



Japan - Australia University Dialogue 2019



Osaka University's Industry-university Collaboration Initiatives



OSAKA UNIVERSITY

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October 9, 2019

How Has Osaka University's Industry-university Collaboration Changed Society?

**Liquid Explosive
Detection System**
(Liquid Scanner LSR-M2)

(2018 [full installation])



Kumahira, Co. Ltd.

Won the 2019 National Invention Awards
21st Century Invention Award/
Contribution Award

290 installed at domestic airports
(as of March 2019)

**Development of Tocilizumab,
an industry-first in antibody
generic drugs**

(2005)



Actemra®

Interleukin-6

Medicine for rheumatism of the
knee (blockbuster)
est. 70 million patients

**World's first automatic ticket gate
at Hankyu Kita-senri Station**

(1967)



**Development of the
high-power magnetron**

(1950s)

Kinjiro OKABE

▶ 6th Director of The Institute of Scientific and Industrial Research



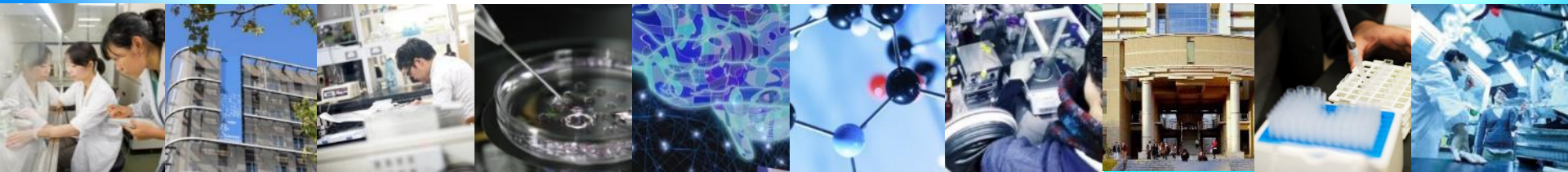
**popularized in
microwave
motors**

Industry-university Collaboration (1)

Phase 1

- Technology consultations
- Individual joint research

Point-to-point joint research activities



Industry-university Collaboration (2)

Phase
2

Industry on Campus



Osaka University
maintains a separate
research environment



Discover
breakthroughs
(4-5 years)



Industry
dispatches managers and
researchers

First
in
Japan

98 Joint Research Labs (As of July 1, 2019)

*Not including 39 Endowed Chairs

2 types of Joint Research Labs:

1. Joint Research Chair: Company labs on campus

2. Research Alliance Laboratories: Larger-scale corporate labs on campus

Joint Research Chairs and Research Alliance Laboratories with Industries, etc.

*As of July 1, 2019

Joint Research Chairs (80)

Joint Research Chairs are university research labs sponsored by enterprises

1. Laboratory of Advanced Cosmetic Science
2. Laboratory of Vaccine and Immune Regulation
3. Laboratory of Innovative Food Science
4. Laboratory of Advanced Health Science
5. Skin Regeneration, PIAS Collaborative Research
6. Building Block Science Joint Research Chair
7. Laboratory of Science & Innovation for pain
8. Department of Cancer immunology
9. Department of Advanced Clinical Engineering
10. Joint Research Chair of Innovative Drug Discovery in Immunology
11. Joint Research Chair of Innate Immunity
12. Joint Research Chair of Innovative Drug Discovery in Host Defense
13. Division of Nutrition & Medical Engineering
14. Department of Chronic Heart Failure Management
15. Advanced Functional Materials Science
16. Advanced Oral Environmental Science
17. Department of Neuromodulation and Neurosurgery (Teijin Pharma)
18. Department of Genome Informatics
19. Department of Immunology and Molecular Medicine
20. Department of Clinical Research in Tumor Immunology
21. Department of Frontier Research in Tumor Immunology
22. Department of Ocular Immunology and Regenerative Medicine
23. Department of Medical Data Science
24. Translational Cell Therapy Joint Research Chair
25. Department of Device Application for Molecular Therapeutics
26. Department of Advanced Stem Cell Therapy
27. Department of Vascular Regeneration and Podiatry
28. Department of Cardiovascular Regenerative Medicine
29. Department of Stem Cell Based Drug Discovery and Regenerative Therapy
30. Department of Frontier of Regenerative Medicine
31. Department of Biodesign for Healthcare Innovation
32. Department of Advanced Hybrid Medicine
33. Department of Cell Design for Tissue Construction
34. Department of Environmental Space Infection control
35. Department of Urological Immuno-oncology
36. Department of Clinical Genomics
37. Department of Future Diagnostic Radiology
38. Department of Thermo-Therapeutics for Vascular Dysfunction
39. Department of Neuro-Medical Science
40. Department of Biostatistics and Data Science
41. Department of Next Generation Endoscopic Intervention
42. Department of Artificial Intelligence Diagnostic Radiology
43. Department of Sports Medical Science
44. Department of Stem Cell Gene Therapy Science
45. Department of Sports Medical Biomechanics
46. Department of Musculoskeletal Regenerative Medicine
47. Department of Neural Diagnosis and Restoration
48. Department of Advanced Clinical and Translational Immunology
49. Microwave Joint Research Laboratory
50. Mitsubishi Electric Research Laboratory of Manufacturing Converging Technologies
51. Welding and Maintenance Joint Research Chair
52. Joint research chair of creative/storage/energy saving device production technologies
53. NEXCO-West Joint Research Chair for Expressway Engineering and Management
54. Imabari Shipbuilding Joint Research Chair
55. Cell Manufacturing Systems Engineering (Healios) Joint Research Chair
56. Osaka University Shimadzu Analytical Innovation Research Laboratory
57. Joint Research Laboratory (TOPPAN) for Advanced Cell Regulatory Chemistry
58. SiC Application Technology Joint Research Chair
59. RORZE Lifescience Joint Research Chair for Cell Culture Engineering
60. OPTORUN Joint Research Chair
61. Joint Research Chair on Design for Advanced Medical System
62. Future Biomedical Micro Machine
63. Frontier Intelligent System Collaborative Laboratory
64. Impulse Science Collaborative Laboratory
65. Biomedical Engineering & Health Informatics Laboratory
66. Daifuku Logistics Automation Tech Joint Laboratory
67. Computational Engineering Laboratory for Medical Instruments and Devices
68. Division of SCREEN Single-Molecule Analysis
69. Division of Nano-Lithography Research
70. Division of Yushiro Chemical Industry Polymer Gel Joint Research
71. Hitachi Zosen Advanced Welding Technology Joint Research Chair
72. Osaka Fuji "Advanced Functional Processing" Joint Research Chair
73. "Advanced Joint Production System" Joint Research Chair
74. Advanced Joining Technology Joint Research Chair
75. SEI Joint Research Division
76. Advanced and High-Performance Computing System Architecture Joint Research Division
77. Okamoto Optics Optical Dielectric Multi-Layers Joint Research Division
78. Honda Joint Research Division for Optical Science Application
79. SRJ Joint Research Division for Laser Application
80. Molecular Photocatalysis Joint Research Laboratory

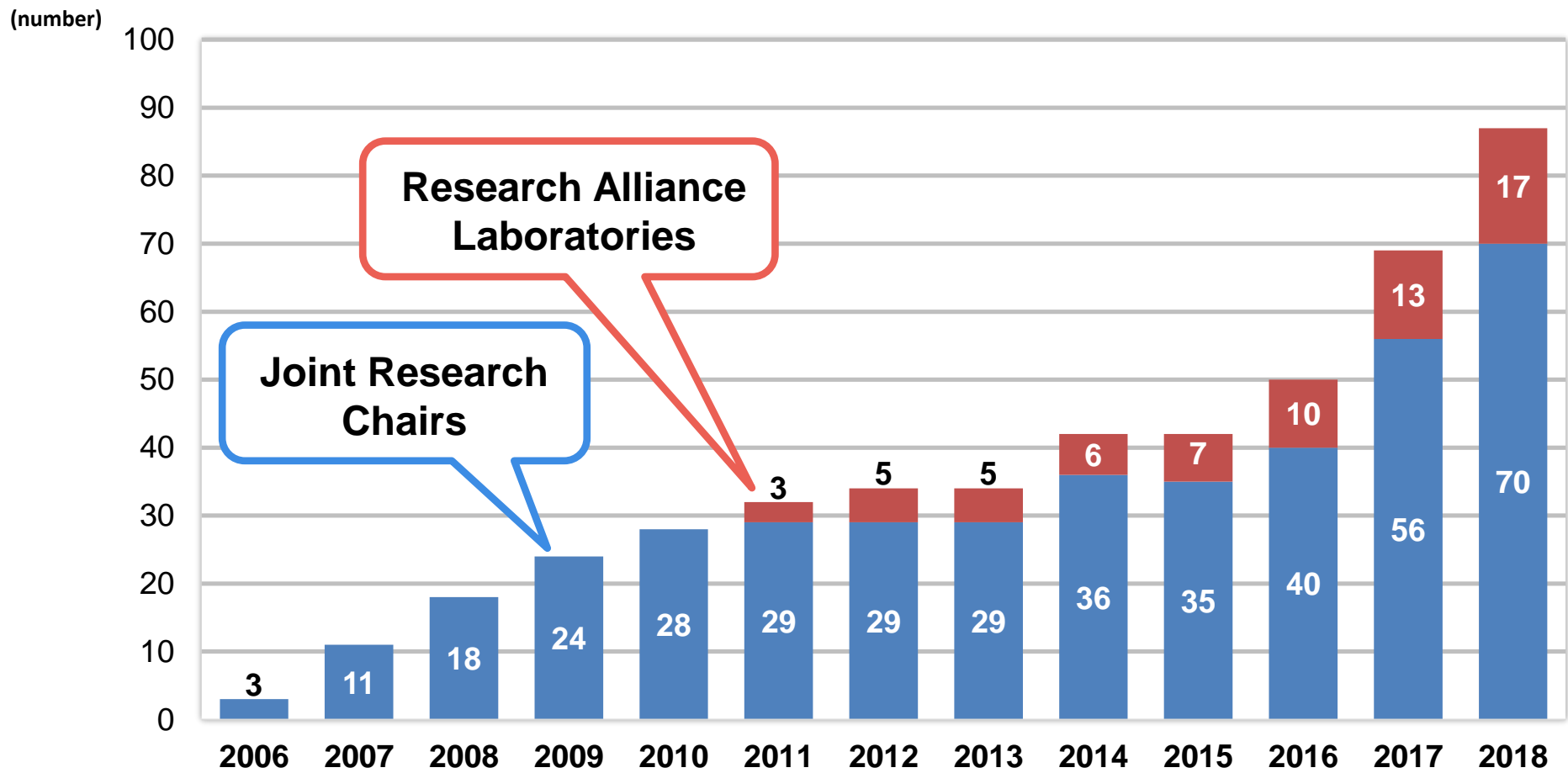
Research Alliance Laboratories (18)

Research Alliance Laboratories are research labs for various industry-university collaborations

1. BIKEN Innovative Vaccine Research Alliance Laboratories
2. JEOL YOKOGUSHI Research Alliance Laboratories
3. Kaneka Fundamental Technology Research Alliance Laboratories
4. Nitto Denko
5. Panasonic Science Research Alliance Laboratories
6. Hitz Research Alliance Laboratory Inc.
7. Komatsu MIRAI Construction Equipment Cooperation Research Center
8. DAIKIN Research Alliance Laboratories
9. NIPPON SHOKUBAI Research Alliance Laboratories
10. NTN Next Generation Research Alliance Laboratory
11. Hitachi Plant Services Research Alliance Laboratories
12. ULVAC-Osaka University Joint Research Laboratory for Future Technology
13. Nippon Steel Fundamental Materials Research Alliance Laboratories
14. NEC Brain Inspired Computing Research Alliance Laboratories
15. Mitsubishi Electric Cybersecurity Research Alliance Laboratories
16. Fujitsu Next Generation Cloud Research Alliance Lab
17. JFE Welding Research Alliance Laboratories
18. DAIHEN Welding and Joining Research Alliance Laboratories

Joint Research Labs - Industry on Campus

- In 2018, Osaka University had 70 Joint Research Chairs and 17 Research Alliance Laboratories.
- In 2019, the numbers increased to 80 Joint Research Chairs and 18 Research Alliance Laboratories.

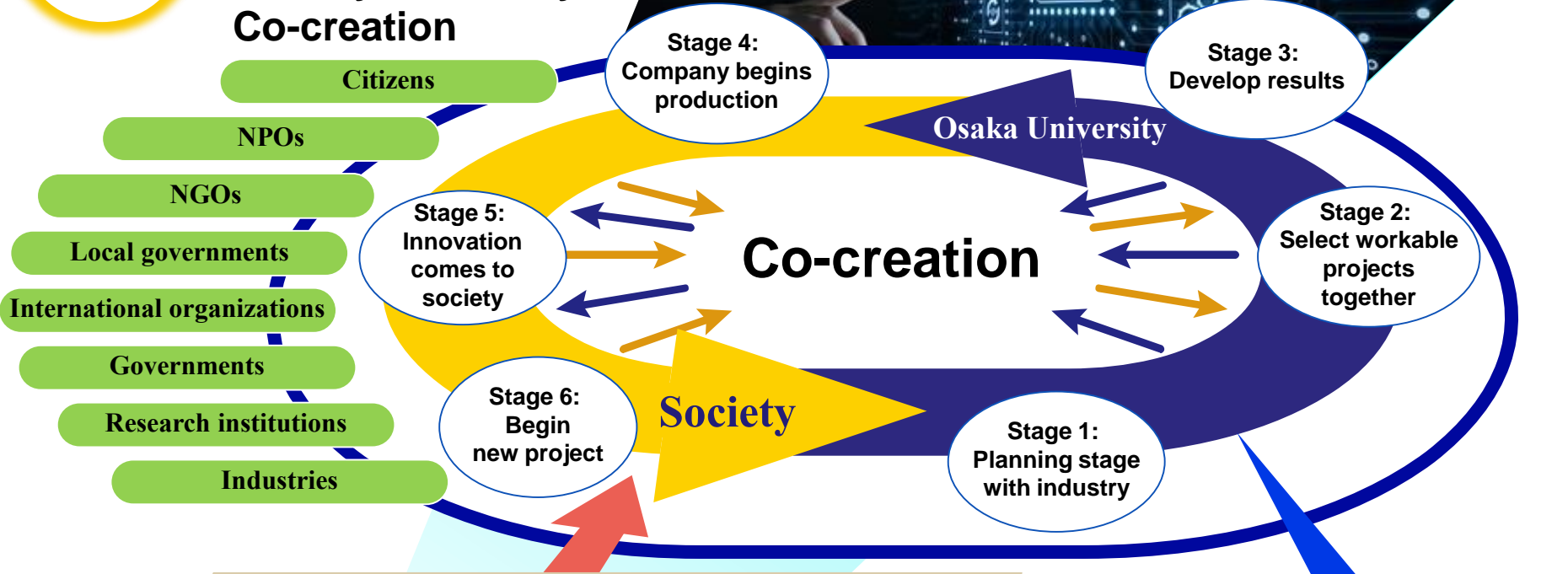


From Collaboration to Co-creation

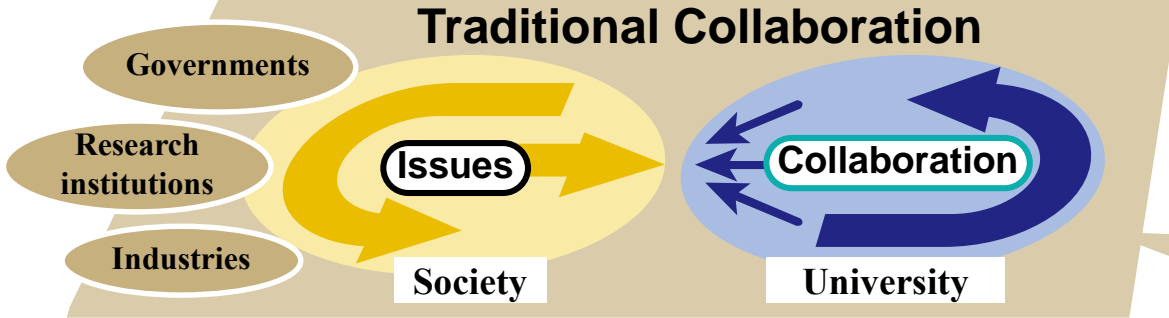
Phase 3

Industry-university / Society-university Co-creation

Innovation



Traditional Collaboration



Stakeholders and universities work together to drive innovation

Stakeholders come to universities with issues to solve

Comprehensive Partnerships with Industry from the Fundamental Research Stage (1)

Immunology

May 2016



- Chugai Pharmaceutical Co., Ltd.
- Financial package of 1 billion JPY per year for 10 years (totaling about 136 million AUD)

Basic research

From seamless industry-university collaboration to applied research

Research applications



Comprehensive Partnerships with Industry from the Fundamental Research Stage (2)

Information Technology

June
2017



- **Daikin Industries, Ltd.**
- **500 million yen per year, totaling 5.6 billion JPY (80 million AUD) for 10 years, including equipment costs**

Comprehensive cooperation between Daikin Industries and Osaka University

DAIKIN ダイキン工業株式会社



Daikin Industries
Technology Innovation Center
(Osaka University Satellite Office)

▶ **Delivers 24 prominent technicians**

Cooperation period:
July 2017 – June
2027 (10 years)

 **OSAKA UNIVERSITY**



Techno-Alliance Building
Research Alliance Laboratory (Daikin)

Awarded 1st Japan Open Innovation Prize (JOIP)



The theme, "inter-organizational collaboration in industry-university co-creation from the stage of basic research," received honors from MEXT



Middle: Prof. Shojiro Nishio, PhD, president of Osaka University and representative of Chugai, Otsuka, and Daikin



Education Minister Yasuhiko Katsuno presents the Minister of MEXT Award

- The Japan Open Innovation Prize is a new award to accelerate the creation of innovation in Japan, recognizing initiatives that serve as role models for open innovation.
- The cooperation of Osaka University, Chugai, Otsuka, and Daikin was recognized as particularly remarkable for the promotion of science and technology and was awarded the Minister of MEXT Award.

Innovation is Our Tradition and Future

World Rankings for Innovation

Nature Index
Innovation

2017

31 (1)



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nature INDEX

Home News Current Index Annual tables Supplements Client s

Home / Supplements / Nature Index 2017 Innovation / Top 200 institutions by Lens score

Top 200 institutions by Lens score

Table presents data on research quality and broad influence on inventions. Institutions are ranked by influence on patents. Data used to derive this metric are featured in the **Top 100 institutions by Lens** include article count and weighted fractional count in the Nature Index. Also listed are an institution's rank in the Nature Index. For further information on the normalised Lens influence metric, see [https://www.natureindex.com/supplements/nature-index-2017-innovation/tables/top200-institutions-lens](#)

Rank	Institution	Country	Normalized Lens influence metric	AC 2012-2016*	WFC 2012-2016*	Natural science articles 2012-2016*	NSA in the Nature Index†
1	The Scripps Research Institute (TSRI)	United States of America (USA)	18.15	1,520	763.6	3,795	40.1%
2	The Rockefeller University	United States of America (USA)	15.43	1,173	306.0	2,564	45.7%
3	Massachusetts Institute of Technology (MIT)	United States of America (USA)	9.48	8,114	2,473.0	22,688	35.8%
4	University of Massachusetts Medical School (UMass Medical School)	United States of America (USA)	8.70	2,044	643.6	2,968	76.0%
5	The University of Texas Southwestern Medical Center (UT Southwestern Medical Center)	United States of America (USA)	8.66	2,300	1,169.5	5,045	45.0%
6	Weizmann Institute of Science (WIS)	Israel	8.03	1,705	757.7	5,285	32.3%
7	National Institutes of Health (NIH)	United States of America (USA)	7.82	3,856	1,731.6	25,061	15.4%
8	University of California San Francisco (UCSF)	United States of America (USA)	7.04	4,654	1,979.6	11,671	39.9%
9	University of Cambridge	United Kingdom	6.92	2,000	1,000.0	3,000	32.9%
21	University of Göttingen	Germany	5.63	1,000	644.4	9,076	27.3%
22	Rice University	United States of America (USA)	5.44	1,000	1,000.0	4,998	27.3%
23	Hanyang University (HYU)	South Korea	5.33	1,000	1,000.0	4,998	27.3%
24	University of Southern California (USC)	United States of America (USA)	5.33	1,000	1,000.0	4,998	27.3%
25	University of Alabama System	United States of America (USA)	5.33	1,000	1,000.0	4,998	27.3%
26	University of Dundee	United Kingdom	5.33	1,000	1,000.0	4,998	27.3%
27	Duke University	United States of America (USA)	5.33	1,000	1,000.0	4,998	27.3%
28	University of Washington (UW)	United States of America (USA)	5.33	1,000	1,000.0	4,998	27.3%
29	California Institute of Technology (Caltech)	United States of America (USA)	5.33	1,000	1,000.0	4,998	27.3%
30	The Johns Hopkins University (JHU)	United States of America (USA)	5.33	1,000	1,000.0	4,998	27.3%
31	Osaka University	Japan	5.33	1,000	1,000.0	4,998	27.3%
32	Purdue University	United States of America (USA)	5.33	1,000	1,000.0	4,998	27.3%
33	Harvard University	United States of America (USA)	5.33	1,000	1,000.0	4,998	27.3%
34	University of Zurich (UZH)	Switzerland	5.33	1,000	1,000.0	4,998	27.3%
35	Yale University	United States of America (USA)	5.33	1,000	1,000.0	4,998	27.3%
36	University of Wisconsin-Madison (UW-Madison)	United States of America (USA)	5.33	1,000	1,000.0	4,998	27.3%



<https://www.natureindex.com/supplements/nature-index-2017-innovation/tables/top200-institutions-lens>

* Numbers in parentheses indicate ranking among universities in Japan.

*U7+: Alliance of university presidents and leading institutions

Virtuous Cycle of Knowledge, Talent, and Funds Utilizing Our Strengths

Research Topics

Basic research and
applied research

Research Results

Develop innovation by
combining the knowledge
and strength of society and
universities



- Cooperation of industry, government, and the private sector
- Co-creation from the stage of research project exploration and basic research

R&D
Ecosystem



Social Issues



Research
Results



Society

Osaka University Co-Creation Bureau

- Osaka University is strengthening activities to “co-create” new values by combining the knowledge and strength of society and universities.
- In January 2018, we established the “Co-Creation Bureau, Osaka University” as an organization to promote this and are building an “ R&D Ecosystem.”

Osaka University Co-Creation Bureau



Shojiro NISHIO
Director, Co-Creation Bureau
President, Osaka University

Collaboration with
industry and
academia,
Strengthening co-
creation
foundation



1. Support for commercialization
2. Strengthen intellectual property
3. Coordinate between industry and academia
4. Innovate education
5. Fundraising and connections
6. Promote public relations

