



The Need for Innovation:
Digitalization, Sustainable Cities, and Reforming Higher Education

Higher Education in the Age of Great Transformations

Teruo Fujii, PhD
President, The University of Tokyo

Economic and materialistic development alone is not enough to increase human prosperity and well-being.



Climate change



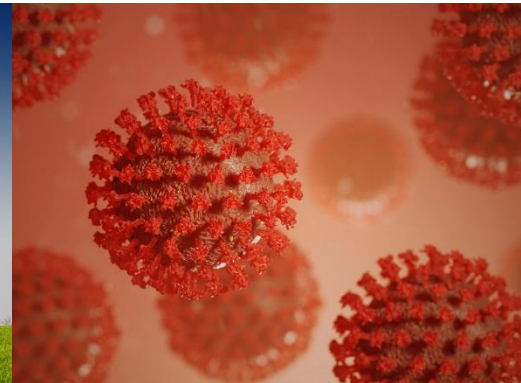
Food crises



Plastic waste



Energy problems



COVID-19

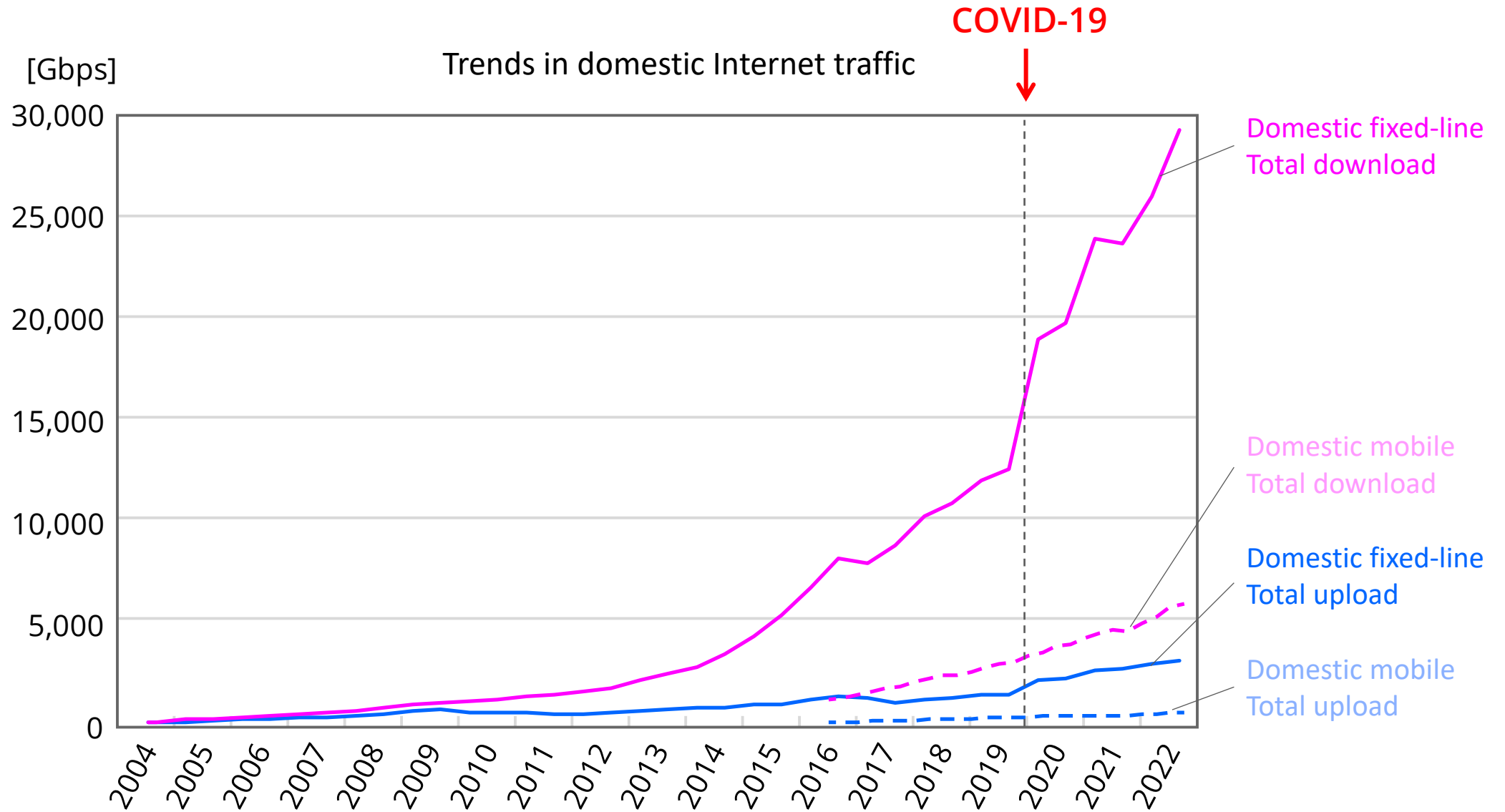
UTokyo COMPASS

*Into a **Sea** of Diversity:* Creating the Future through Dialogue



Achieve academic excellence and realize an inclusive society by creating, connecting, and deepening academic knowledge

Rapid increase in data traffic



Based on data from the Ministry of Internal Affairs and Communications; figures are estimates.

Paradigm shift to a data-driven society

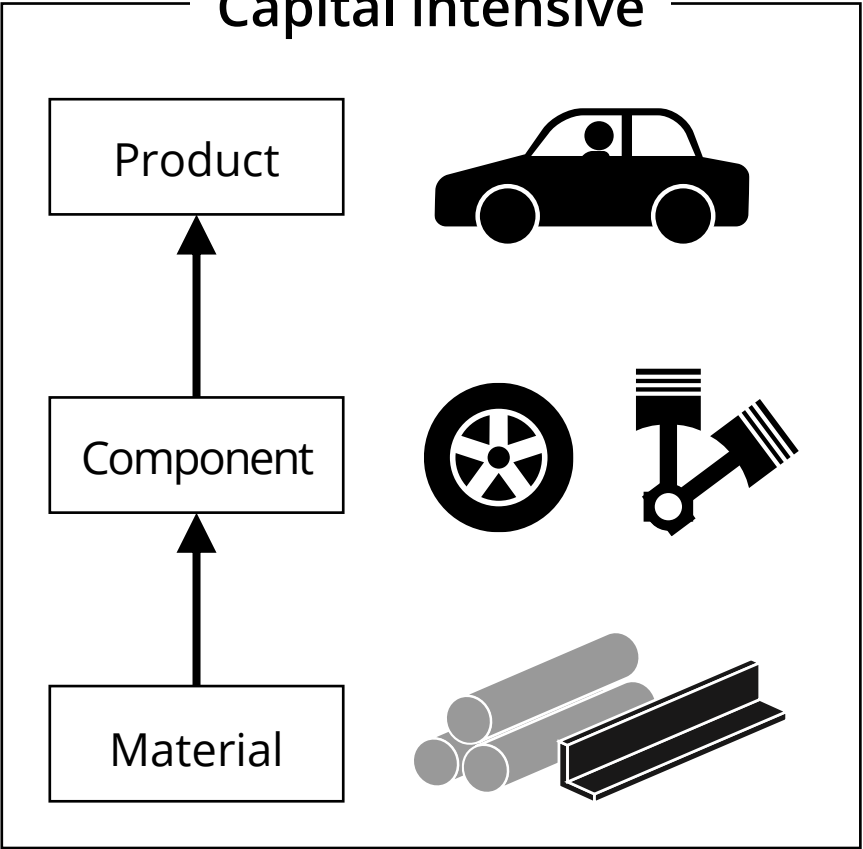
Product ← Knowledge / Information

Knowledge / Information ← Product

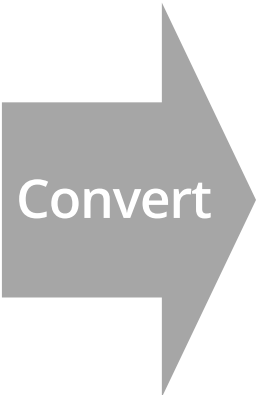
Added Value



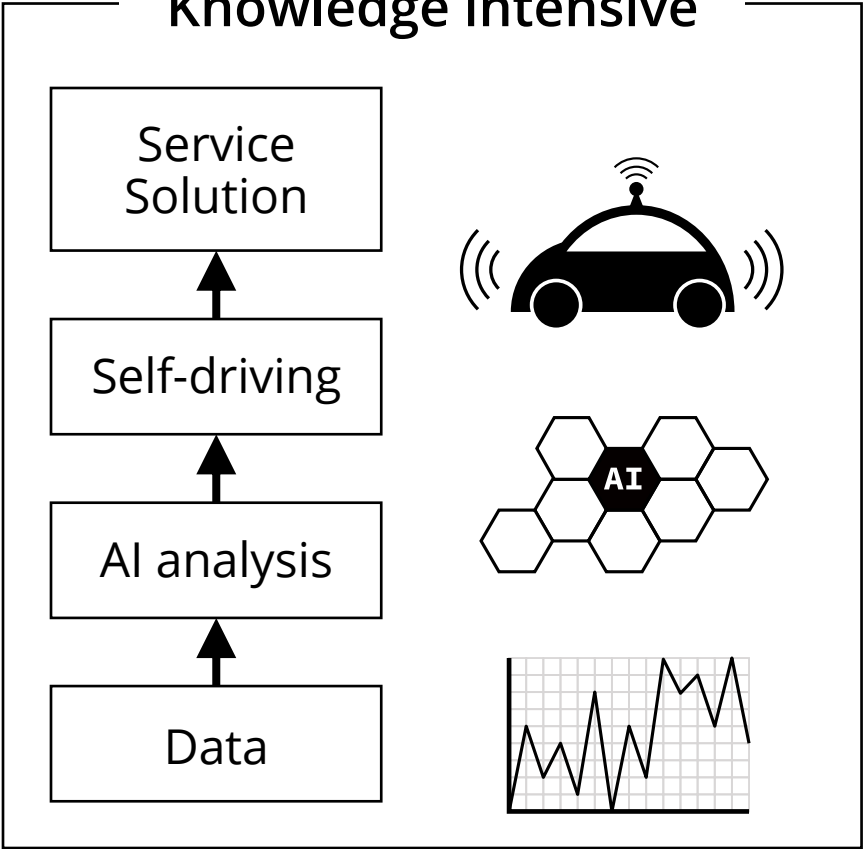
Capital intensive



ex. Roads, railroads, ports

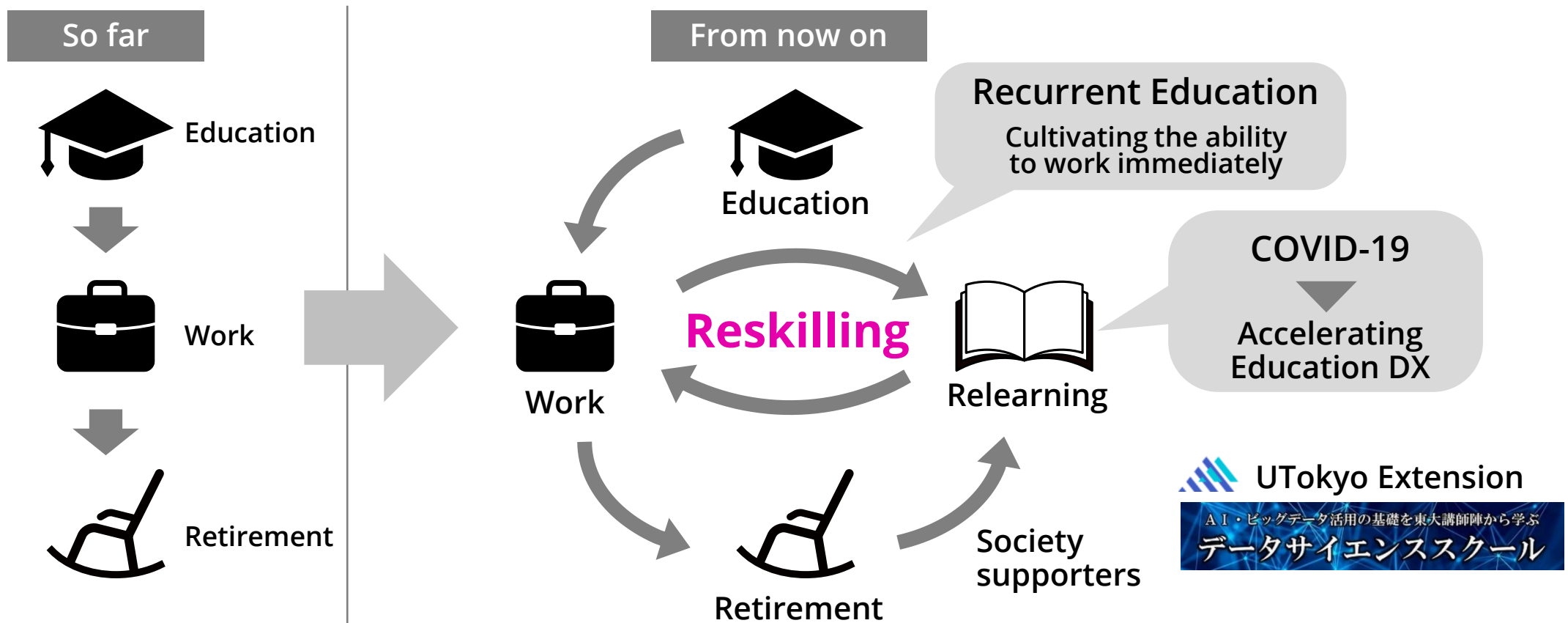


Knowledge intensive



ex. High-speed information networks, 5G, Beyond5G

Toward a data-driven society - Upgrading human capital



STEAM education × Education DX ▶▶▶ From "If you don't learn, you don't learn" to "Learn how to learn."
Expand opportunities for Lifelong Learning and contribute to the advancement of human capital.
Need to consider mechanisms (taxation, etc.) that will lead to "behavioral change" in society as a whole.

Approaches to Reskilling that contribute to the development of DX human resources

Data Science School by UTokyo Extension Co., Ltd., a subsidiary company



Professors from the UTokyo provide a thorough explanation of systematic data science theories developed at UTokyo from the very basics.

- Aiming to develop those who can fully make use of AI and data
- A central hub for disseminating UTokyo's various educational contents to society
- Classroom for 80 students in Otemachi Building
- The number of students : 241 in the first year, 480 in FY2020, and over 1,000 in FY2021 and FY2022

STEAM approach / Why we need "A" ?

STEM

Developments in Science & Technology
Emphasis on science subjects

+



Creativity

Brushing up Imagination

← **Design**

← **Art**

← **Liberal Arts**

Philosophy, Culture, Anthropology,
Literature, History, Arts ...

- Design, art, and liberal arts are essential to create a better society.
- Integrate design and art into education to focus on individuals.
- Nurture people who can handle academic knowledge not only in STEM areas, but also in Liberal Arts (humanities, social sciences, etc.)

DLX Design Academy

Cultivating human resources capable of creating new value (since 2018)

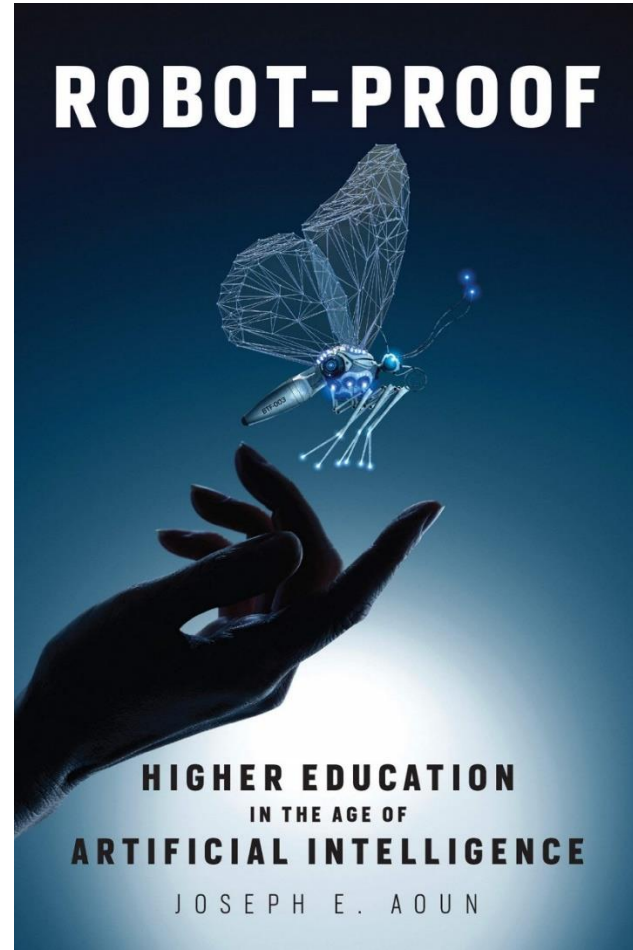


Cooperation with: Institute of Industrial Science/UTokyo, Mori Building Co., Ltd., The Mori Memorial Foundation, RCA, The Foundation for the Promotion of Industrial Science

Re-connect learning to society



@ The Inauguration Ceremony of Sally Kornbluth, 18th President of MIT



“Joseph E. Aoun, president of Northeastern University in the United States, in his book *Robot-Proof: Higher Education in the Age of Artificial Intelligence*, explains how, in this era of advanced AI and robotic technology, experiential learning in university education is important as a foundation for nurturing creativity.”

Quoted from President's Welcome Address AY2023 Matriculation Ceremony

Re-connect learning to society

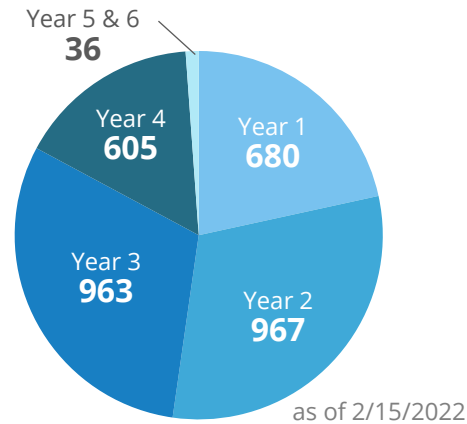
Hands-on Activity Programs

Undergrad

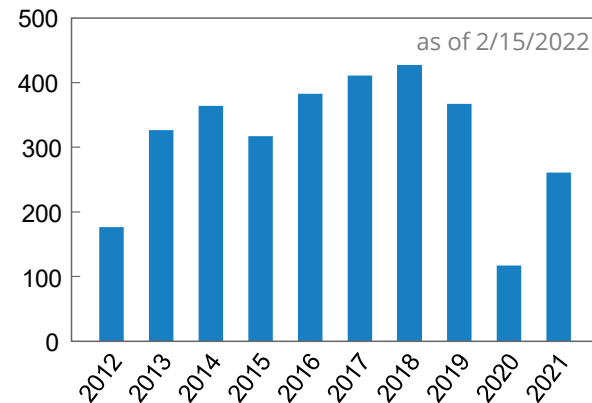
Grad

- Exposed to lifestyles and sets of values different from their own
- Acquiring the ability to generate new ideas and inspiration

Number of participants



Change in number of participants



Volunteer work in an organic farm (US)



Medical work experience (UTokyo Hospital)



Field work experience (Hokkaido)

UTokyo Problem-Solving Fieldwork Program

Undergrad

Grad

- Developing leaders who can formulate and implement policies in collaboration with diverse stakeholders
- Through pre-surveys, field activities, and post-surveys, proposing pathways to solving social issues

Location (FY 2022)

13 prefectures, **19** regions:

Yamagata, Fukushima, Toyama, Ishikawa, Yamanashi, Mie, Shiga, Tottori, Shimane, Kagawa, Kochi, Nagasaki, Miyazaki

Number of participants

FY 2017 **43**
 FY 2018 **49**
 FY 2019 **40**
 FY 2020 **60**
 FY 2021 **95**
 FY 2022 **90**

as of 2/15/2022

(Due to COVID-19, all programs utilized online tools, "FS Regional Exchange in online format" in FY 2020)

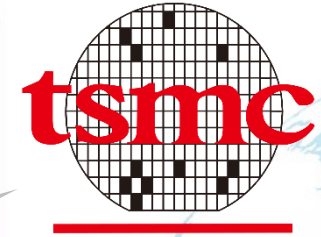
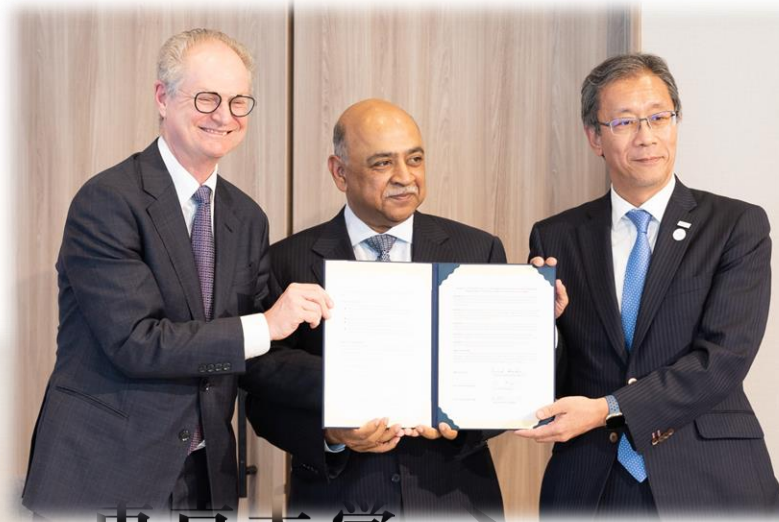
Strategic approach on semiconductor & quantum technology

\$100M from IBM

Semiconductor companies (d.lab + RaaS)

Sumitomo Corporation
Toppan Printing Co.
Panasonic Corporation
Hitachi, Ltd.
Mirrise Technologies, Inc.
... etc.

**@G7 Summit
in Hiroshima**



from Nov 2019



from Dec 2019

Quantum compa

Toshiba Corpora
Toyota Motor Co
Mizuho Financia
Mitsubishi Chem
Corporation
Mitsubishi UFJ FC
... etc.



東京大学
THE UNIVERSITY OF TOKYO



Quantum Innovation
Initiative Council
from Jul 2020

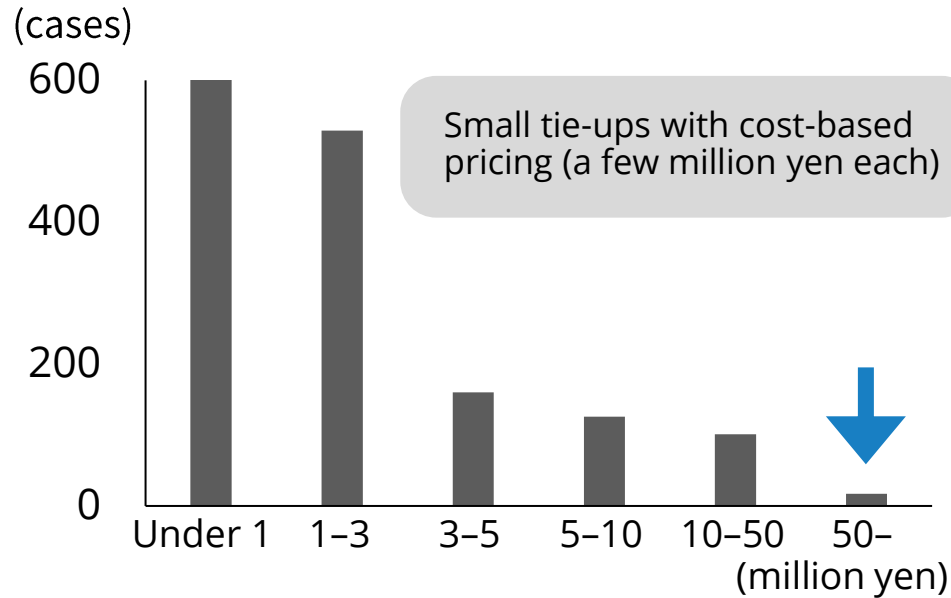
\$50M from Google

Overseas bases

Universities, Industries,
Startups, etc.

Strategic Collaborations with Industry

Academia-Industry Cooperation



Value of universities' knowledge was underestimated.

Strategic Collaborations



“Valuing Air”

Collaboration on organizational level



“Innovation Ecosystem”

Sharing future vision

Accurate estimate of intangible intellectual property

UTokyo has established long-term strategic collaboration partnerships with:

Hitachi (2016), Daikin (2018, **over ¥10 billion**), SoftBank (2019, **¥20 billion**), Mitsui Fudosan (2020. 1), Nippon Paint (2020. 5), IBM (2020. 6), Sumitomo Forestry (2020. 9), TCS (2020. 10), **Kubota (2021. 11, ¥10 billion)**, Mitsubishi Estate (2022.10)

Share future vision featuring “Valuing Air”

Leveraging academic knowledge of UTokyo



LOOK UTokyo

Daikin technology managers and engineers visit UTokyo for technology discussions

LEARN with UTokyo & Daikin
Creating questions together

TRY with UTokyo & Daikin
Challenging/trying before implementing joint research

Collaborating globally



UTokyo Global Internship Program

UTokyo students experience the front line of business at Daikin overseas bases
Round-the-world:10, Regional stay: 36 (2023)

LOOK Daikin

UTokyo researchers visit Daikin domestic and overseas bases

Co-creation in diverse fields: Manufacturing, Agriculture, Mechanics, Architecture, Light laser, Electronics, Chemistry/Material, Information...

A cumulative total of 800 or more Daikin employees involve in co-creation

Administrative staff as well as researchers and students stimulate each other

A new model of Co-creation with Industry and recurrent education



Positive earthshaking changes in both Daikin and UTokyo

UTokyo start-up in Africa



WASSHA Inc. / Graduate School of Engineering

Developing a service to sell electric power by measure through "Solar Lantern" that combined storage batteries and solar panels

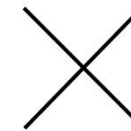
Providing electricity to 1.5 million people at 1,000 locations in off-grid areas such as Tanzania

Achieved sustainable electricity supply via a business model utilizing existing KIOSKS and mobile money to address the social issue of electrification with low profitability

Solar KIOSK business leveraging research results



DAIKIN's
energy-saving
air conditioner



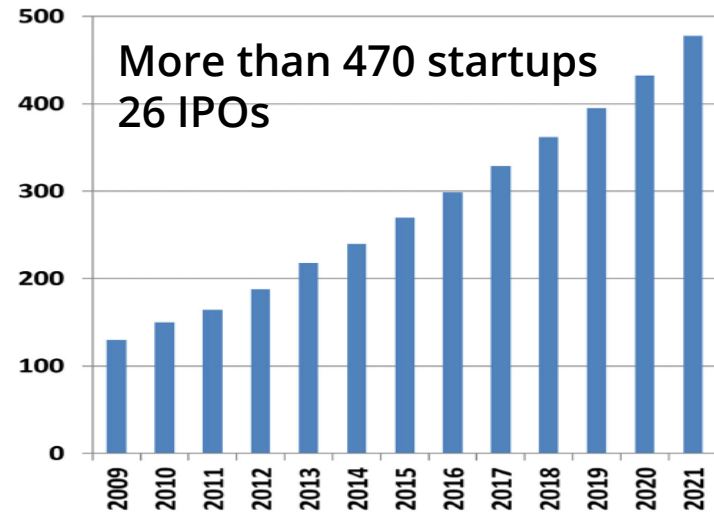
WASSHA's
mobile-money
technology

Joint venture established by Daikin Industries and WASSHA, founded in Tanzania

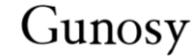
Developing air conditioner subscription business

UTokyo Startup Ecosystem

Total number of startups



Listed startups



Life/Chem.-related



UTokyo group companies for startup support



Innovation Platform for The University of Tokyo

UTokyo Investment Company / 2016

No.1 fund: 25 billion yen in total, invested in 85 companies so far, 5 IPOs / M&A

No.2 fund: 25.6 billion yen in total, invested in 30 companies so far



UTokyo venture capital / 2004

Managed 5 funds with a cumulative value of approximately 84.7 billion yen

Invested in about 150 companies so far, 19 IPOs & 20 M&A



UTokyo technology transfer / 1998

Cumulative license revenue of 12.55 billion yen

6,382 contracts signed in total

Expanding the Horizons of the Ecosystem

Emphasizing entrepreneurship by students, faculty, and others as "**pioneers of social value**," we realize **a comprehensive entrepreneurship support system** by strengthening three functions that have been lacking: global expansion, deep-tech entrepreneurship support, and non-profit-type social entrepreneurship support.

Two openness

Expansion of **eligibility** for startup and growth support

Entrepreneurship and growth support **entities**



Become **an entrepreneurial university** with a global startup ecosystem

Collaboration including other universities, outside experts, industry, and overseas institutions

1 Global startup investment support



2 Deep Tech Entrepreneurship, Startup Support



3 Non-profit social entrepreneurship support



Total number of startups (including social entrepreneurs) to **6,500** by 2049 (expect **10 unicorn equivalent companies** with a total market capitalization of **10 trillion yen**)

Turning the ecosystem in the area surrounding the campus into a global ecosystem that connects to the world

Workshop & Networking by UTokyo, TMDU & Greater Tokyo Biocommunity at Cambridge

[Date & Time]
Tuesday, May 2, 2023 2:00-8:00PM (EDT)
[Venue]
Havana Room and Venture Café, at CIC
(Cambridge Innovation Center) Cambridge
One Broadway, 14th Floor, Kendall Square, Cambridge, MA 02142, USA
****Live streaming available from 3:00AM on May 3 (JST)**
[Organizers]
The University of Tokyo, Tokyo Medical and Dental University, GTB HOTS HILL*, UTokyo IPC
[Supporters] JETRO, UIDP, GTB
[Registration] Free
****Pre-registration is required.**
Available from [Here](#)



Cambridge Innovation Center (2023)

UTokyo startups Globalization

NorthAmerica:
NY, SFO, **Boston/Cambridge**,
Toronto/Waterloo



Moderna



The UTOPIA Center

Director [Academic]



Yoshihiro Kawaoka
General Supervision



The UTOPIA Center

Japan's centre will operate with around 30 members of staff and funding to last 5 years. Of the allotted \$2 billion, \$1.2 billion will go to vaccine research and development projects, and \$400 million will be used to support start-ups in drug development. The rest will be spent on setting up a virtual network of centres of excellence for basic research in vaccine science, and testing vaccine candidates in early-stage trials. The goal is "to find seeds for future vaccines", says Kawaoka.

SCARDA's central research centre will be based in Tokyo, and there will be four core

AMED: Japan Agency for Medical Research and Development

SCARDA: Strategic Center of Biomedical Advanced Vaccine Research and Development for Preparedness and Response

News in focus

JAPAN'S \$2-BILLION INITIATIVE TO PREPARE VACCINES IN 100 DAYS

A new centre will invest in shots for a range of diseases so the country is ready for future outbreaks.

By Smriti Mallapaty

After recognizing that Japan was slow to develop vaccines for COVID-19, the government has pledged to invest US\$2 billion in a vaccine-research initiative to ensure that the country is ready to respond promptly to future epidemics.

The Strategic Center of Biomedical Advanced Vaccine Research and Development for Preparedness and Response (SCARDA) will initially invest in vaccine research for eight pathogens, including coronaviruses, monkeypox, dengue virus and Zika virus. It will use a range of technologies for vaccine delivery, such as mRNA technology, viral vectors and recombinant proteins.

Japan has been "too slow to catch up" with the rest of the world in making COVID-19 vaccines, says Ken Ishii, a University of Tokyo vaccinologist who is part of SCARDA's central research centre. The country's three most advanced COVID-19 vaccine candidates are still in late-stage clinical trials and none of them is approved for use.

Hundred-day goal

In recognition of this delay, the Japanese government established SCARDA in March; the centre will launch formally in November, says Ishii. The government has realized that developing vaccines is complicated and takes resources, and has given the field a boost, says Toshihiro Horii, a vaccinologist at Japan's Osaka University. "That is a tremendously

huge amount of money," he says.

The initiative will bring together researchers from across Japan, says Yoshihiro Kawaoka, a virologist at the University of Tokyo, and head of the SCARDA central research centre. "That is unique, at least for Japan."

SCARDA's aim will be to produce diagnostic tests, treatments and vaccines ready for large-scale production within the first 100 days after a pathogen with pandemic potential is identified. This 100-day mission was first proposed by the United Kingdom in 2021, and was backed by the other countries in the G7 group of wealthy nations. Similar initiatives include the US Biomedical Advanced Research and Development Agency (BARDA); this coordinates the development of vaccines, drugs and diagnostics in response to public-health emergencies, including pandemics, and invested in several COVID-19 vaccines.

"Since SCARDA is a new organization, it has much to learn from BARDA" and other initiatives funding vaccines, such as the Coalition for Epidemic Preparedness Innovations in Oslo, says Michinari Hamaguchi, director-general of SCARDA.

Seeds for the future

Two of SCARDA's first approved projects aim to develop universal coronavirus vaccines and vaccines against a group of coronaviruses related to severe acute respiratory syndrome (SARS), such as SARS-CoV-2. Another project will create a fast-track system for evaluating vaccine candidates.

Japan's centre will operate with around 30 members of staff and funding to last 5 years. Of the allotted \$2 billion, \$1.2 billion will go to vaccine research and development projects, and \$400 million will be used to support start-ups in drug development. The rest will be spent on setting up a virtual network of centres of excellence for basic research in vaccine science, and testing vaccine candidates in early-stage trials. The goal is "to find seeds for future vaccines", says Kawaoka.

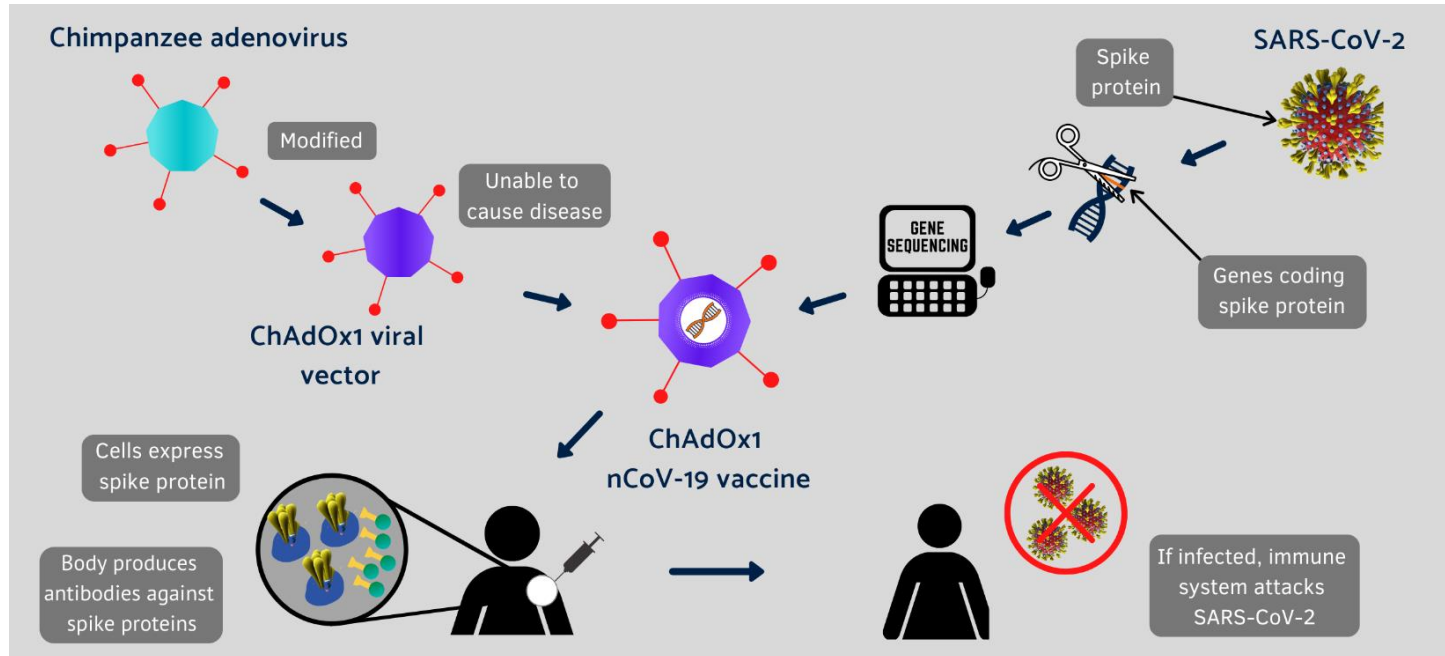
SCARDA's central research centre will be based in Tokyo, and there will be four core institutes, at Osaka University, Nagasaki University, Hokkaido University and Chiba University. Another five institutions will be involved in support services such as providing animal models.

Horii, who leads several clinical trials for malaria and is not involved with SCARDA, says that the current bottleneck in vaccine development in Japan is the translation of research into clinical practice. SCARDA will have to move beyond basic science to develop expertise in taking vaccine candidates through clinical trials, he says. "We have many vaccinologists in Japan, but the majority of them are basic researchers."



A Japanese research effort will work on vaccines for infectious diseases.

Oxford-AstraZeneca SARS-CoV-2 Vaccine Development



Louise Richardson
Former Vice-Chancellor
(now at Carnegie Corporation)

“Creating Space”



Andrew Pollard
Prof. Sir

Safety and immunogenicity of the ChAdOx1 nCoV-19 vaccine against SARS-CoV-2: a preliminary report of a phase 1/2, single-blind, randomised controlled trial

Background: The pandemic of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) might be curtailed by vaccination. We assessed the safety, reactogenicity, and immunogenicity of a viral vectored coronavirus vaccine that expresses the spike protein of SARS-CoV-2.

Lancet, 396 (2020) 467-478, doi: 10.1016/S0140-6736(20)31604-4.

Published online July 20, 2020 ← Work started on January 11, 2020



COVAX

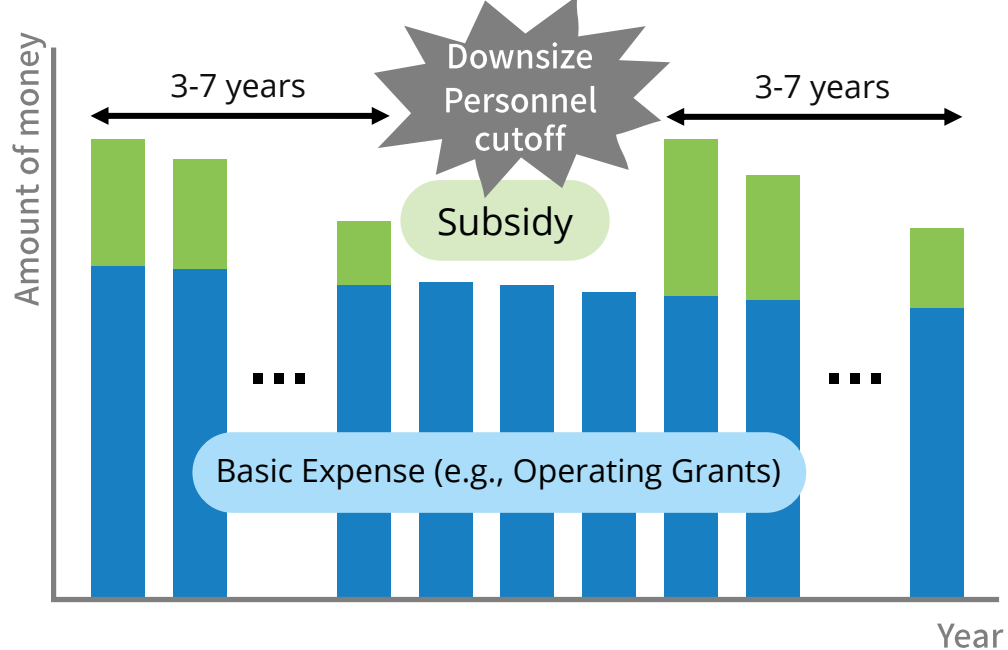
Ensure prompt and equitable access
for people in all 190 countries
3.0 Billion or more Doses.

A new management model unique to universities

~ From "Subsidy Type" to "Endowment Type" ~

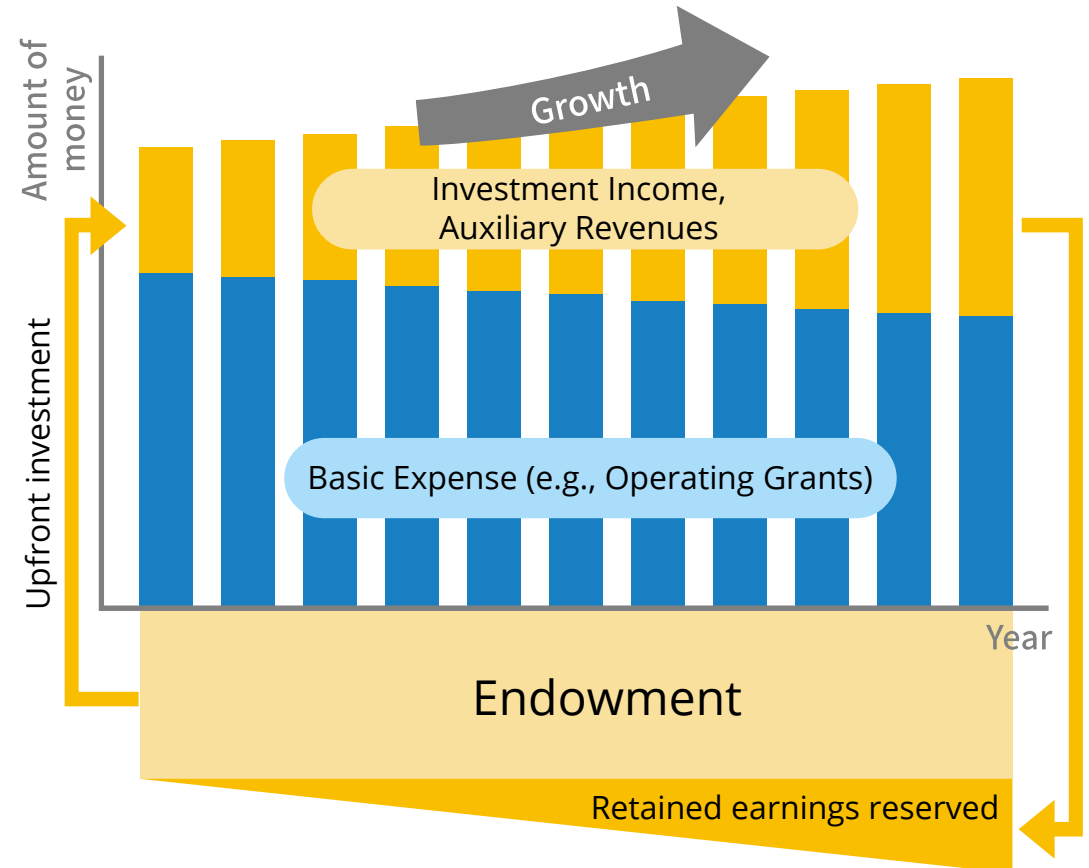
Subsidy Type

Depend on public expenses such as operating subsidies
The need to obtain grants limits the scope of activities to those that are in line with government policies, and the limited time frame makes them unsustainable.



Endowment Type

Long-term and sustainable project promotion
Upfront investment in autonomous activities, based on support and requests from outside the university.



20 Goals



Establish
Management
Capacity
for Autonomous and
Creative Activity

0-1. Develop an Autonomous and Creative University Model

Construct a new university model, and establish and manage a Financial Management Headquarters

Legal management, Risk management, Data-driven management

Cultivate corporate management personnel

0-2. Formulate a Sustainable Management Strategy and Expand the Functions of the University

Establish a Statutory Endowment

Expand the financial base through diversification of financing

Implement intellectual property IR through the development of a portfolio of intellectual property that contributes to management

Pursue liaison activities that foster empathy and dialogue with society

Strengthen support for startups

0-3. Cultivate Support and Appreciation for the University's Roles

Promote awareness of UTokyo Compass and build our brand reputation as one of the world's leading universities

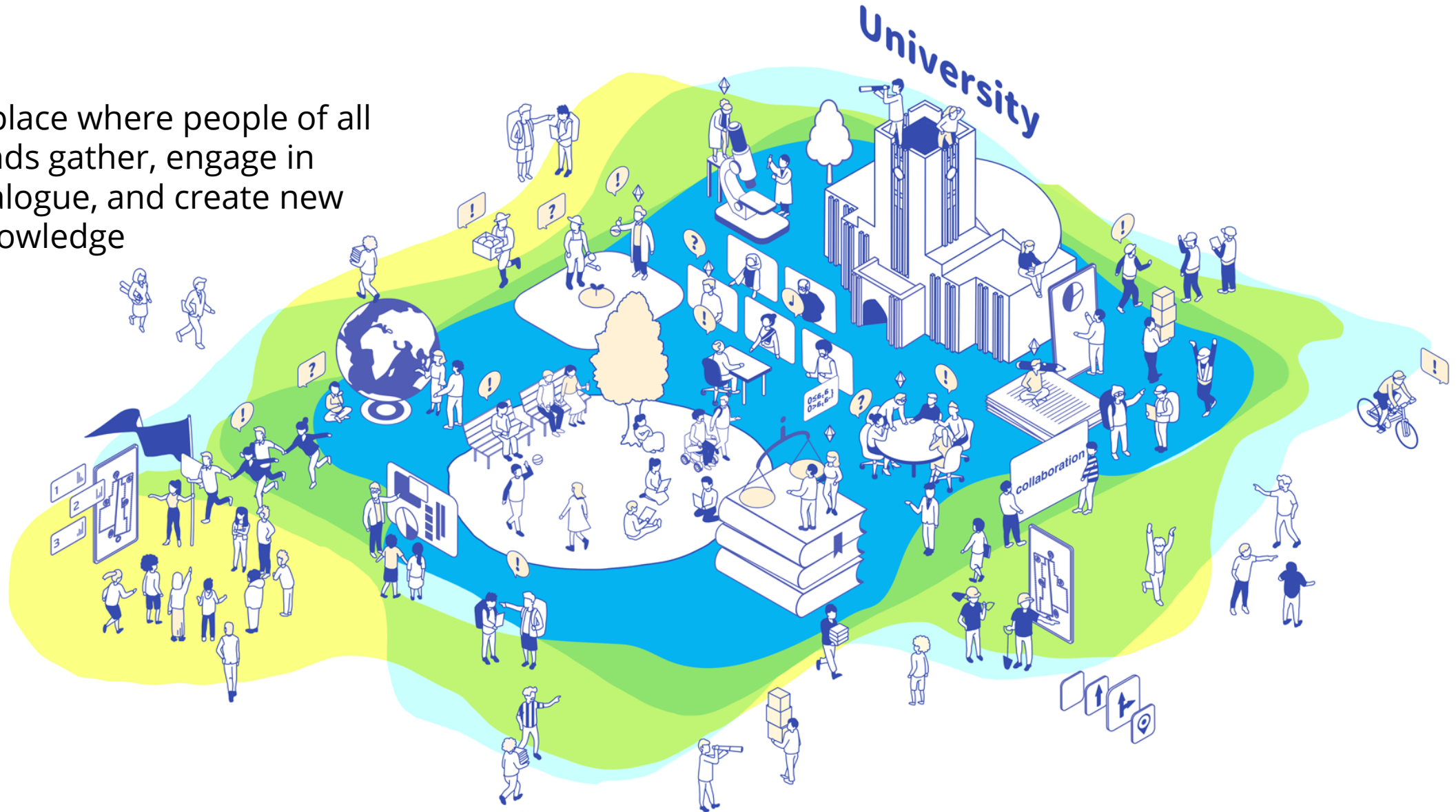
Develop a management system toward the establishment of a new UTokyo brand

Strengthen communication activities in the areas of donations, industrial co-creation, and startup support

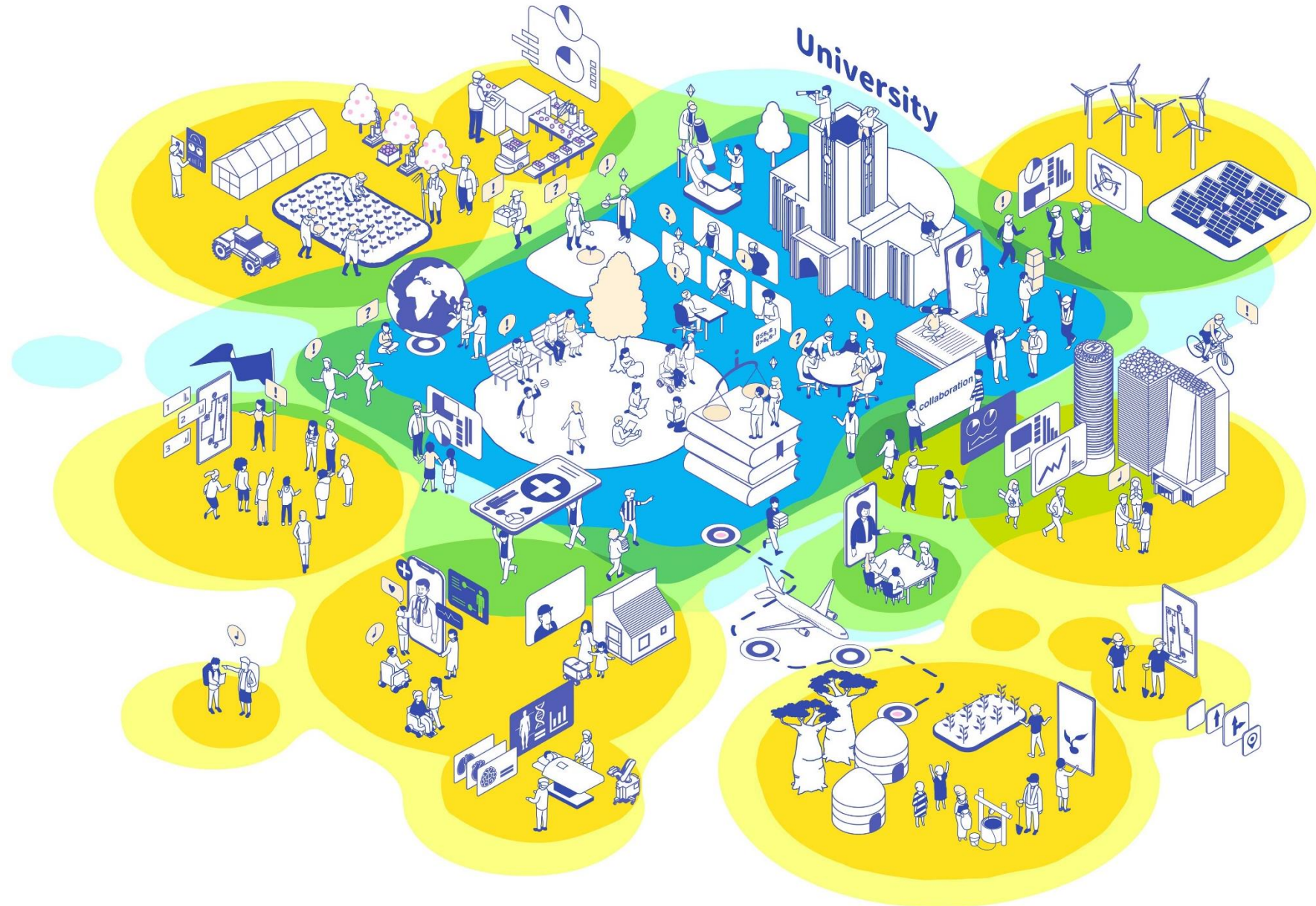
Pursue networking with alumni

UTokyo as Envisioned by UTokyo COMPASS

A place where people of all kinds gather, engage in dialogue, and create new knowledge



Create an ideal vision of the future through diverse dialogues with society



UTokyo COMPASS 

*Into a **Sea** of Diversity:*
Creating the Future through Dialogue