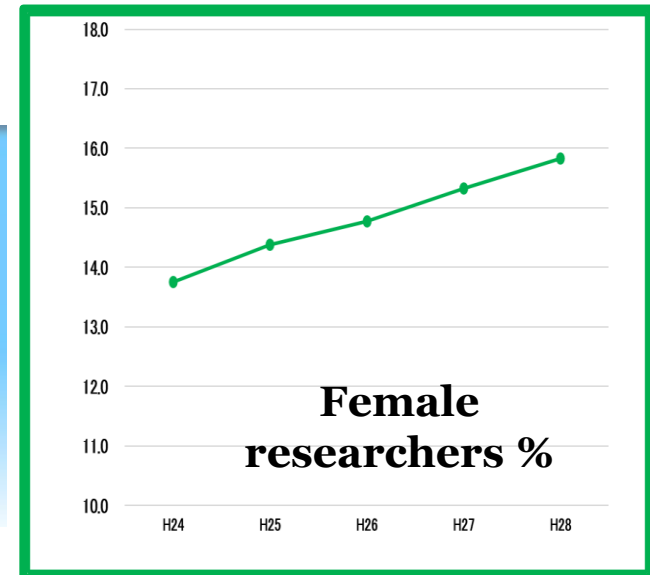
MANA
Adopted in FY 2007

I²CNER
Adopted in FY 2010

ITbM
Nagoya University
Adopted in FY 2012

Enrich Diversity in University

Initiatives on Enhancing Female Researchers MEXT/JST



Initiatives on Tenure Truck System MEXT/JST

Tenure Truck



Tenure Post

Enrich Diversity SAKURA Science Plan

Short-Term Invitational Program for Asian Youth



SSP in Collaboration with Exchange Programs

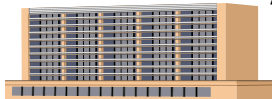
Invite highly excellent youth including
high school, university students and
young professors in S&T



Science camp



Attend S&T•Policy
Symposium



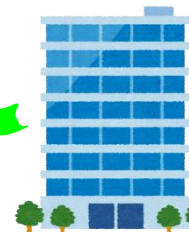
Visit to companies



Visit to Science Museum



Exchange with researchers/
SIT administrators



STI & Education
Ministries



Visit to Research institutes



Lecture by distinguished scientists

Exchange Programs

Student exchange program
(related organizations)

Youth exchange program
(related organizations)

Private sector's program

4. Driving Innovation by Enhancing Borderless Connectivity and Convergence

Many Ways of Innovation

- ◆ **Borderless Connectivity**
-Open Innovation
- ◆ **Diversity and Convergence**
-Disruptive Innovation
(Disruption)
- ◆ **Societal Needs and Wants**
-Issue-drive Innovation

Innovation Centers for Advanced Interdisciplinary Research Areas (MEXT/JST) (2006 -)

**Hokkaido University
Future Drug Discovery**

**AIST
Optical Routing Energy Saving**

**Kyoto University
Immuno-regulation
Technologies**

**Kyoto University
Bio-Medical Imaging**

**Osaka University
Photonics Center**

**Kyushu University
Medical Redox
Navigation**

**Co-Creation of
Innovation by
Equal Partnership
(University/Company)**

**-Innovation Center in
University Campus
-Matching Fund
-Long-term: 10 years
-Interdisciplinary Area
-System Reform**

**Tohoku University
Micro System Fusion**

**Tokyo Women's
Medical University
Regenerative
Medicine**

**University of Tokyo
Nano Quantum Information
Electronics**

**University of Tokyo
System Bio-Medicine**

**Kobe University
Innovative Bio Production**

**Yokohama City University
Clinical Proteomics**



Center of Innovation (COI) for Creating a New Future, MEXT/JST

Vision 1 : Secure sustainability as a country advanced in its aging population and declining birth rate. Smart Life Care, Ageless Society

Vision 2 : Create a living environment with a high quality of life as prosperous and reputable country. Smart Country

Vision 3 : Establish a sustainable society with vitality. Active Sustainability

**Back-casting
Visionary Leader**

Research Promotion Institute

**Industry, Municipality, Academia
Under One Roof**

Co-creation with Society

JST-MIRAI Program (2017 -)

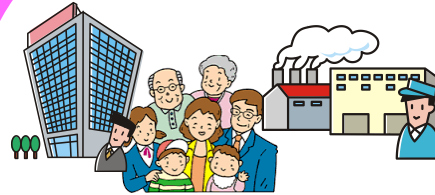


Small Start type

MEXT

**4 Areas based on the 5th
S&T Basic Plan**

Super smart Society , Sustainable Society
Safe and Secure Society, Low carbon Society



**Industrial / Societal
Needs/wants**

**S&T Trends
investigated by JST**

JST

Theme decision

**Call for proposal
research projects (FS)**

Feasibility Studies

R&D Projects

Feasibility Studies

Up to 3 years
20million JPY/year/project

R&D Projects

Up to 5 years
200 to 400 million
JPY/year/project

Large Scale type

MEXT

Theme decision

to change current technology
system and to be future basic
technology

JST

**Call for proposal
research projects**

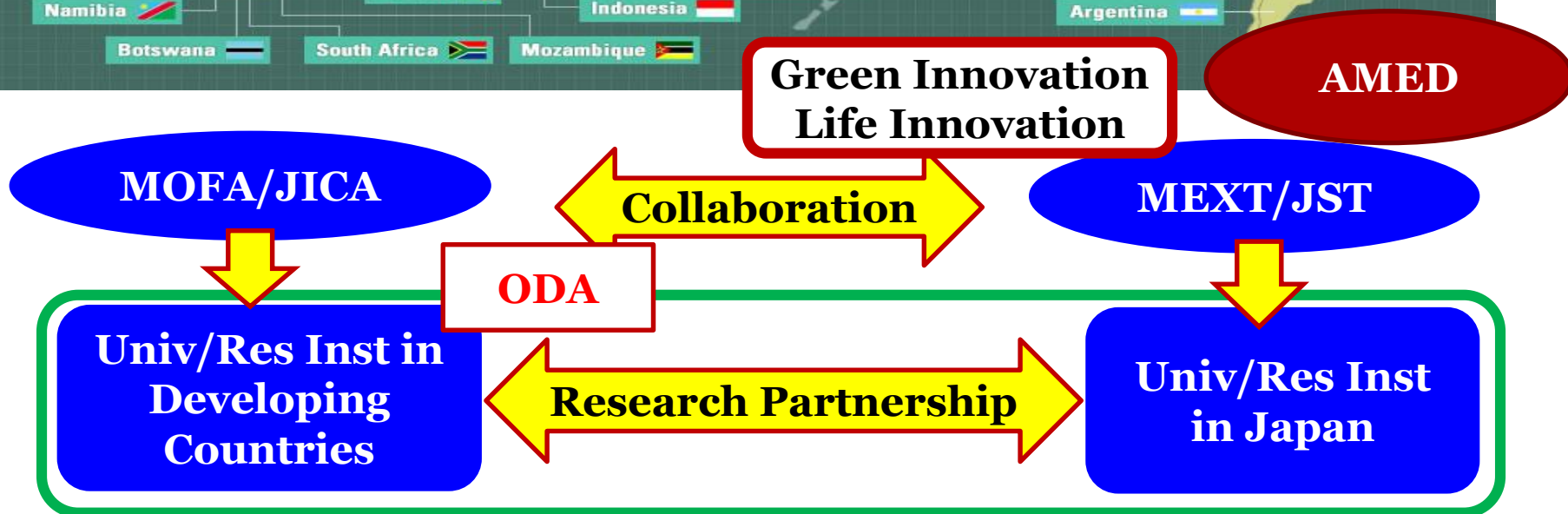
R&D Projects

R&D Projects

Up to 10 years
400 to 600 million
JPY/year/project

Issue-driven Innovation

S&T Research Partnership for Sustainable Development (SATREPS) JST/JAICA



German Innovation Award Gottfried Wagner Prize For Young Researchers in Japan

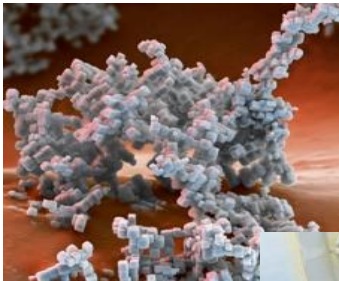


Deutsche Industrie- und
Handelskammer in Japan
在日ドイツ商工会議所

**Embassy of Germany,
DAAD, DFG, Fraunhofer,
JST, JSPS**

**Partner Companies
BASF Japan, Bayer Holding, Bosch
Co.**

**Continental Japan, Evonik Japan,
Daimler, Merck, Schffler Japan,
Siemens Group in Japan**



Materials



**Digitalization
& Mobility**



Energy



Life

JURY

Chair: M.Aizawa

- T. Kishi**
- M. Gonokami**
- A. Fujishima**
- J. Yamagiwa**

5. Concluding Remarks

- ❑ *Urged to enhance core competence of individual university toward a brighter future.*
- ❑ *Enforced to transform university for empower diversity and transdisciplinary research over the Silo Effects.*
- ❑ *Encouraged to create disruptions from convergence of diversities by collaboration with society, business & industry toward a brighter future.*