Nagaoka University of Technology

(University Functions to be Enhanced: 3. Take a lead in resolving regional issues through collaboration with regional communities.)
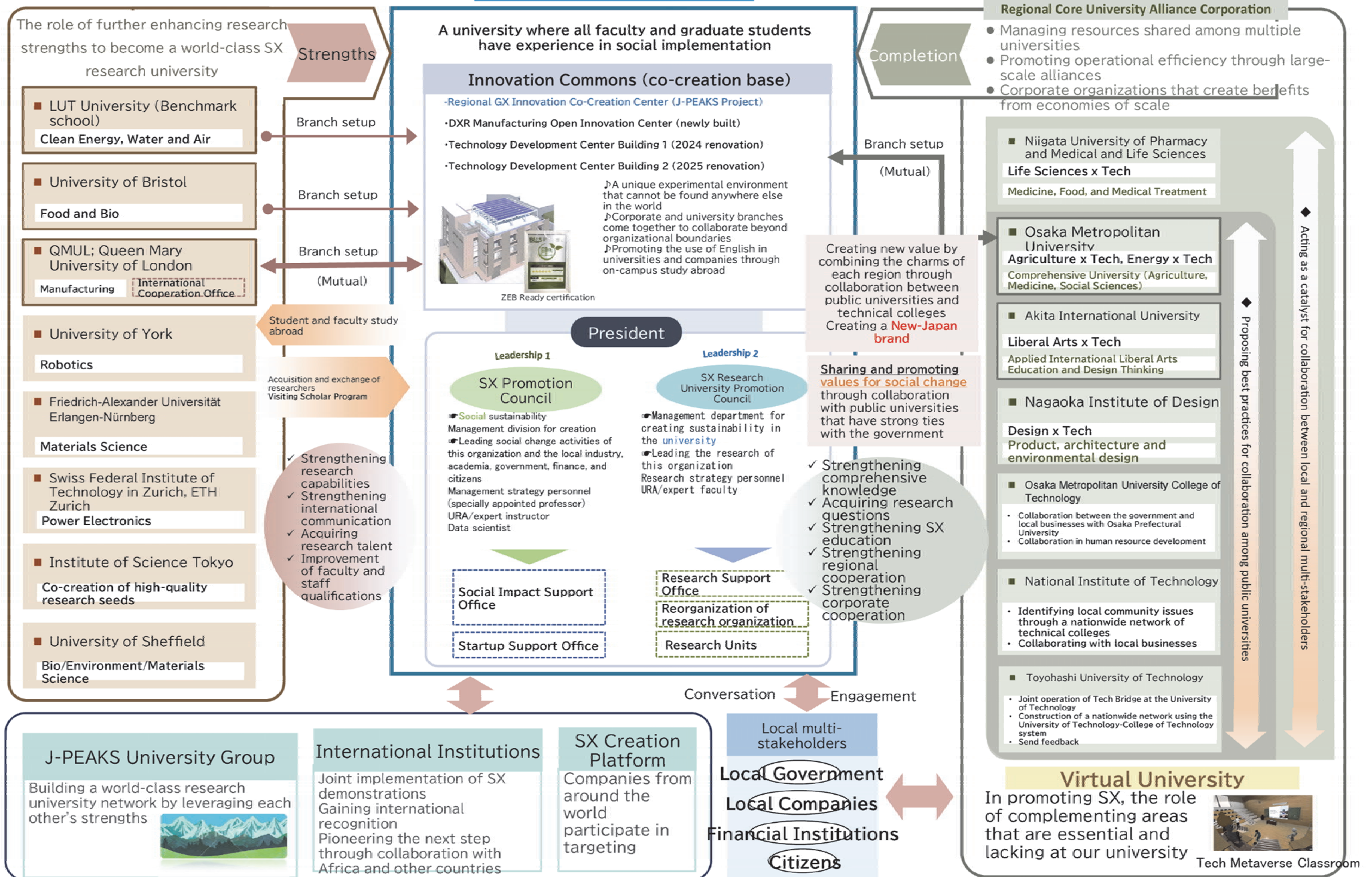
Collaborators : Osaka Metropolitan University, Akita International University, Niigata University of Pharmacy and Medical and Life Sciences

Participators : Toyohashi University of Technology, National Institute of Technology, Institute of Science Tokyo, Nagaoka Institute of Design, Osaka Metropolitan University College of Technology, Swiss Federal Institute of Technology in Zurich, LUT University, Queen Mary University of London, University of Bristol, Friedrich-Alexander Universität Erlangen-Nürnberg, University of York, University of Sheffield

Summary

■10-year vision■

① Based on basic research into sustainability transformation (SX), we will co-create a future society beyond the SDGs with multiple stakeholders including citizens, companies, and local governments.
② We will utilize the power of Tech-X to promote social practices in the Global South in order to solve social issues on a global scale.
③ We will Re-Start up local small and medium-sized enterprises, propose New-Japan Brand that utilize the charm of the region, and revitalize Japan from the local area.

■Four targets towards social change■
①Beyond Manufacturing ②Beyond Resources
③Beyond Protection ④Beyond Promotion

Universities Lead Regional Cooperation:
Attractiveness x Attractiveness = Value Creation "New-Japan Brand"

■Catching up with benchmark universities (LUT)■

—Numerical target (10 years from now)—

Ratio of TOP10% papers	Ratio of internationally co-authored papers
25% (28.9%)	40% (69%)

(Figures from LUT University)

-Qualitative aspects-
■ A world-class SX research university
■ Establishing itself as an international research hub
■ Strengthening international collaboration by introducing a paper writing system

LUT University

Lappeenranta-Lahti University of Technology (LUT) is a public science university in Finland and one of the SX research universities that has focused its investments on the fields of energy, water, and air as resources that create life. It is a university that has grown dramatically in the 10 years since 2015 and will not only be benchmarked but will also participate in this project and work hard together. An example of LUT's growth: The ratio of top 10% papers has increased from 18.2% to 28.9% in the 10 years since 2013.

Towards the ideal university | Research resources (input) | Strategy for improving research capabilities | Output (5 year goal) | Outcome | Social impact (image of the social change we aim for)

Motivation for change

- Research: Further improvement of the quality of papers
- Education: Broader, more practical learning
- Social Contribution: Strengthening collaboration to realize social change
- International Cooperation: Raising international awareness and introducing different ways of thinking
- Public University/ Technical College Collaboration: Strengthening cooperation with local governments and critical mass

Research resources (input)

- Total external funding: 3.408 billion yen (Three-year growth rate: 1.58 times)
- Commissioned research and project expenses: 1.028 billion yen (Three-year growth rate: 2.09 times)
- Ratio of international students: 11.5%
- Number of GTP offices (Overseas Collaboration Base): 9 countries / 12 locations
- Number of domestic affiliated bases: 7 bases
- Shared remote devices: 96 devices
- Co-creation base (GX building)

Strengthening SX research capabilities through collaboration: Strategy ①
To promote joint research with top overseas universities on a daily basis through the Innovation Commons
To collaborate with domestic universities to promote fusion research between liberal arts, design thinking, and life sciences
To promote comprehensive knowledge by flexibly restructuring research organizations and making corporate or overseas faculty members mandatory within research units
— World-class research

Strategy ①: Expanding Technology and Science through "Tech-X"
Enhancing education and streamlining through the creation of a "virtual comprehensive university" with the support of partner universities
Expanding "Tech-x" and promoting comprehensive intellectual activities through collaboration with multiple stakeholders
Recreating the "Japan brand" with careful consideration for the fine details, through human resources who combine skills and wisdom
— Promoting comprehensive knowledge activities for SX research

Acquiring and interacting with outstanding European and American researchers: Strategy ②
Introduction of a personnel system for "top international faculty" and preparation of a system for accepting English-speaking faculty and staff
"Visiting Scholar Program" - a mutual acceptance system for short-term researchers who are required to write papers
Establishment of a UK office and talent management through employment of an international URA
— Improve international recognition and exchange of knowledge

Establishing a research support system and acquiring and developing human resources: Strategy ③
Developing research support personnel through the employment of URAs for PhD holders and the mutual conversion system between faculty and URAs
Supporting young researchers to focus on their research through the introduction of a junior research group system
Expanding Japan's largest remote equipment sharing system and strengthening the support system
— An environment where you can concentrate on your research

Co-creation with multiple stakeholders: Strategy ④
Emphasis on dialogue and engagement with industry, government, academia, finance, and the public, which is essential for social change
Support system for local companies to Re-Start up through students of seven-year integrated SX research development course
System for reflecting doctoral students' capabilities in local companies (internships for creating new businesses, etc.)
— Implementing social change

Human resource development strategy for faculty, staff and graduate students ⑤
Establishment of a seven-year integrated SX research development course consisting of two years of undergraduate studies and a graduate school (Master's and Doctoral) course
Cultivating "writing skills" throughout the university by introducing a master's thesis writing support system
Promotion of overseas, corporate, and administrative training for faculty and staff to improve the skills of staff and research support personnel
— Training the talent that is the source of the Japanese brand

Output (5 year goal)

- Increase TOP 10% journal publication rate by 30%
- Increase the ratio of internationally co-authored papers by 40%
- Increase in the number of master's student theses: 40
- Number of affiliated bases established: 15 overseas bases
- Number of overseas researchers accepted (2 weeks or more): 40
- Number one in the nation for number of university-based startups per student (entrepreneurship support office)
- 100% of researchers are affiliated with companies

□ KPI available

Outcome

- University evaluation based on social impact according to international standards = TOP 1% of SX research universities
- To improve your reputation among researchers
- Increased student satisfaction
- Local government and support for the location Improved evaluation from local government
- To improve evaluation of students (especially doctoral students) by employers
- To improve retention rate of research support faculty and staff
- Reducing business closures by creating Restartups for local businesses
- Realizing well-being through the creation of new value using "comprehensive knowledge"

Social impact (image of the social change we aim for)

- A society where people can be human
- A society where Japan remains true to its Japanese roots
- A society where people can live comfortably even on remote islands and in remote areas
- A society in which agriculture, forestry and fisheries are commonplace as a source of employment
- A society where the elderly are active as producers
- A society without division caused by the internet
- A society where everyone is a good person
- A society without waste
- A society without 3D jobs

A world-class research university with distinctive features that make the most of the Japanese brand

■Slogan■
Ranked in the top 1% of SX research universities! All researchers collaborate with companies to create social change! Appeal to the world with a new Japanese brand!

Reinvesting for sustainable value creation
Diversifying resource acquisition methods and developing management methods based on value creation
Establishment of a regional core university alliance corporation, collaboration with international organizations, public engagement, collaboration with philanthropic organizations with overseas universities, and donations for ESG investment

Nagaoka University of Technology

長岡技術科学大学
Nagaoka University of Technology

Strengths — The role of further enhancing research strengths to become a world-class SX research university

A university where all faculty and graduate students have experience in social implementation

Innovation Commons (co-creation base)
- Regional GX Innovation Co-Creation Center (J-PEAKS Project)
- DXR Manufacturing Open Innovation Center (newly built)
- Technology Development Center Building 1 (2024 renovation)
- Technology Development Center Building 2 (2025 renovation)

♪A unique experimental environment that cannot be found anywhere else in the world
♪Corporate and university branches come together to collaborate beyond organizational boundaries
♪Promoting the use of English in universities and companies through on-campus study abroad

ZEB Ready certification

Completion

Regional Core University Alliance Corporation
- Managing resources shared among multiple universities
- Promoting operational efficiency through large-scale alliances
- Corporate organizations that create benefits from economies of scale

- **LUT University (Benchmark school)** — Clean Energy, Water and Air — Branch setup
- **University of Bristol** — Food and Bio — Branch setup
- **QMUL; Queen Mary University of London** — Manufacturing / International Cooperation Office — Branch setup (Mutual)
- **University of York** — Robotics
- **Friedrich-Alexander Universität Erlangen-Nürnberg** — Materials Science
- **Swiss Federal Institute of Technology in Zurich, ETH Zurich** — Power Electronics
- **Institute of Science Tokyo** — Co-creation of high-quality research seeds
- **University of Sheffield** — Bio/Environment/Materials Science

Student and faculty study abroad
Acquisition and exchange of researchers Visiting Scholar Program

Branch setup (Mutual)

Creating new value by combining the charms of each region through collaboration between public universities and technical colleges Creating a **New-Japan brand**

- **Niigata University of Pharmacy and Medical and Life Sciences** — Life Sciences x Tech — Medicine, Food, and Medical Treatment
- **Osaka Metropolitan University** — Agriculture x Tech, Energy x Tech — Comprehensive University (Agriculture, Medicine, Social Sciences)
- **Akita International University** — Liberal Arts x Tech — Applied International Liberal Arts Education and Design Thinking
- **Nagaoka Institute of Design** — Design x Tech — Product, architecture and environmental design
- **Osaka Metropolitan University College of Technology**
  - Collaboration between the government and local businesses with Osaka Prefectural University
  - Collaboration in human resource development
- **National Institute of Technology**
  - Identifying local community issues through a nationwide network of technical colleges
  - Collaborating with local businesses
- **Toyohashi University of Technology**
  - Joint operation of Tech Bridge at the University of Technology
  - Construction of a nationwide network using the University of Technology-College of Technology system
  - Send feedback

Acting as a catalyst for collaboration between local and regional multi-stakeholders
Proposing best practices for collaboration among public universities

President

Leadership 1 — SX Promotion Council
- **Social** sustainability
- Management division for creation
- Leading social change activities of this organization and the local industry, academia, government, finance, and citizens
- Management strategy personnel (specially appointed professor)
- URA/expert instructor
- Data scientist

Social Impact Support Office
Startup Support Office

Leadership 2 — SX Research University Promotion Council
- Management department for creating sustainability in the university
- Leading the research of this organization
- Research strategy personnel
- URA/expert faculty

Research Support Office
Reorganization of research organization
Research Units

✓ Strengthening research capabilities
✓ Strengthening international communication
✓ Acquiring research talent
✓ Improvement of faculty and staff qualifications

✓ Strengthening comprehensive knowledge
✓ Acquiring research questions
✓ Strengthening SX education
✓ Strengthening regional cooperation
✓ Strengthening corporate cooperation

Sharing and promoting values for social change through collaboration with public universities that have strong ties with the government

Conversation — Engagement

J-PEAKS University Group
Building a world-class research university network by leveraging each other's strengths

International Institutions
Joint implementation of SX demonstrations
Gaining international recognition
Pioneering the next step through collaboration with Africa and other countries

SX Creation Platform
Companies from around the world participate in targeting

Local multi-stakeholders
Local Government
Local Companies
Financial Institutions
Citizens

Virtual University
In promoting SX, the role of complementing areas that are essential and lacking at our university

Tech Metaverse Classroom

Program for Forming Japan's Peak Research Universities （J-PEAKS）

Strategy ① [Research capabilities] To promote world-class research as an SX research university
Strategy ② [Base establishment] To strengthen the co-creation hub function of the Innovation Commons
Strategy ③ [Support capabilities] To build a research support system and promote collaborative research

Strategy ④ [Social change power] Social impact To promote collaboration among industry, academia, government, finance and the private sector to create further social change
Strategy ⑤ [Human resources power] To promote acquisition, training and utilization of SX research talent

Strategies and Initiatives	Past performance (at the start of operations)	Step1 (After 3 years)	Step2 (After 5 years)	Step 3 (The university after 10 years)
Strategy ① [Research capabilities] Initiative ①: Improve research capabilities across the university, including mid-career researchers	• Implementing independent research support projects using discretionary funds from the president • Training associate professors as PIs through the implementation of the large lecture system	• In order to establish interdisciplinary core research fields at Nagaoka University of Technology, we will utilize the above-mentioned **research unit system** led by mid-career researchers. • We will exchange researchers from overseas universities under the **Visiting Scholar Program**, which requires two papers to be published in the top 10% of journals.	• Develop research seeds from research units into representative research fields of the university • Increase the volume of high-quality papers	Cultivate areas that will be the pillars of our university's research in the next generation
Strategy ① [Research capabilities] Strategy ④ [Social change capabilities] Initiative ② Strengthening input ·Acquisition of research resources	• Total **external funding has increased 1.56 times** in the past three years • Percentage of papers co-authored by companies: 2nd among national universities • **Corporate joint research funding** per faculty member: **2nd among all universities** • Established the first industry-academia collaboration center at a national university, currently with 27 companies • Raised 90 million yen through **crowdfunding** in collaboration with Nagaoka City	• **Public engagement system** / Research funding support system for multiple universities using alliance corporations / LDC (Least Developed Countries) support system in collaboration with international organizations / Collaboration with European philanthropic organizations	• Support system for social impact creation activities in collaboration with overseas partner universities • As an SDGs hub university, we are **developing a donation system** as an incentive for ESG investment	Transform into a growth stage university
Strategy ① [Research capabilities] Strategy ④ [Social change capabilities] Initiative ③ Promote international collaboration and SX demonstration	• UNAI Global Hub University for SDG Goal 9 • Double selection as UNESCO Chair & UNITWIN • Received Prime Minister's Award at the 5th Japan Open Innovation Prize for "Nagaoka University of Technology Model" in Africa	• Work with international organizations such as UNDP and WIPO to promote social change in LDCs in Africa and other regions • Create new value with the **SX creation platform**	• Leading **social change through reverse innovation**, where results verified in Africa, where the costs of verification are low, are then reimported to Japan	Reverse innovation that leverages international collaboration to bring about social change
Strategy ② [Base Establishment] Initiative ④: Strengthening university-wide research capabilities by utilizing and expanding co-creation bases	• Selected as one of **the top 10 news stories in Science magazine's "2019 BREAKTHROUGH of the YEAR"** • **10 faculty members from our university** selected in Elsevier's list of the world's top 2% of scientists • GX Building (regional core project) currently under construction is **nearly ZEB certified**	• The four buildings, including the **GX Building**, DXR Building, and Technology Development Centers #1 and #2, will be **operated as an integrated Innovation Commons** • To **establish an overseas branch** within the University of London to scout for outstanding research talent from European universities and develop new overseas research bases • To match international researchers by utilizing overseas bases established for each research field.	• A **place for open innovation** where domestic and international technologies and local stakeholders come together • A place where local companies gather in addition to affiliated universities • Pursue uniqueness that can only be learned here by promoting SX research of the "New-Japan brand"	A place to learn the new "Japan brand" A university of choice for European and American students
Strategy ② [Establishment of bases] Initiative ⑤ Promote sharing of research equipment	• In cooperation with technical colleges nationwide, we **have built the largest remote equipment sharing network** in Japan, providing remote support and integrated management of operations • Currently, **13 institutions and 96 pieces of equipment are shared** (including the Niigata Prefectural Industrial Technology Center)	• Developing doctoral personnel with expertise in both equipment and information security to maintain equipment networks • **Diversification of shared equipment** with the participation of partner universities	• Promote equipment sharing with partner universities overseas and build an **international remote equipment sharing network**.	Achieving borderless equipment usage
Strategy ② [Establishment of bases] Initiative ⑥ Promote data utilization and digital transformation	• Independently manage the Tech Metaverse (Toyohashi University of Technology and National Institute of Technology are also involved) • Manage the "Fountain of Research Seeds" database of all university of technology and college of technology faculty (information on over 4,000 researchers, with AI search and matching function)	• Promoting "**virtual comprehensive university**" in collaboration with partner universities, acquiring diverse specialized knowledge and reducing the burden on faculty • **Digitalization of operations** in collaboration with partner universities • Research data management **RDM**, introduction of **FAIR data principles**	• Develop a wide range of content using AR and XR in experiments, practical training, and research activities • Develop in-house support systems such as an **AI system for correcting papers** (for research security)	Becoming a virtual comprehensive university by fully utilizing the metaverse
Strategy ③ [Support capabilities] Initiative ⑦: Establishing a research management system	• Received the highest "S" rating in the mid-term evaluation of the **Graduate School of Excellence Program** • Number of papers published per faculty member is **equivalent to that of a designated national university** • International network through the Global Expansion Strengthening Project	• Establish a research management system **[SX Research University Promotion Council]** • Establish a social change implementation system **[SX Promotion Council]**, and manage this initiative through these two organizations	• Become a **hub for collaboration between public universities** • Promote **collaboration between regions nationwide** through collaboration between public universities and technical colleges	Top 1% in SX research
Strategy ③ [Support capabilities] Strategy ⑤ [Human resources] Initiative ⑧: Organizational reform to strengthen research capabilities	• Promoting the Tokyo Institute of Technology and TC College project to improve **the qualifications of technical staff** • Hiring **24 specialized personnel** including URA, UEA, and technical and academic producers	• Restructure research organizations for each of **the four social change targets** • **Each research unit will have at least one** visiting/specially appointed/closely appointed faculty member from a company, local government, or overseas faculty member • Establish an organization such as an RSO by faculty and staff + URA	• Further promoting flexibility of research organization • Expansion of endowed courses • Introducing the CIP (Technology Research Association) system to enable large courses and promote corporate collaboration	Transform into a sustainable university organization
Strategy ③ [Support capabilities] Initiative ⑨: Human resource development for URAs, etc.	• **A system has been introduced where URAs have the same employment system and salary as teachers** • 6 current company executives are employed as specially appointed teachers • 6 URAs, 3 UEAs, and 6 coordinators are supporting the promotion of collaborative activities	• We are able to recruit and train new doctoral graduates as URAs because we treat them the same as faculty members. • We headhunt and support collaboration with faculty members from European universities, and **employ international URAs** to acquire resources.	• Introducing a **job transfer system** between faculty and URA • Improvement of URA expertise, increasing the number of URAs with patent attorney qualifications, etc.	An organization where all faculty and staff + URAs strengthen research capabilities
Strategy ④ [Social change power] Initiative ⑩: Regional production and Restart support	• Producing the whole region: Cross-pollinating knowledge in each region of Japan, and **leading social change in the region with bases in seven locations nationwide** • **Second-highest number of startups** per student among universities in Japan.	• "**New Business Development Internship**" to expand doctoral students' knowledge to local companies • Promoting regional revitalization by utilizing abandoned elementary schools	• Support the growth of university-based startups • **Strongly support re-startups by creating new businesses for local companies**	A university where all researchers collaborate with companies Supporting the revival of local businesses
Strategy ⑤ [Human Resources] Initiative ⑪: Developing human resources to lead the regional core university	• Although the university has 200 faculty members, it has acquired 17 people through the "Public and Private Young Researcher Discovery Support Project" and 3 people through the "Emergent Research Support Project" • We have established a systematic **overseas training program** to develop international professional **administrative staff**, and plan to send two people in 2023 and three people in 2024	• Establishment of a new **SX research course** consisting of two years of undergraduate studies and **seven years** of graduate studies (Master's and Doctoral programs) (**Frontier course** + distinguished graduate school) • Expansion of **career breaks** to faculty and staff • Support system for writing master's thesis	• **Introducing the Junior Research Group System** • Subsidizing the employment costs of specially appointed assistant professors for approximately three associate professors per year • Expanding university administration and education in both Japanese and English	Towards a university where young faculty and staff can thrive