

# Research & Development Centers



## R&D Center for Precision Medicine

Japan's first center for comprehensive Omics Analyses for Precision Medicine.



## R&D Center for Frontiers of MIRAI in Policy and Technology

A Leading Research Hub for Mobility Infrastructure to Realize Society 5.0



## R&D Center for Sport Innovation

Advanced research center for improving wellbeing through sports



## R&D Center for Health Services

Japan's first center of specializing in the discipline of services that bring health & happiness



## R&D Center for Tailor-Made QOL

Development of 'Tailor-Made QOL programs' aimed at promoting health



## R&D Center for Working Persons' Psychological Support

Research activities and building social contribution infrastructure related to psychological support for working persons



## R&D Center for Innovative Material Characterization

Toward innovative measurement and evaluation technologies



## R&D Center for Innovative Drug Discovery

100 years of vitality with new drugs and new technologies



## R&D Center for Digital Nature

Investigating new relationships between computers and nature



## R&D Center for Smart Wellness City Policies

Evidence-based Policy Making for the realization of Smart Wellness & Long-lived Society



## R&D Center for Lifestyle Innovation

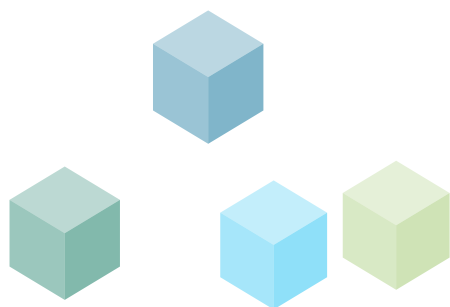
Exploring lifestyle for health and well-being for the future



## R&D Center for Zero CO<sub>2</sub> Emission with Functional Materials

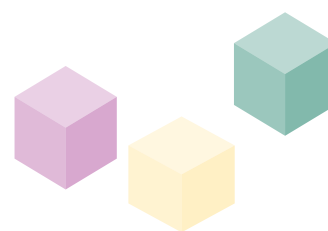
Toward carbon neutrality and hydrogen economy





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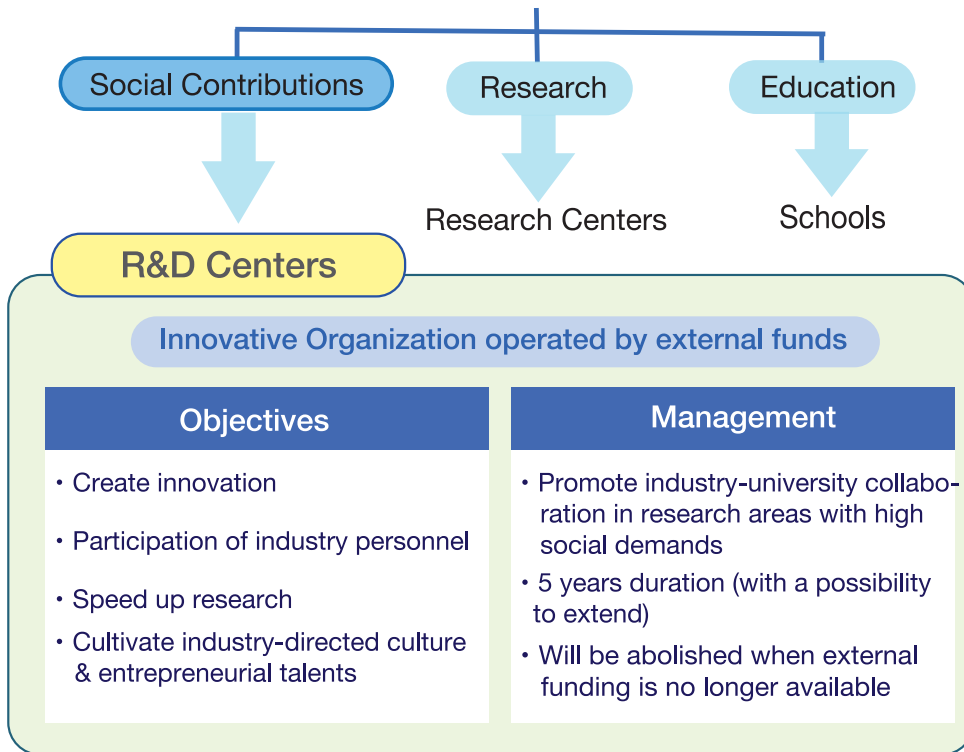
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Centers terminated due to expiration of the establishment period

- \* Algae Biomass and Energy System R&D Center  
(July 1, 2015 – March 31, 2021)
- \* R&D Center for Wellness Innovation  
(July 1, 2020 – August 31, 2023)

## Mission of University of Tsukuba



Yasushi Nakauchi

Director General of Headquarters for International Industry-University Collaboration and Vice President (Industry-University Collaboration), University of Tsukuba

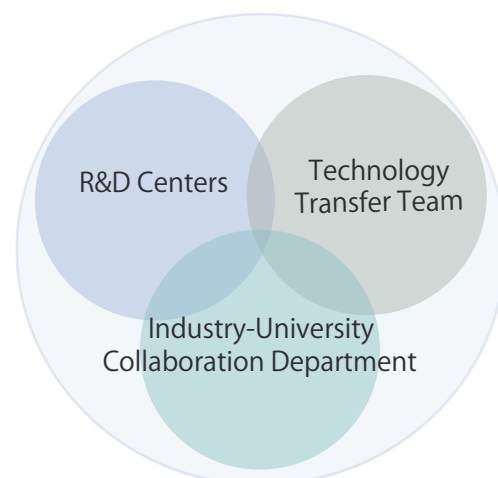
## About the R&D Centers

Since July 1, 2015, the R&D centers have sequentially found under the Headquarters for International Industry-University Collaboration. They are founded for promoting joint research and development in academic fields of high social demands, and organizing a cooperative research system. Their operation cost only comes from an external fund such as a collaborative or sponsored research with private sectors.

As the mission of a national university, we are responsible for education, research and social contribution. And the R&D centers are the new body which undertakes a role of social contribution.

We are continuously supporting their centers and developing more R&D center of other fields In the future.

## Organization



# R&D Center for Precision Medicine

Since January 1st, 2017

## Aiming for Social Implementation of Precision Medicine

The Research and Development Center for Precision Medicine (PMC) was established as Japan's first omics analysis center aiming to develop a \$1000 genome sequencing technology. Using state-of-the-art technologies in genome sequencing and mass spectrometry, the Center aims to provide analytic and translational approaches to provide precise diagnosis of cancers and various diseases in a data-driven/evidence-based approach.

The Center has been working with the Tsukuba Preventive Medicine Research Center, which offers a comprehensive medical examination utilizing the function of initiative prevention of medical research. In order to promote collaborations with leading domestic and international research institutions, the PMC is also active in cross-border multidisciplinary networking.

The Center aims to establish a research infrastructure for the implementation and realization of Precision Medicine, to improve/determine the best course of treatment for each individual.



Taka-Aki Sato, Ph.D.  
Director, R&D Center  
for Precision Medicine

### Mission

Introduce the next-generation ultra-high-throughput human whole genome sequencing system in the University of Tsukuba.

Form a platform for Precision Medicine by building partnerships across industry, academia, and government.

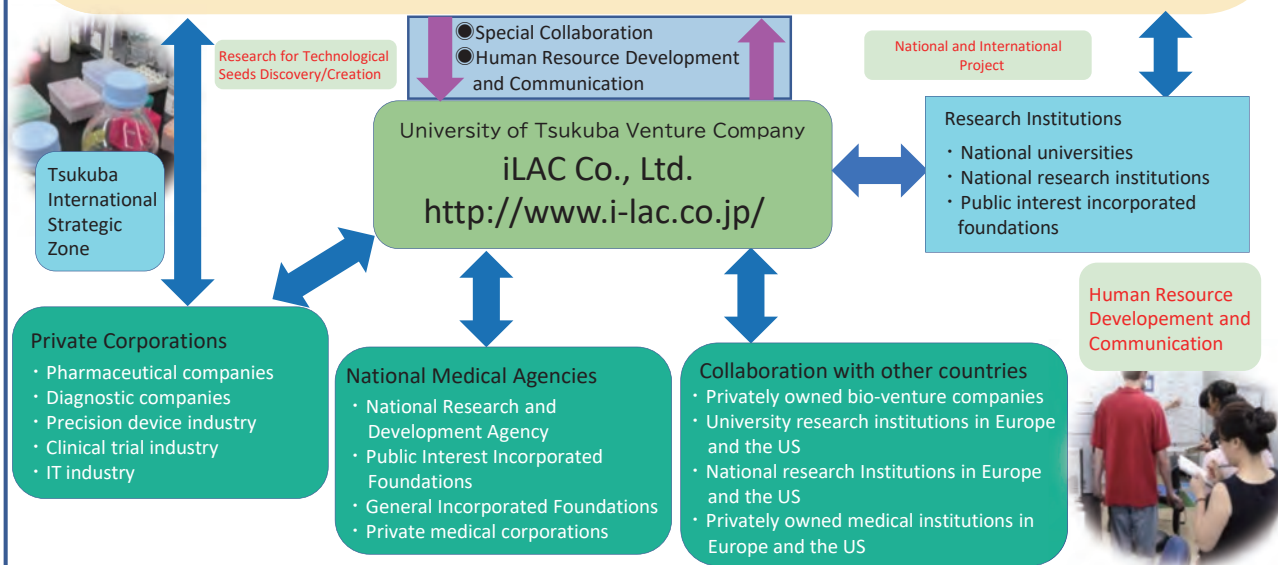
### 7 Core Laboratories

- Medical Genomics
- Cancer Genomics and Epigenomics
- Congenital Metabolic Diseases
- Precision Psychiatry
- Morpho-informatics and Multi-omics
- Food and Healthcare
- Large-Scale Data Analysis

Innovative Medical  
Research Institute



Next Generation High-Throughput Human Whole-Genome Sequencing



#### ※About the R&D Centers

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# R&D Center for Frontiers of MIRAI in Policy and Technology

Since April 1st, 2017

## A Leading Research Hub for Mobility Infrastructure to Realize Society 5.0

R&D Center for Frontiers of MIRAI in Policy and Technology (F-MIRAI) was established by the University of Tsukuba and Toyota Motor Corporation as a cutting-edge research hub for mobility infrastructure to realize Society 5.0. Drawing on my experience as Executive Research Director of the Center for Cybernics Research and as a principal investigator of national initiatives such as FIRST, ImPACT and SIP, I am committed to leading this center with a strong sense of mission. F-MIRAI promotes interdisciplinary collaboration with researchers in social engineering and partners with key institutes such as the Center for Cybernics Research and the International Institute for Integrative Sleep Medicine (IIIS). Through strong collaboration among academia, industry, and government, we strive to create innovations with real social impact.



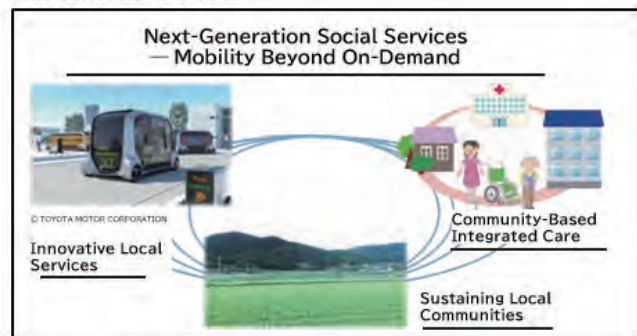
**Yoshiyuki Sankai, Ph.D.**

Director, R&D Center for Frontiers of MIRAI in Policy and Technology

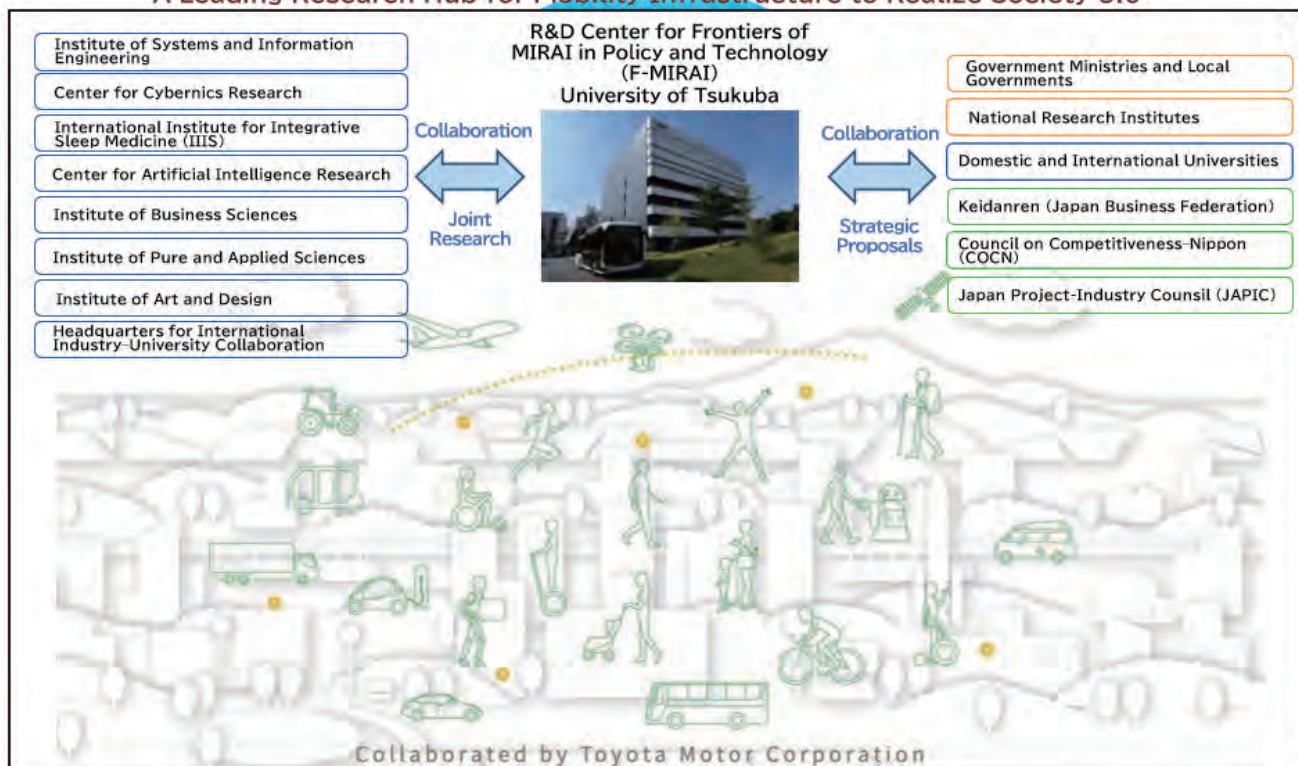
### 《Addressing Social Challenges》



### 《Economic Growth》



## A Leading Research Hub for Mobility Infrastructure to Realize Society 5.0



## R&D Center for Sport Innovation

Since April 1st, 2017

### Advanced research for improving wellbeing through sports

The Development and Research Center for Sport Innovation conducts cutting-edge development research aimed at improving human well-being through sport. In particular, it focuses on research to generate new knowledge on mental health, improving athlete performance and promoting sport for people with disabilities.

We also focus on human resource development, providing educational programs and training opportunities for young researchers, coaches and sports administrators. In addition, it promotes the development of innovative sports products and services that utilize technology through corporate collaborations and actively engages in international exchanges. We aim to contribute to the improvement of well-being through sport by integrating the latest technologies and sports science knowledge from around the world.



Prof. Hideki Takagi

#### Well-being means ...

Well-being is a concept that refers to a state of physical, mental and social fulfillment for individuals and groups, and includes many aspects such as happiness, satisfaction, health, stability and self-fulfillment.

#### Mission of the center

##### Research

To promote practical research in the application of the latest advances in sports science.

##### Human Resource Development

To develop human resources capable of transforming society through the power of sport.

##### Corporate partnerships

To work with different companies and organizations in order to solve social problems.

##### International exchange

Activate international exchanges to share advanced practices.

#### Advanced sports science

○ Scientific knowledge on sports physiology, biomechanics and sports

#### Industrialisation of university sport

- Sale of goods and tickets.
- Seeing, doing and supporting university sport
- Sport is the front door to the university

#### Human Resource Development

- Promoting human development through sport
- Developing human resources capable of transforming society

#### International exchange

- Aggregate and disseminate information on national and international best practice
- Stimulate international exchange of people and increase international presence

#### Corporate partnership

- Development of systems and products tailored to the needs of businesses and municipalities
- Solving social problems through various forms of cooperation.

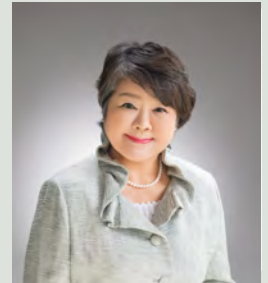


# R&D Center for Health Services

Since July 1st, 2017

## Towards health services in harmony with life

Health Services Research & Development Center was established on July 1, 2017. The center is specialized in a health services research (HSR) which is Japan's first academic research field. Through the data analysis of nationwide or district region, we investigate and research considering "how to effectively deliver care services that bring the health and well-being to people who need them". By focusing on its continuity of the services from preventive care to nursing care, the outcome improves the quality of the sequence of the healthcare services at each stage in our society. We hope this newly created center would follow the openness to society that our university, the University of Tsukuba, represents, so that we could imagine the future together.



**Nanako Tamiya, Ph.D.**  
Director, R&D Center  
for Health Services

### Mission

To research how we can effectively contribute to provide services that bring good health & happiness to people in the declining birthrate and aging of the population society.

### Cooperation with Government

Policy proposal

Clinical Evidence

Gov't

Public Fund

### R&D Ctr. For Health Services

Promote academic research and social contribution by making effective use of 2D data.

Medicine  
Hospital  
Health and Sport  
Sciences  
Human Sciences



Dept. of Secondary Data Infrastructure  
Dept. of Regional inclusive care research/implementation  
Dept. of Local Preventive Medicine  
Dept. of Clinical Medicine  
Dept. of Global Aging  
Dept. of Comprehensive Family Policy

Academic  
Cooperation

International  
Cooperation

*Without using taxes, we support an aging society!*

### Cooperation with Industries

#### Medical Providers



Fast Doctor Inc.

Japan Medical Data Center Co., Ltd.

Institute of Global Medical and Sports Science, Ltd.

SMS Co., LTD.

TOPPAN Holdings Inc.

#### Care Service Providers



### Cooperation with community

#### Municipals

Ibaraki prefecture  
Tsukuba City, etc



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# R&D Center for Tailor-Made QOL

Since February 1st, 2019

## Development of 'Tailor-Made QOL programs' aimed at promoting health

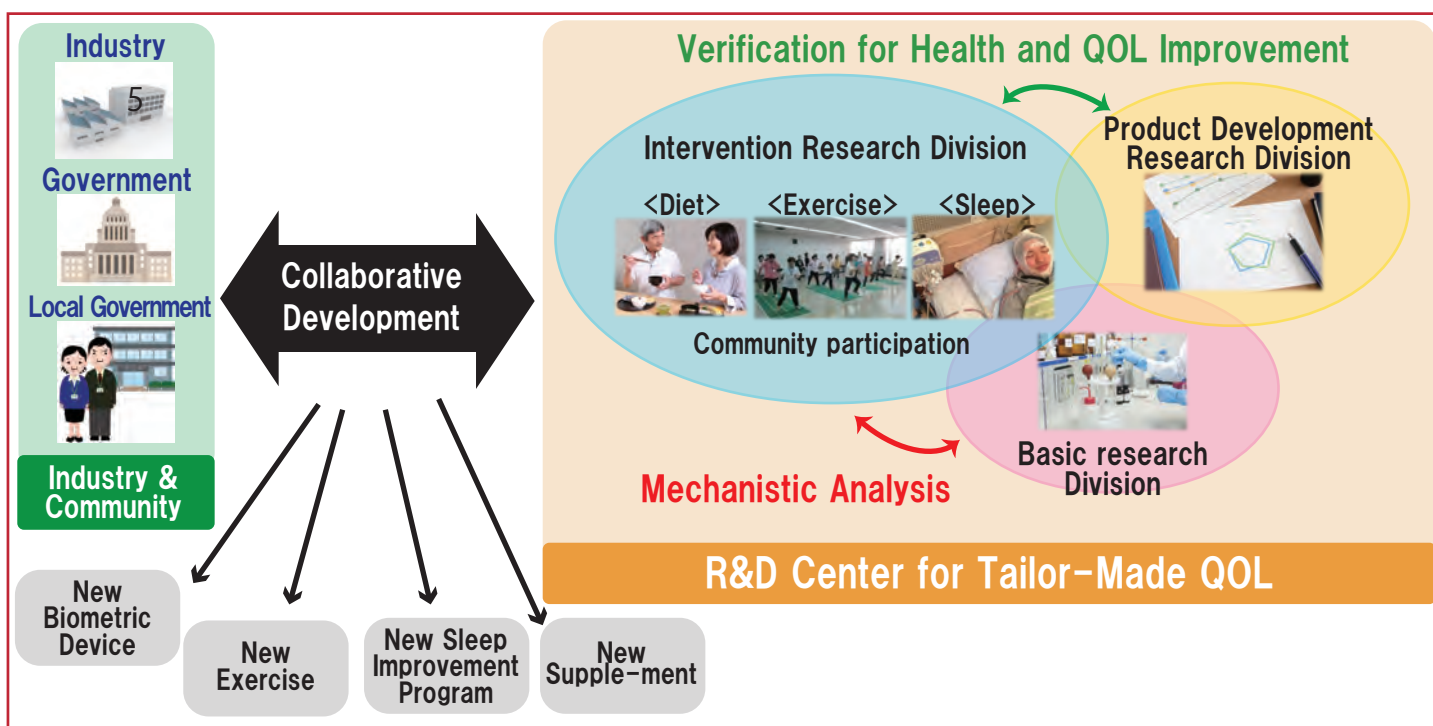
R&D Center for Tailor-Made QOL has been established to disseminate an innovative 'Tailor-Made QOL Program' aimed at promoting health and preventing functional decline to people all over Japan and the world. Reducing the burden of health care cost has become an urgent issue; therefore, the national policy is shifting focus from 'treatment/care' to 'prevention and improvement'. It has become necessary to develop effective programs to improve the QOL and extend healthy life span that enable people to age with dignity, thereby overcoming the current situation where people remain bedridden for long periods of time at the end of their life. Not only will this lead to a significant reduction in medical expenses, but this will also change the image of the elderly people and contribute to the accumulation and utilization of human and intellectual capital in the society.



Hiroko Isoda, Ph.D.

Director, R&D Center for Tailor-Made QOL

### Mission



## Development of Tailor-Made QOL Program (Integration of Diet, Exercise and Sleep)

Achieve QOL Improvement for Each Resident



## International Expansion



# R&D Center for Working Persons' Psychological Support

Since April 1st, 2019

A Research and Development Center with a Framework for Psychological Support for Working Individuals and Social Contribution.

◆ Our center promotes research and development on topics such as "working individuals' consciousness and behavior," "relationships between individuals and organizations," "mental health in the workplace," and "professional development tailored to one's expertise and age". We engage in joint research with various companies and offer academic guidance. Additionally, we actively participate in a wide range of educational and social contribution activities to support working individuals, including the development and management of educational programs for professionals and leaders in recurrent education, offering extension programs, and providing individual support through our Life Career Counseling Center.

◆ In the future, we will continue to advance research and development using psychological approaches on "human capital management," a new challenge that bridges the gap between workers and organizations. We will deepen our exploration of topics such as "work engagement" and "organizational culture," which contribute to workers' motivation and vitality, as well as sustainable growth and development for organizations. By publishing our findings and implementing them in society, we aim to make a meaningful and ongoing contribution to society.



Masaki Okada, Ph.D.  
Director, R&D Center  
for Working Persons'  
Psychologica1 Support

## Our Mission

### 「Pursuit lifelong development, with us.」

As workplaces face various environmental changes, the need for a deeper understanding of human psychology is rapidly growing. We believe that individuals can continue to develop at any stage of life and are committed to supporting both life and work in a holistic way.

With this aspiration, leading practitioner-researchers have gathered here.

## Research

[Research Unit]

Advancing research on psychological support for working individuals

Research funded by external public funding, special joint research projects, and large-scale scientific research projects



## Social contribution

[Consulting Unit]

Advancing joint research and academic guidance in collaboration with companies, and translating research findings on psychological support for working individuals into societal contributions.

[Education & Training Unit]

Development and implementation of training for professionals, evaluation of educational effectiveness, and design and delivery of recurrent education.

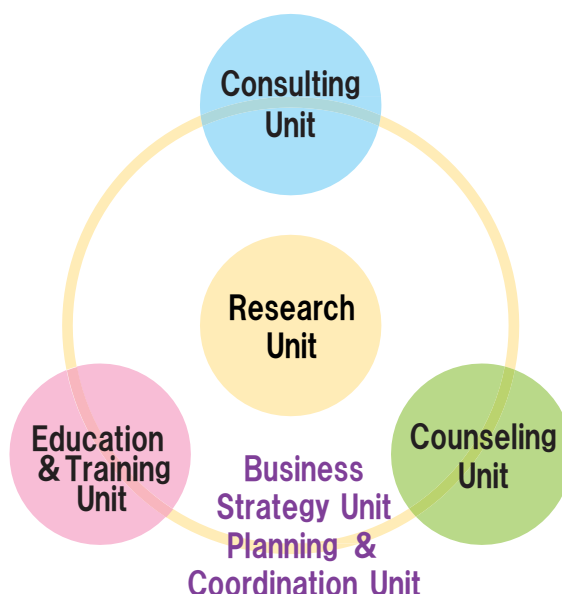
[Counseling Unit]

Management of life career counseling room, and provision of supervision.

## T-One Lab \*

\*The center's informal name

By bringing together the wisdom of the University of Tsukuba, we unite as one team to deliver seamless, one-stop solutions.







# R&D Center for Innovative Material Characterization

Since October 1st, 2019

## - Toward Social Implementation of Innovative Measurement and Evaluation Technologies -

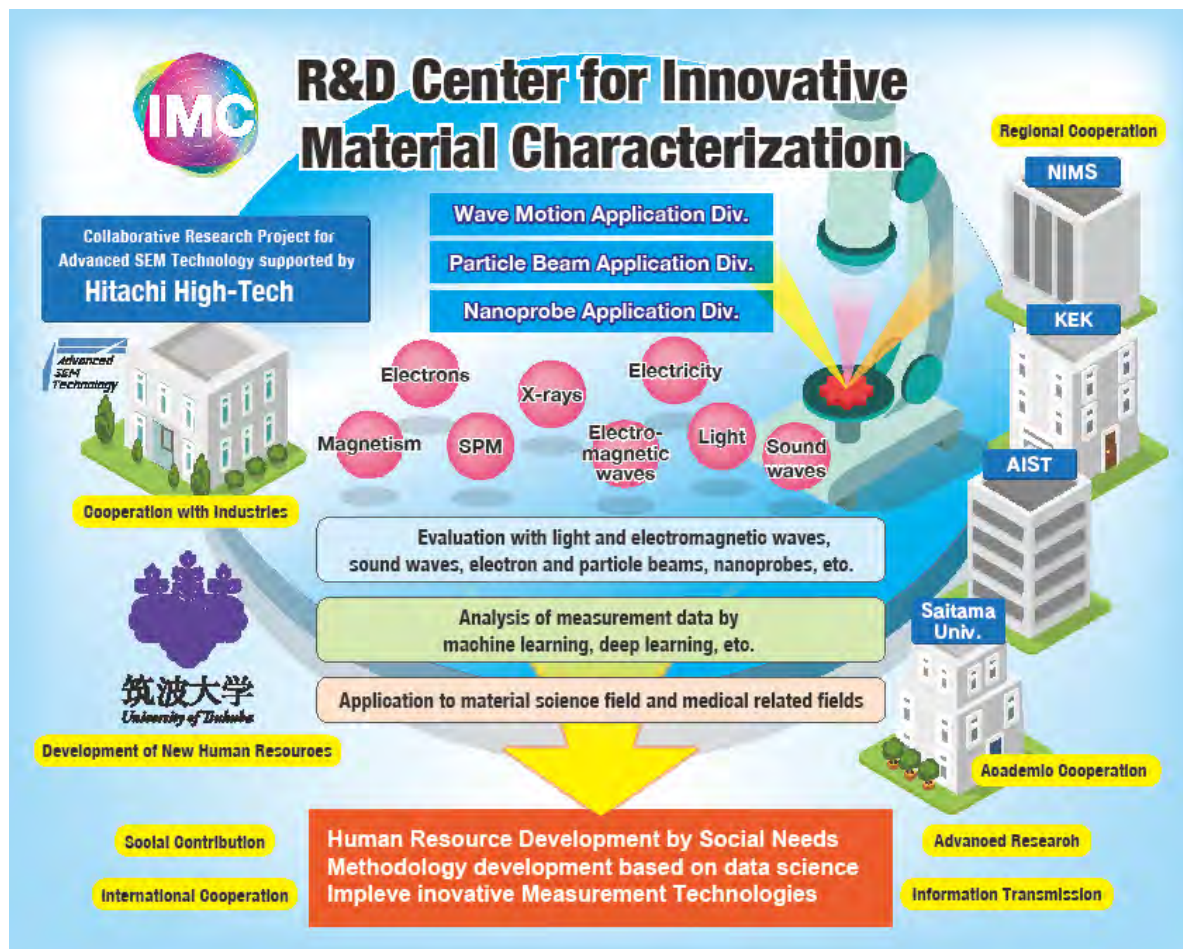
This center has been engaged in comprehensive research and development of new measurement techniques using optical wave, electron and particle beam. In addition, we have been challenging advanced technological issues for the fundamental technology of electron microscopy in semiconductor device measurement and structural analysis of new materials, and have realized high-resolution and high-precision measurement technology.

In the future, we will develop measurement methods based on data science and pursue an approach that comprehensively integrates data collection, analysis, interpretation, information extraction, and predictive modeling.



Masahide Ito, Ph.D.

## Mission



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# R&D Center for innovative Drug Discovery

Since October 1st, 2019

100 years of vitality with new drugs and new technologies

In Japan, a super-aging society with a declining birthrate is progressing and the disease structure is changing along with increasing lifestyle and aging-associated chronic intractable diseases such as cancer and circulatory, musculoskeletal, psychiatric and neurological, metabolic, and immune diseases. In such a situation, it is desired to create a society where all people can live alive with vitality, safety and peace mind at their respective life stages toward the era of 100 years of life. In recent years, there has been great interest and expectations for technological innovations that will support medicine, such as regenerative medicine, genomic medicine, artificial intelligence, and the use of big data. This center promotes basic and developmental researches for drug discovery / diagnostic technology to responds to medical needs in a society with a declining birthrate.

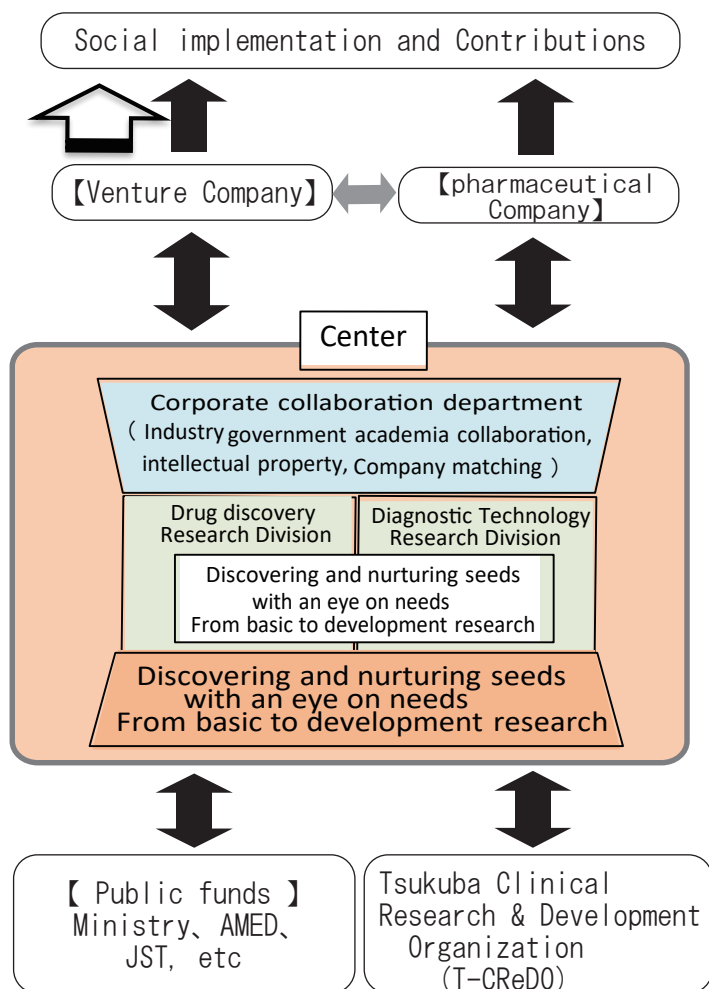


Akira Shibuya, Ph.D.

Director, R&D Center  
for Innovative Drug Discovery

## Mission

### Overview the Center



### Expected results

- Creation of a lively and healthy society
- Revitalizing the medical industry
- Revitalizing young human resource development
- Promotion of industry-academia collaboration



# R&D Center for Digital Nature

Investigating New Relationships between Computers and Nature

Since September 1st, 2024



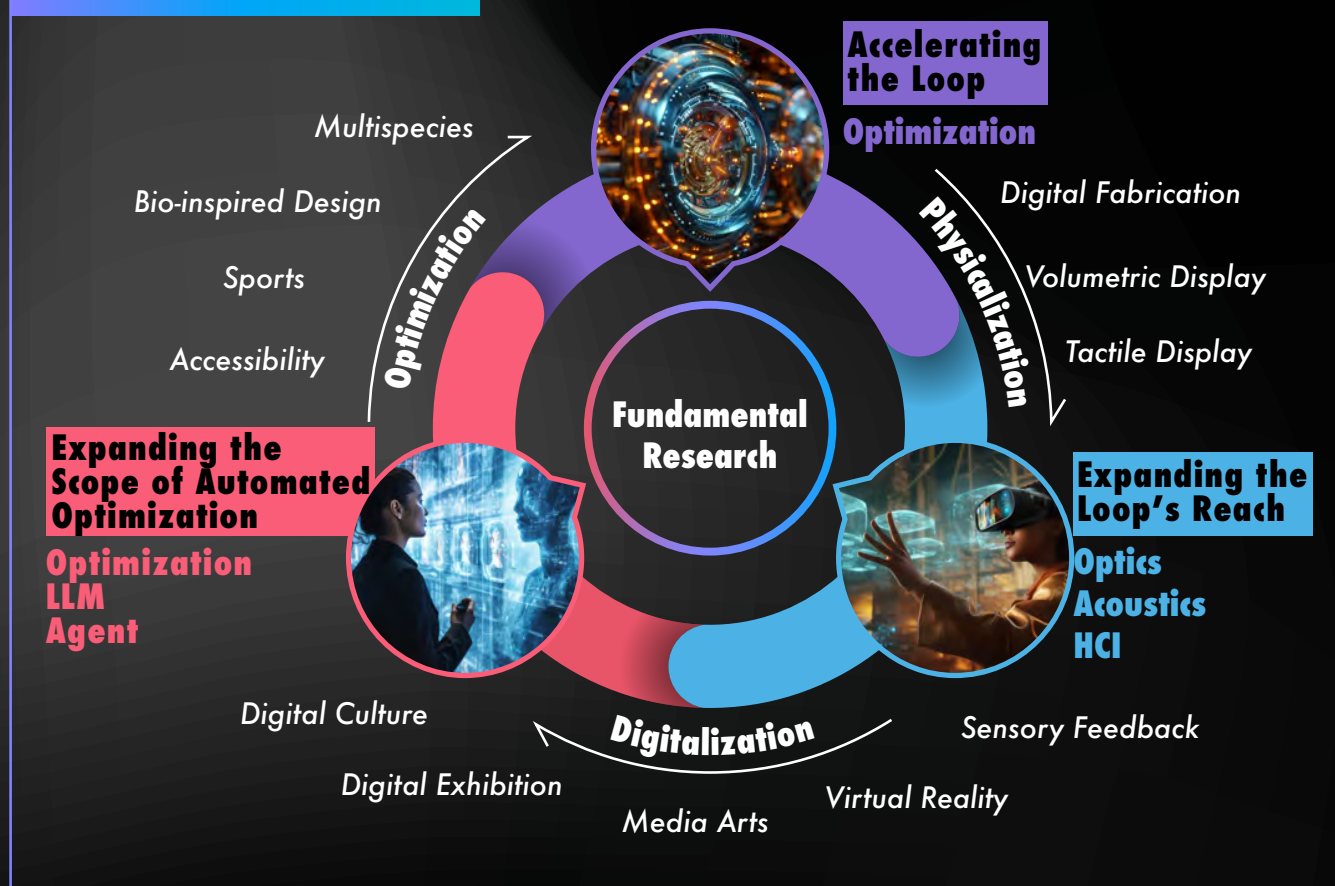
**Director Yoichi Ochiai**

The recent developments in computational platforms for ubiquitous computing, Internet of Things (IoT), and cyber physical systems are enabling a 'new nature' the generation of artificial objects that are indistinguishable from the natural objects. For example, sound and light can be computationally manipulated to render realistic graphics (such as a butterfly) in mid-air or manufacture realistic object (such as material) using a printer. We describe such environment where the environment is restructured through the interaction of natural and computationally generated artificial objects, as the digital nature. Digital nature can be achieved through various methods such as digital fabrication method using 3D printer or through augmented reality (AR) / virtual reality (VR). The interaction of artificial object with

the natural environment feeds back as data and will be utilized in a feedback loop to further infuse the artificial object into the natural world.

This R&D center researches the information media devices and co-creation environment with humans in such a feedback loop and develop building blocks towards social implementation of digital nature through the promotion of researches associated with digital nature. In addition, we will endeavor to develop novel media devices and its services via multidisciplinary collaboration with cultural, art and sports sectors.

## Mission of the Center



**Based on the vision of "Digital Nature," the aim is to accelerate the cycle of fundamental research and optimization, expand its application range, and promote automated optimization using LLMs and agents.**



# R&D Center for Smart Wellness City Policies

Since November 1st, 2020

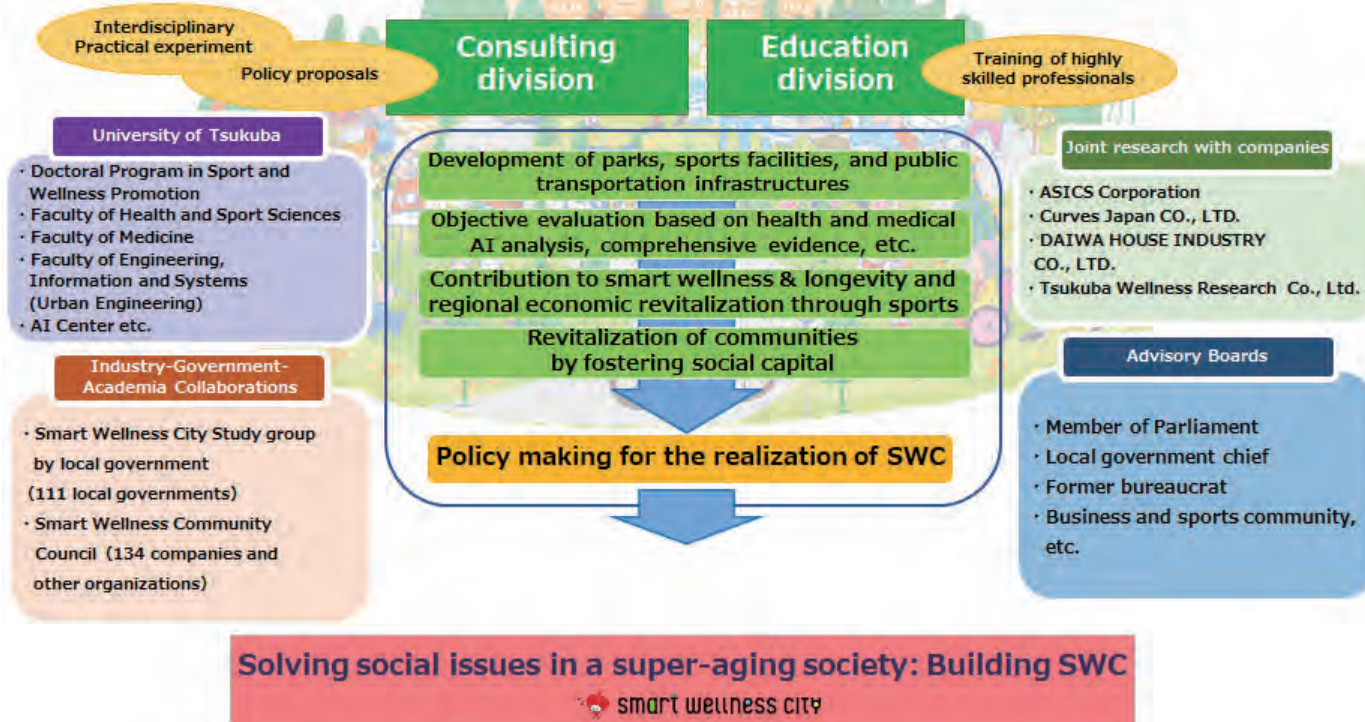
## Evidence-based Policy Making for the realization of Smart Wellness & Long-lived Society

To contribute to the creation of cities that enable the realization of a healthy and long-lived society, the SWC Center will aim to promote developmental research on various issues inherent to a super-aging society, to propose policies to society as products of such research, and to establish a function for training advanced professionals who can implement such policies. Accumulating evidence and formulating policies for creating SWC where residents can live safely and securely requires conducting large-scale, interdisciplinary demonstration experiments by organically integrating sports wellness studies, medicine, urban engineering, and AI. The SWC Center will contribute to policy proposals and human resource development based on the evidences accumulated in the field of sports wellness studies regarding the usefulness of sports for health and well-being and regarding the ideal urban environment, as well as promote joint research in the above-mentioned interdisciplinary research fields in collaboration with local governments and companies. We look forward to your participation.



**Shinya Kuno**  
The director of the SWC Center

## R&D Center for Smart Wellness City Policies



# R&D Center for Lifestyle Innovation

Since April 1st, 2022

## Exploring lifestyle for health and well-being for the future

In recent years, countries around the world have been experiencing a number of social structural changes, such as declining populations, aging societies with fewer children, social inequality, and globalization. Lifestyle changes are required for various reasons including environmental and energy issues, emerging and re-emerging infectious diseases, increasing health consciousness, and value changes.

The Sustainable Development Goals were adopted by the United Nations. For example, Goal 3: "Good Health and Well-being" includes measures against lifestyle-related diseases and proper alcohol consumption. Thus, while more lifestyle transformation is required, a sense of balance between health and well-being is also required in the context of diverse values.

This center will promote basic research on physical and mental health, including physical endurance and brain fatigue, as well as research on health disorders, quality of life, and drinking patterns.

Based on the results of these studies, we will support the development of products and services that constitute healthy and happy lifestyles and create a new culture in the community.

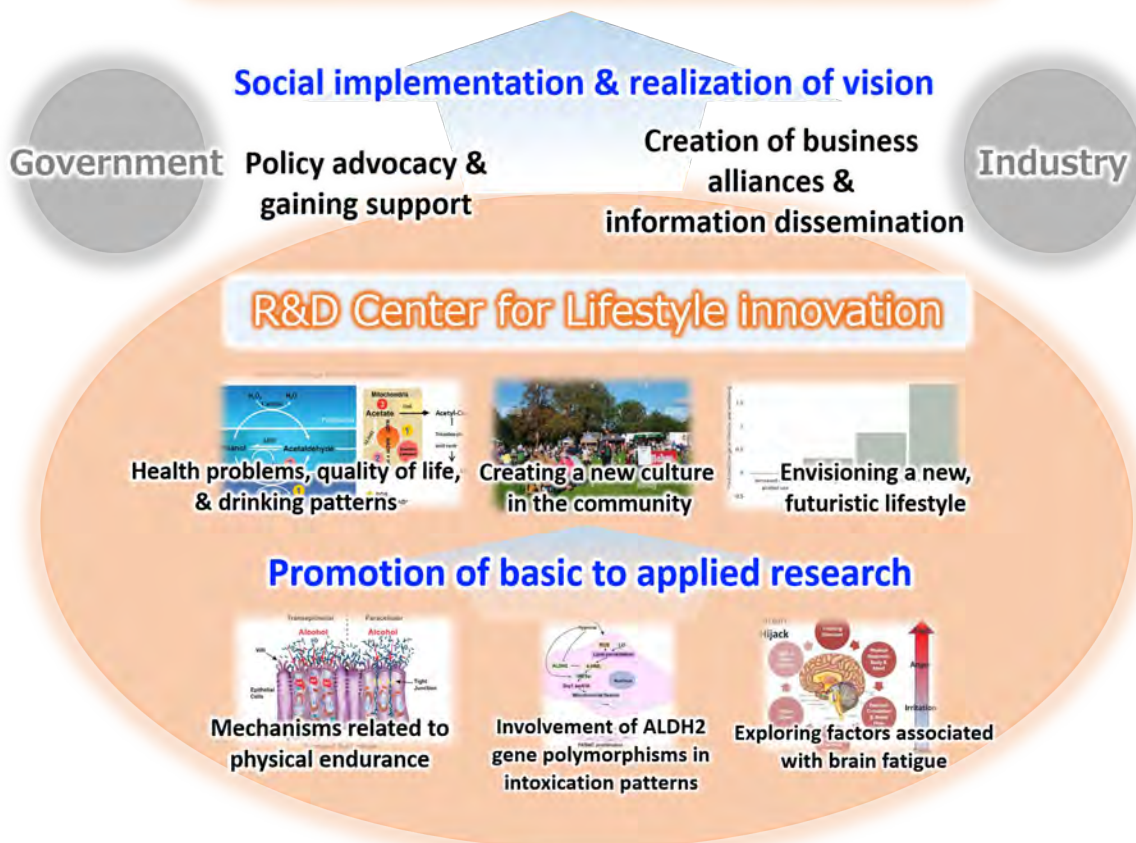
Through these efforts, we aim to create better lifestyles based on scientific evidence. In addition to the interdisciplinary and international nature that is characteristic of the University of Tsukuba, where researchers from inside and outside the university gather from various fields, we will build a system of collaboration and cooperation among multiple companies that conduct joint research to create new value. We will regularly communicate the results of these efforts to society so that as many people as possible will become aware of them.



**Yoshimoto Hisashi, Ph.D**  
*Director, R&D Center  
for Lifestyle Innovation*

Mission of the  
Center

### Creating better lifestyles for the future







# R&D Center for Zero CO<sub>2</sub> Emission with Functional Materials

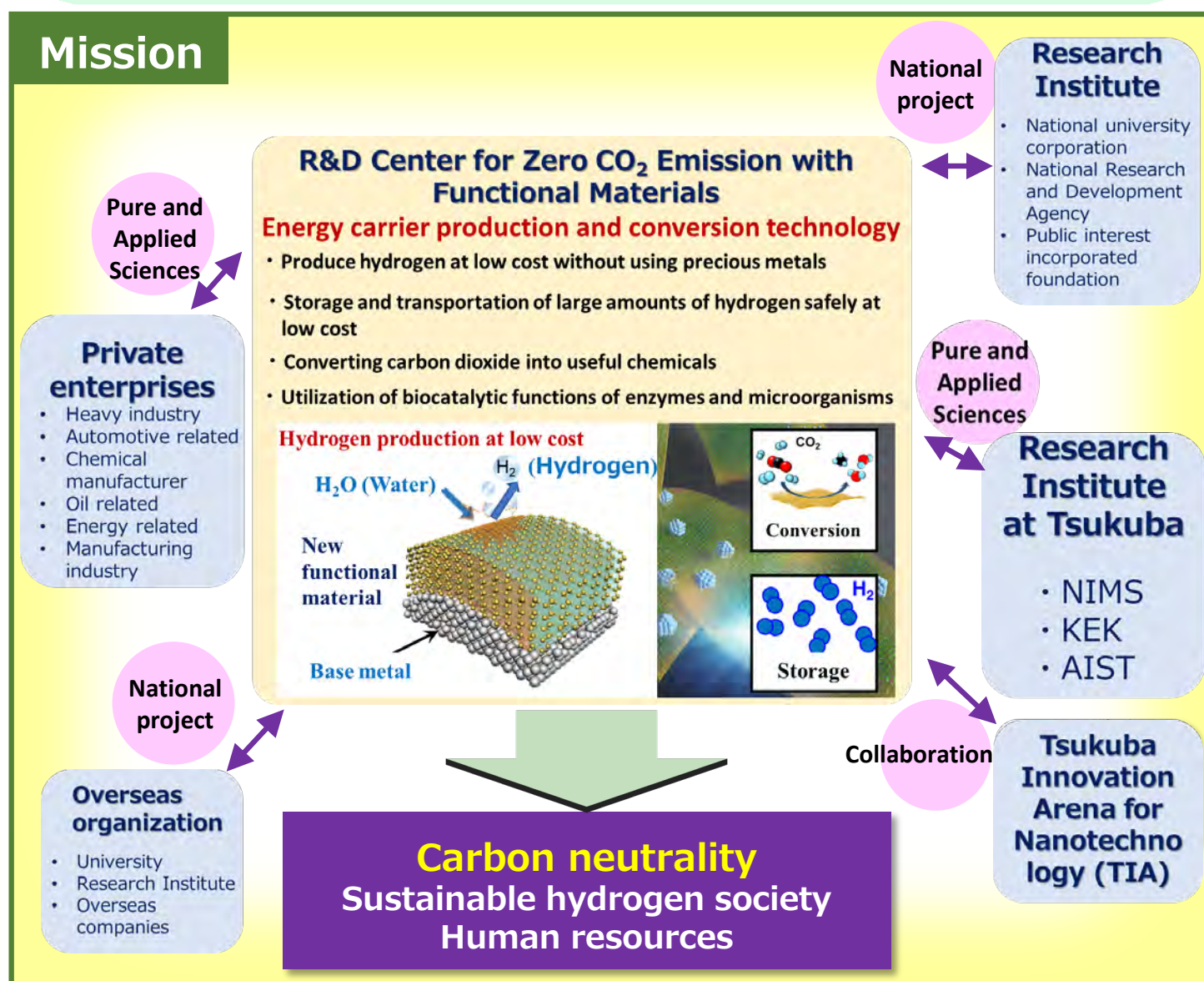
Since April 1st, 2022

– Toward carbon neutrality and hydrogen economy –

Currently, with global warming, carbon neutrality (zero carbon dioxide emission) is required on a global scale. Hydrogen can be produced from water, and fuel cells using hydrogen produce only water as a product without emitting carbon dioxide in the chemical reaction during power generation. So it now draws attention as one of main energy carrier of renewable energy. Hydrogen is thus a molecule capable to play an important role for the sustainable zero-carbon society. In this center, we will promote the research and development of basic important technologies related to hydrogen production, storage and transportation, and green innovation basic technologies that convert carbon dioxide into useful materials such as methanol and formic acid and fuels.



Dr. Takahiro Kondo  
Director, R&D Center  
for Zero CO<sub>2</sub> Emission  
with Functional Materials



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