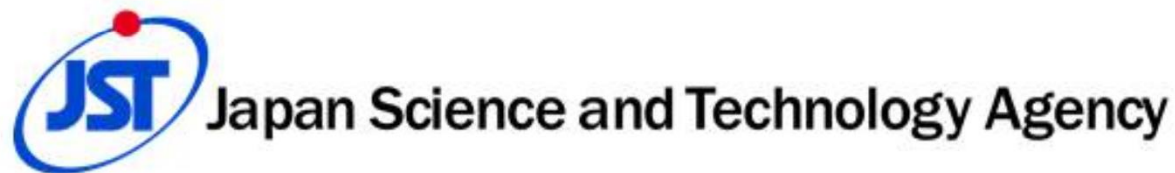


Sofia, March 2017

JST as an Innovation Navigator to Create Jobs

**Michinari Hamaguchi, M.D. ,
Ph.D.**



12 Potentially economically disruptive technologies

**Half of them
are related to
ICT**

1. Mobile Internet
2. Automation of knowledge
3. The Internet of Things
4. Cloud technology
5. Advanced robotics
6. Autonomous and near-autonomous vehicles
7. Next-generation genomics
8. Energy storage
9. 3D printing
10. Advanced materials
11. Advanced oil and gas exploration and recovery
12. Renewable energy

McKinsey Global Institute, May 2013

Disruptive technologies: Advances that will transform life, business, and the global economy

The Fourth Industrial Revolution is coming

- **Around half of US jobs might be lost within 20 years because of IoT & AI.**

“The Future of Employment: How Susceptible are Jobs to Computerisation?”

C.B. Frey & M.A. Osborne, 2013, University of Oxford

- **“Industry 4.0”**

Does the word, innovation, imply “flash of genius”?

- **“systematic innovation consists in the purposeful and organized search for changes” and “discipline of innovation is a systematic examination of the areas of change that typically offer entrepreneurial opportunities”.**

Peter F. Drucker (Innovation and Entrepreneurship

You can change the world by yourself!

The 7 sources of innovative opportunity

Peter F. Drucker “Innovation and Entrepreneurship”

➤ **Within the enterprise or industry**

1. The unexpected
2. The incongruity
3. Innovation based on process need
4. Changes in industry or market structure

➤ **Outside the enterprise or industry**

5. Demographics (changes in the population’s size, age, employment, level of education, income etc.)
6. Changes in perception, mood and meaning
7. New knowledge (both scientific and non-scientific)

Continuous need of innovation with abundant opportunities

Japan Science and Technology Agency

JST

a network-based research institute

JST in a nutshell

As a public R&D organization, we are...

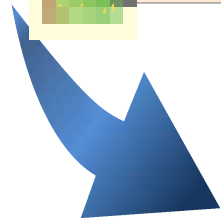
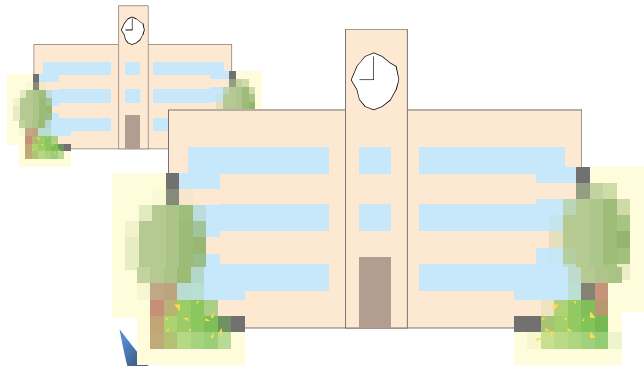
- **developing R&D strategies**
- **promoting S&T and fostering innovation**
- **providing STI infrastructure**



**Creation of Social and
Industrial Values**

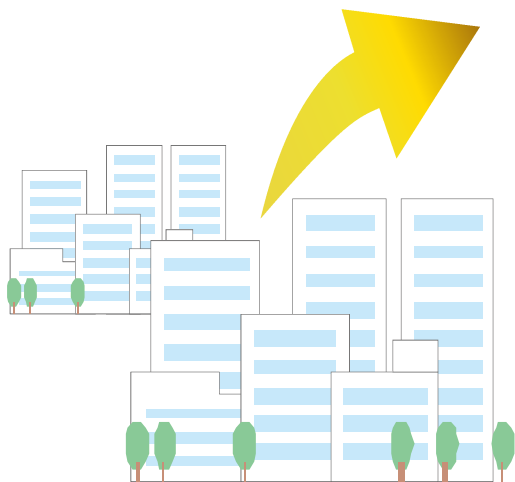
JST as an “Network-Based” Research Institute

Universities



Industries

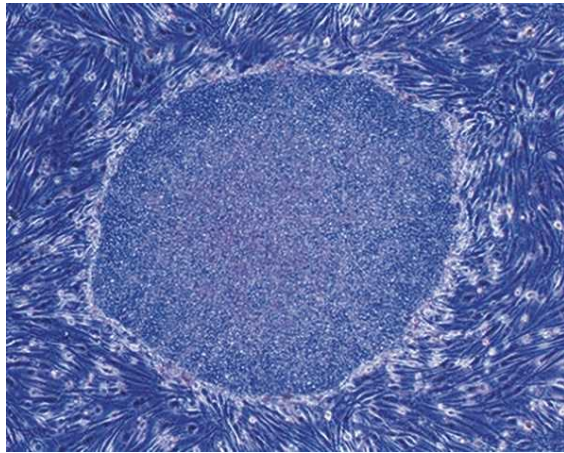
**Network-Based
Research Institute**



National Research Institutes

Our major Achievements to Promote Innovation

Outstanding Achievements – from JST's R&D



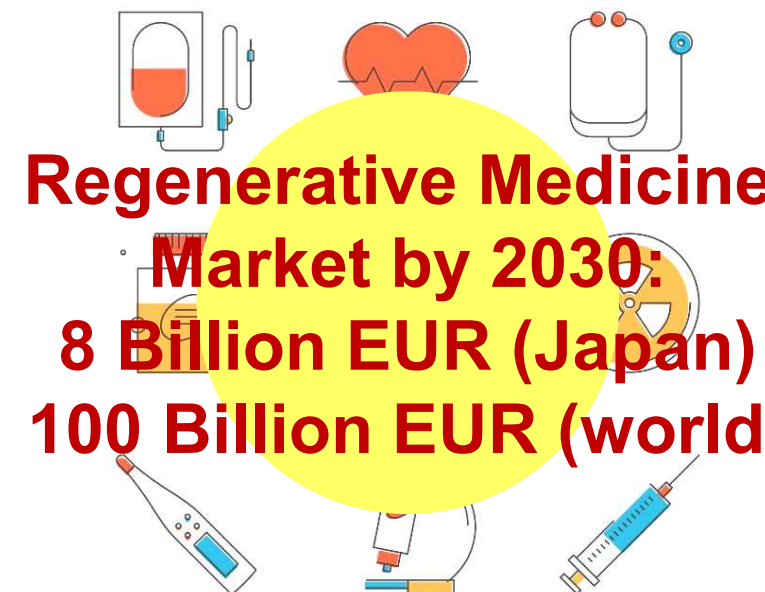
iPS Cells

The Nobel Prize in
Physiology or Medicine 2012

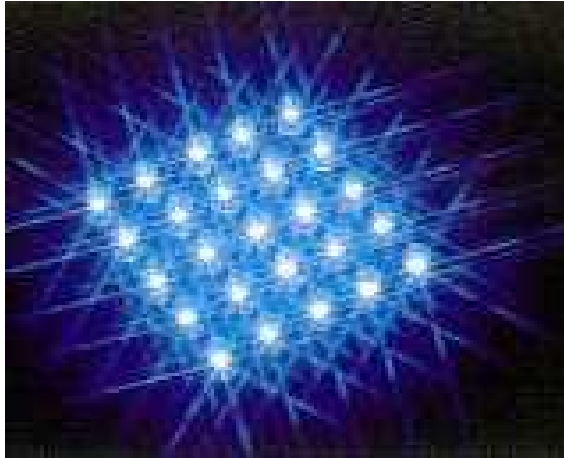


Prof. Yamanaka

- Clinical study on transplant of retinal tissues developed from iPS cells
- Paradigm shift in drug discovery
- Specialized companies, e.g., SanBio and Healios, listed at Tokyo Stock Exchange Mothers market.

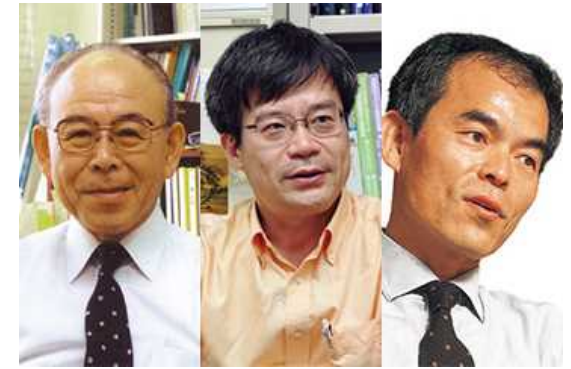


Outstanding Achievements – from JST's R&D



Blue LED

The Nobel prize in physics
2014



Prof. Akasaki/Prof. Amano/
Prof. Nakamura

The LED lamp holds great promise for increasing the quality of life for over **1.5 billion people** around the world who lack access to electricity grids

**Economic
added-value
3 Billion EUR**

**Sales of
applied products
30 Billion EUR**

**Jobs created
32 000**

JST's support for R&D: 4.6 Million EUR (1987-1990) Estimate in 2005

Achievements from JST's Industry-Academia Collaboration

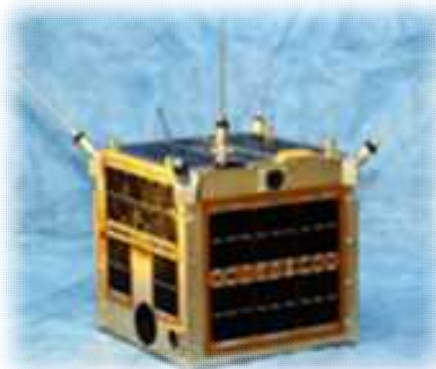
2000

Manufacturing technology for ^{18}O -labeled water (as a PET diagnostic agent)



2006

Low-cost ultra small satellite with short-term R&D



**Economic effect
(1996-2015)
2.5 Billion EUR**

2004

Artificial hip joint with long-term reliability



2009

Retinal repair by cell transplantation

World's first clinical research using iPS cells



2012

Mass spectrometer with Supercritical Fluid



1 EUR = 120 JPY

Outstanding Achievements – Recent Awards

Nov. 2015

Received a “Thomson Reuters 2015 Top 100 Global Innovators” award, the first one for a public research institute in Japan.



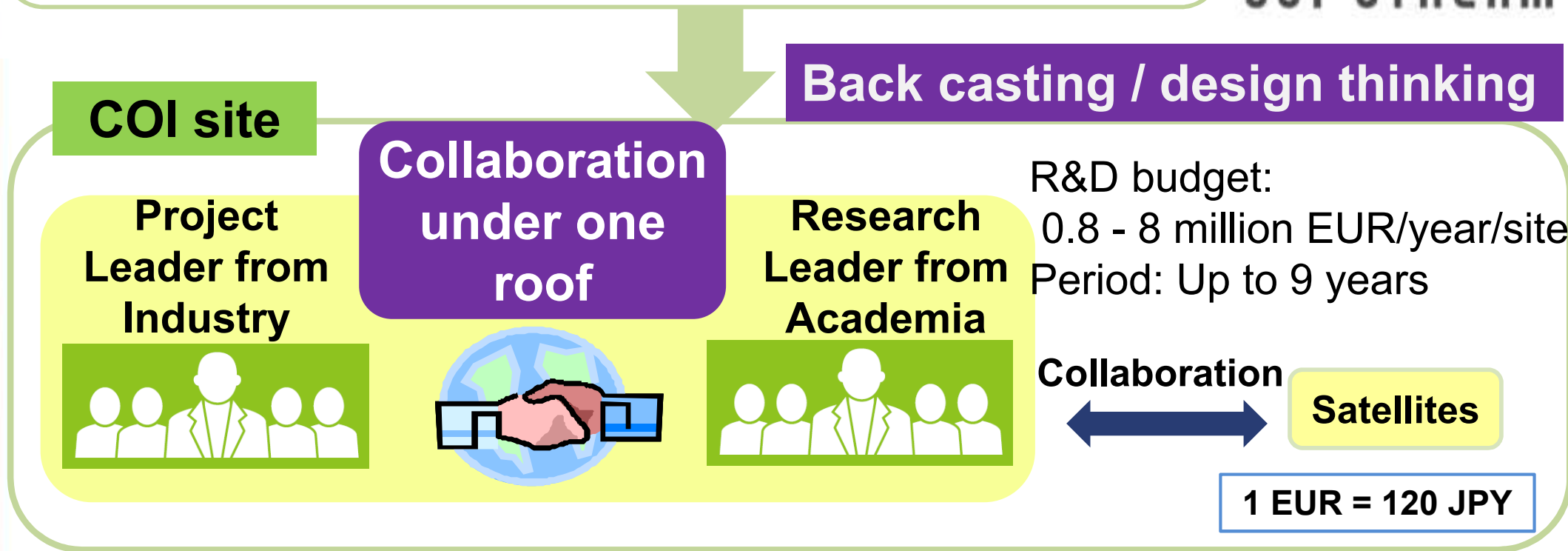
Ranked 3rd in the Reuters The World's Most Innovative Research Institutions in 2015 and 4th in 2017

Capacity Building and Innovation Center of Innovation (COI) Program

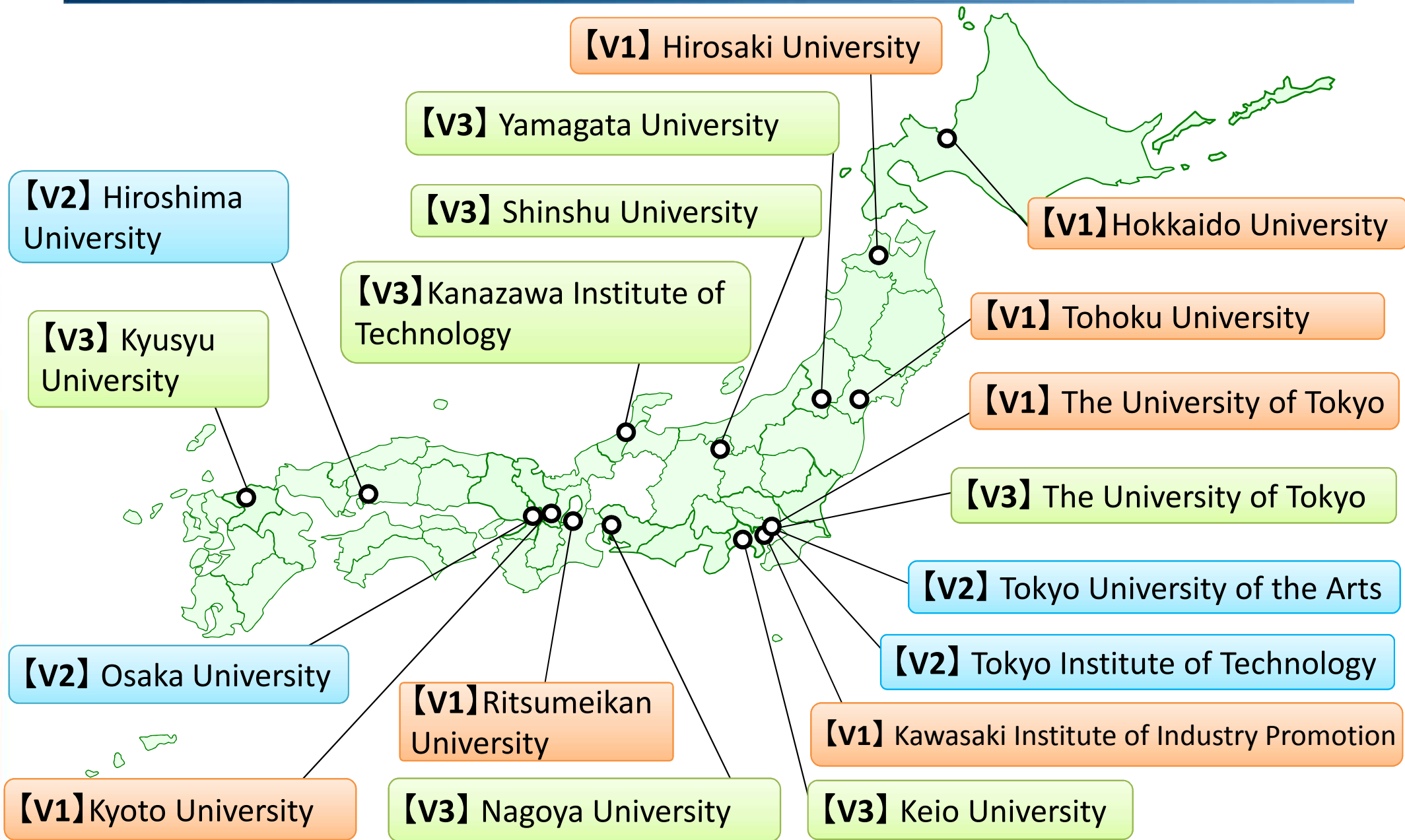
The Center of Innovation (COI) Program

Challenging and high-risk R&D to realize our visions for ideal society in the next 10 years.

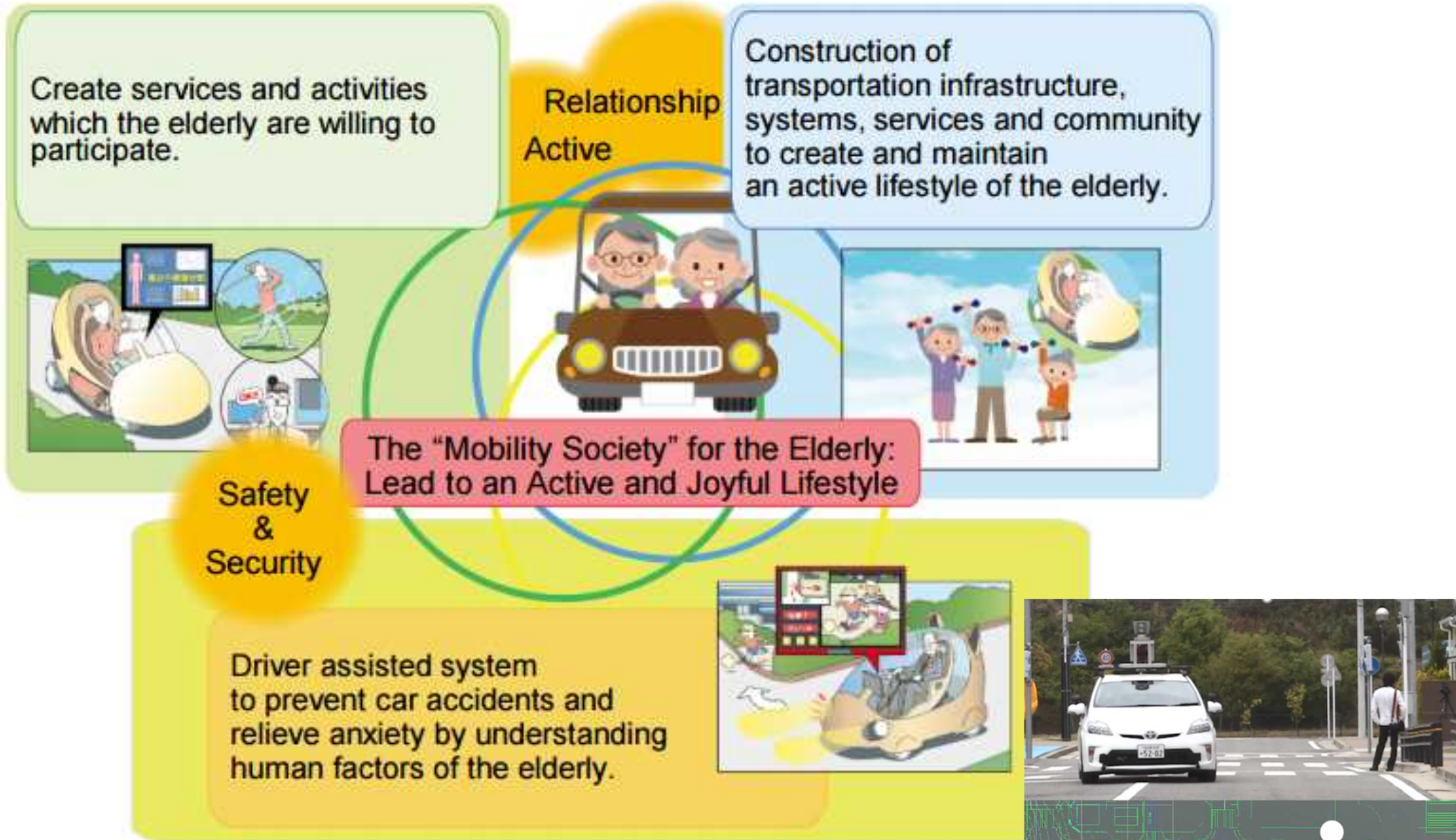
- Vision 1: Smart Life Care, Ageless Society
- Vision 2: Smart Japan (high QoL)
- Vision 3: Active Sustainability



18 COI Sites in Japan

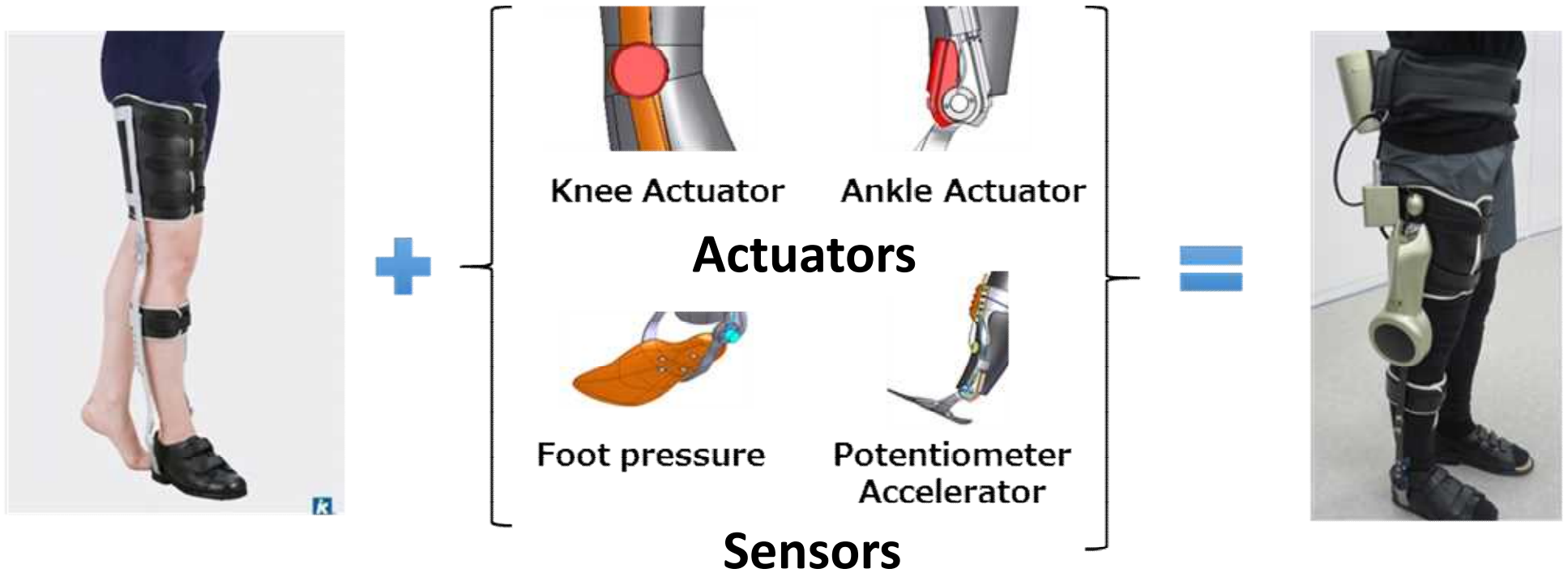


Nagoya Univ. & Toyota: Innovation Hub for a 'Mobility Society'



Smart, happy and resilient society

- Key topics: Healthcare, early detection of illness, regenerative medicine, disaster resilience
- Key technologies: wireless power transmission, ICT



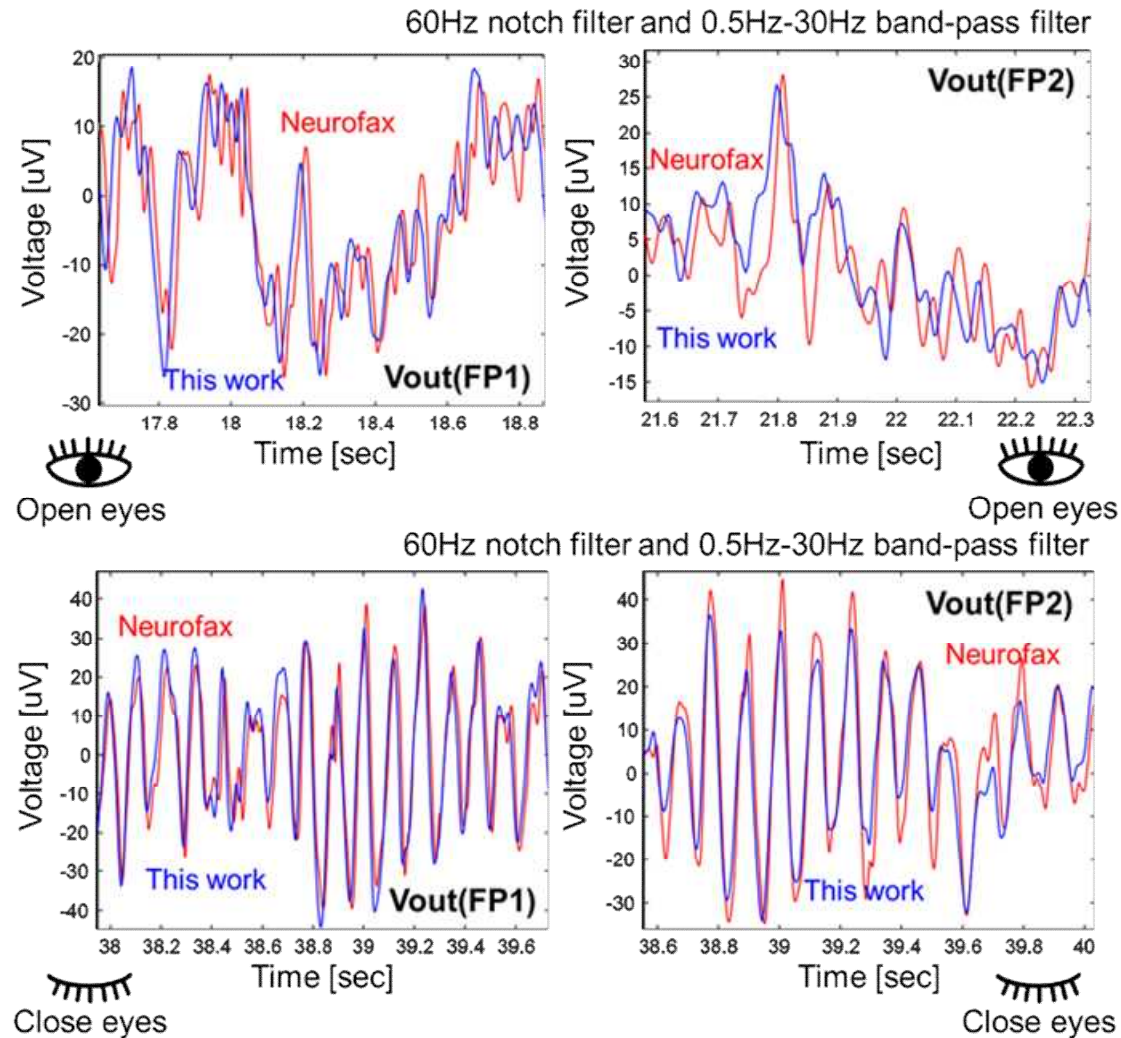
- Self-empowerment society
- Maximization of human potential through brain management

Imperceptible wearable sensors

Low cost, easy to use,
with less physical/mental burden

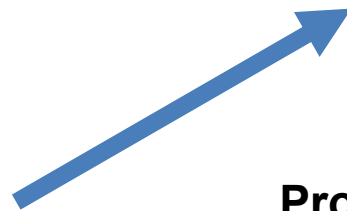
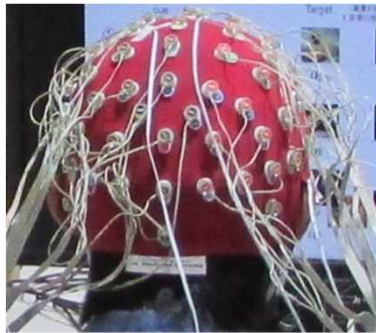


Wearable brain
wave sensor
6 mm thick,
24 g



- Humans and objects in harmony
- Innovation in human-objects interaction

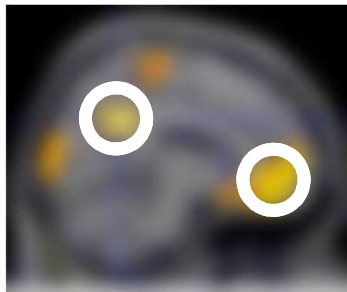
Key technologies: Brain science, optical technology, ICT
Development of Brain-Emotion Interfaces



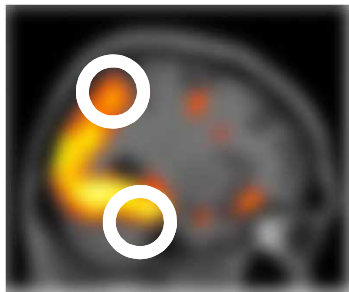
Feasibility study of vehicle installation



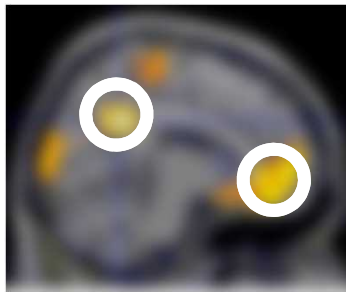
Prototype with emotion-visualization technologies



Comfort



Expectation



Activeness



- Visualization of Brain activities
- Connection to different emotions

- Major Research topics: cultural diplomacy and art business, robotic performance arts, disabilities and expressions, etc.

Cloned Reproduction of the Cultural Property Displayed at G7 Summit 2016, held in Iseshima, Japan



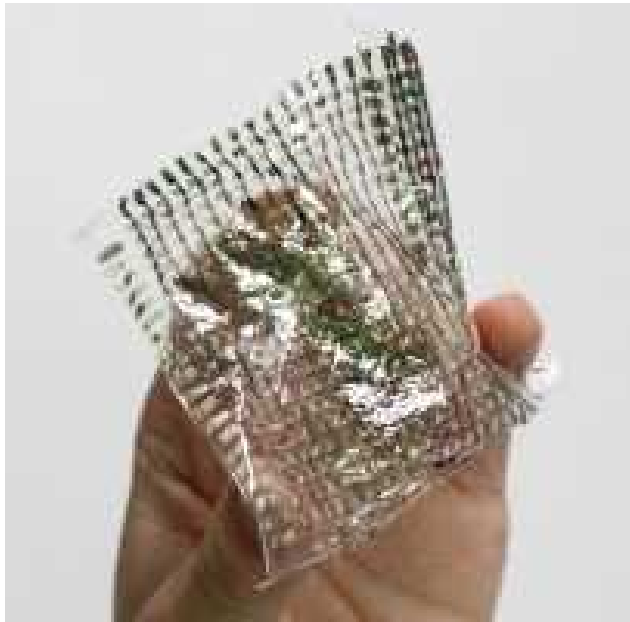
The wall paintings of the Golden Hall of Horyu-ji Temple (Nara)



The Bamiyan Wall Painting

Organic technology for sustainable society

- Key technologies: advanced organic materials, printed devices, design thinking, ICT
- Fusion of organic human sensors and organic RFIDs



The world's thinnest printed electronic circuit on a plastic film (1 micro meter thickness)



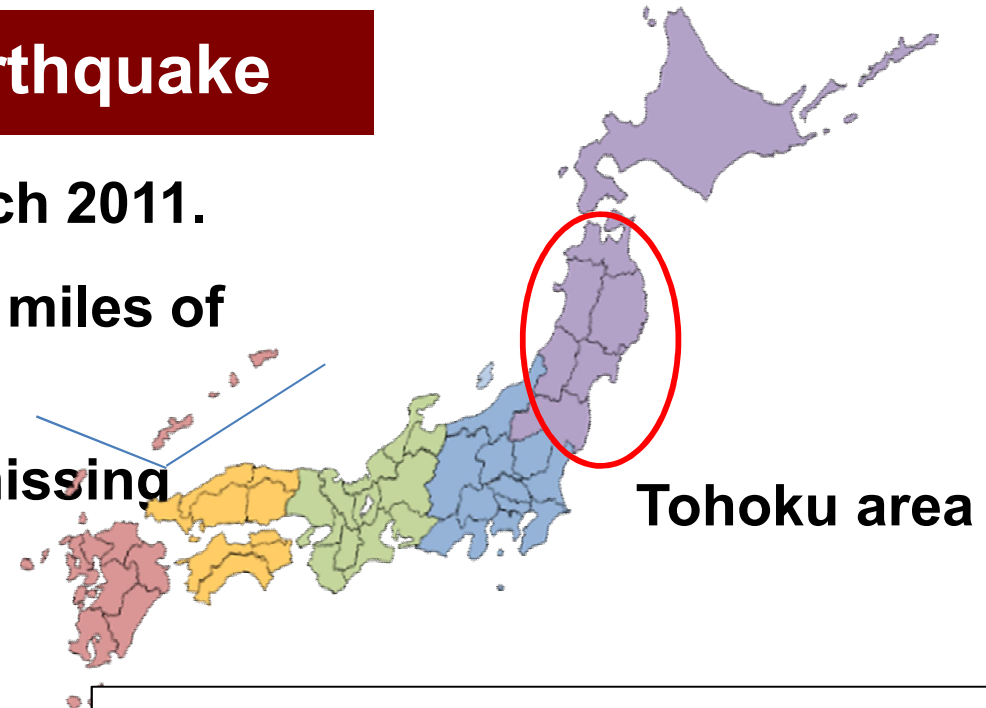
Proof of Concept at the “smart future house”: intelligent ambient space for better QoL

Capacity Building and Innovation Revitalization Promotion Program

Revitalization Promotion Program

The 2011 Great East Japan Earthquake

- 9.0-magnitude earthquake on 11 March 2011.
- Over 20 meters high Tsunami across miles of shoreline
- 19,475 deaths, 6,221 injuries, 2,587 missing (as of Sep. 2016)



Before the Earthquake (14 Mar 2010)

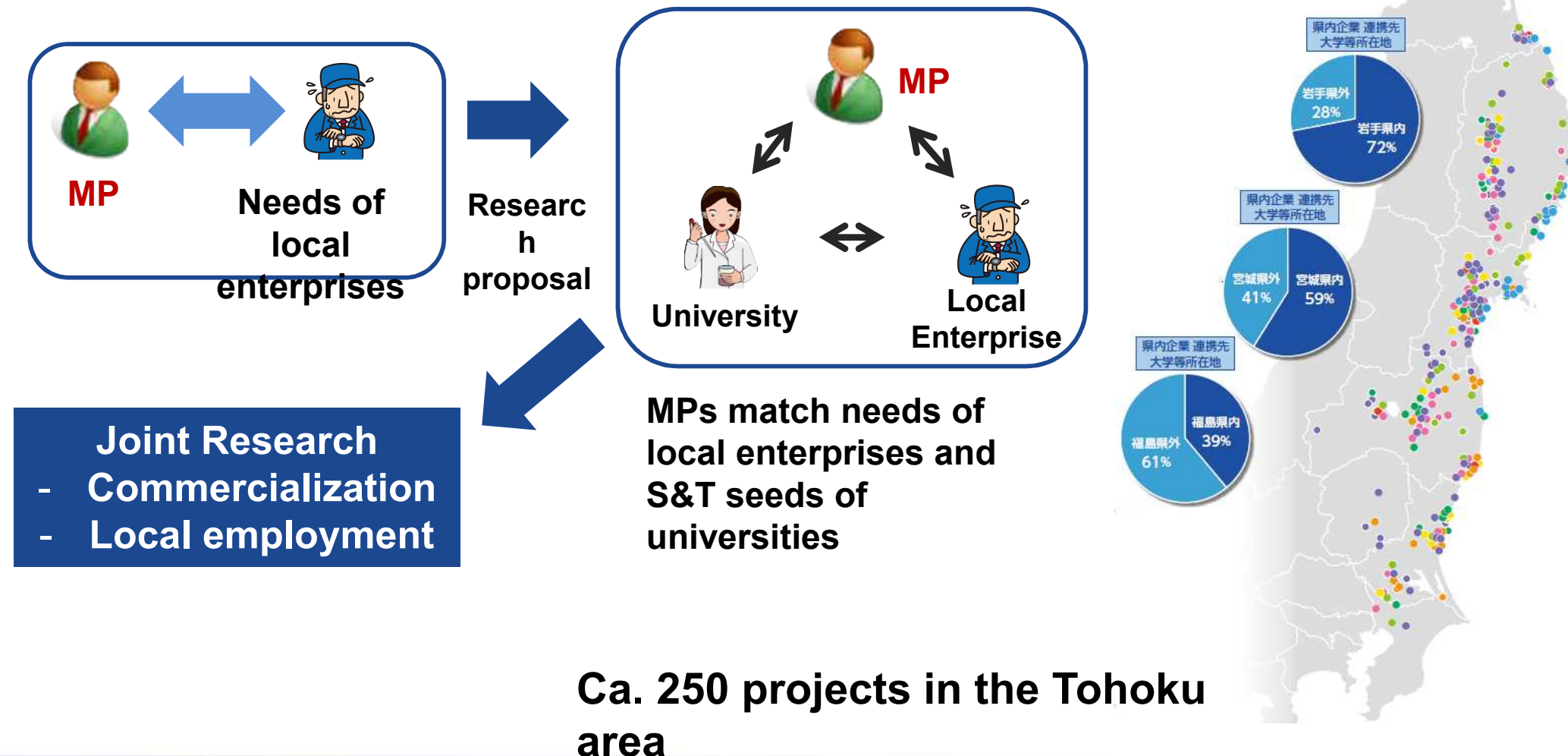


After the Earthquake (29 Mar 2011)



Matching Promotion

Academy-Industry Coordinators, **‘Matching Planners (MPs)’**, play an important role of establishing connections between S&T seeds and local needs.



Outcome of Revitalization Promotion Program



Tamamushi (jewel beetle) lacquerware (Tohoku Kogei Co., Ltd.)

- Lacquerware coating with clay-based film 'CLAIST' for strength and long-term durability
- Selected as one of the gifts to participants in G7 Finance Ministers & Central Bank Governors' Meeting.



Japanese SOBA noodle (Kawaki Corporation)

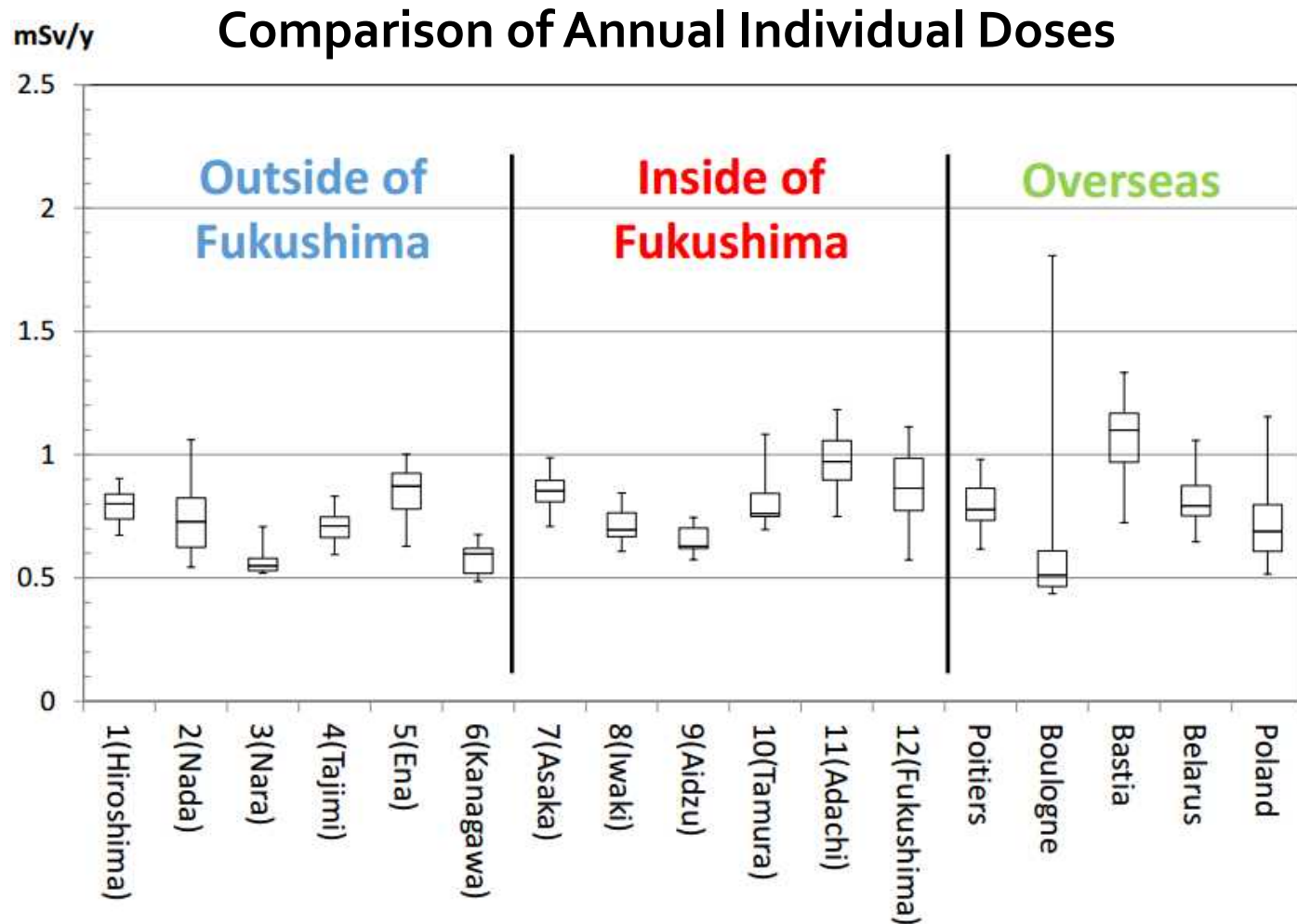
- Fresh noodle with no added preservative and a 10-day expiration date instead of usual 3 days
- Awarded the highest prize in food contests by the Ministry of Agriculture, Forestry and Fisheries et al.

Measurement of radiation levels in and out of Fukushima



D-Shuttle Dosimeter
by Chiyoda Technol Corp.

Inside Fukushima: 0.63 – 0.97 mSv/y
Outside Fukushima: 0.55 – 0.87 mSv/y
Overseas: 0.51 – 1.10 mSv/y



The level of ambient radiation in Fukushima is not higher than the level of natural radiation in other places.

In conclusion...

- Societal challenges = full of opportunities for innovation
- Science and technology to foster innovation, create jobs and realize Sustainable Development Goals (SDGs)



SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD



For more information
<http://www.jst.go.jp/EN/index.html>



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Please come and visit us!