Industry-Academia Collaboration for Local Development

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NYCU at a glance

新竹科學園區
HSINCHU SCIENCE PARK

Pillars for **Taiwan's AI & Semiconductor Industry**

Now:
AI faculty ~80
AI students ~2000
Semiconductor faculty ~160
Semiconductor students ~2000

1st

Transistor in Taiwan (1962)

Integrated circuit in Taiwan (1963)

Minicomputer (1971) and microcomputer (1975) in Taiwan

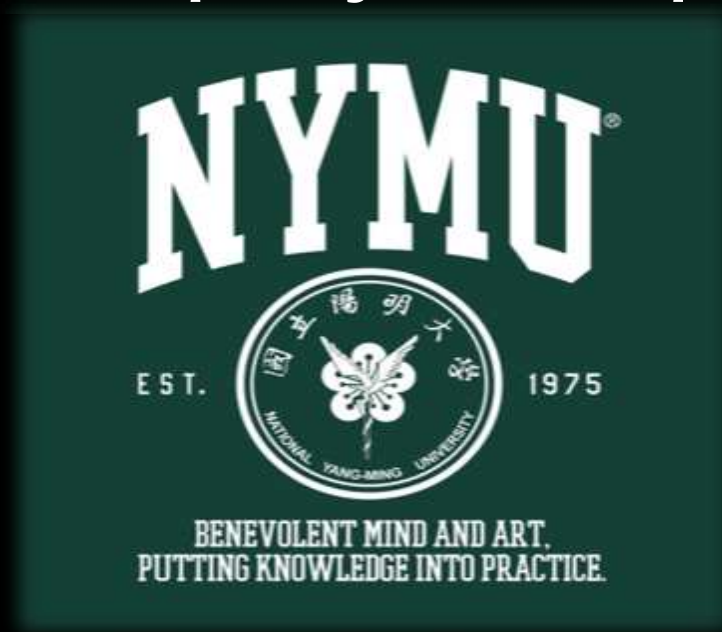**International College of Semiconductor Technology in the world**

The largest College of ECE and College of Computer Science in Taiwan

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To Conquer Health Inequality and Inequity

To promote
health equity
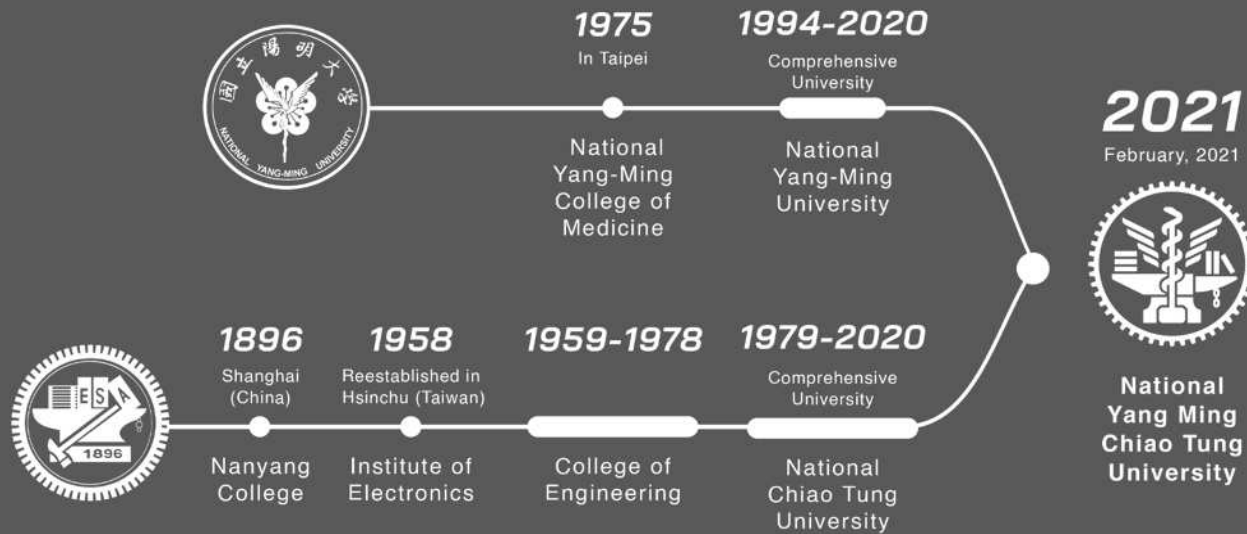
合校歷程 2021 - 2025

融合驅動蛻變

追求卓越領航

過渡中求融合

蛻變方能超越

過渡 Transition ⇒ **融合** Integrating ⇒ **蛻變** Transforming ⇒ **超越** Surpassing ⇒ **領航** Pioneering

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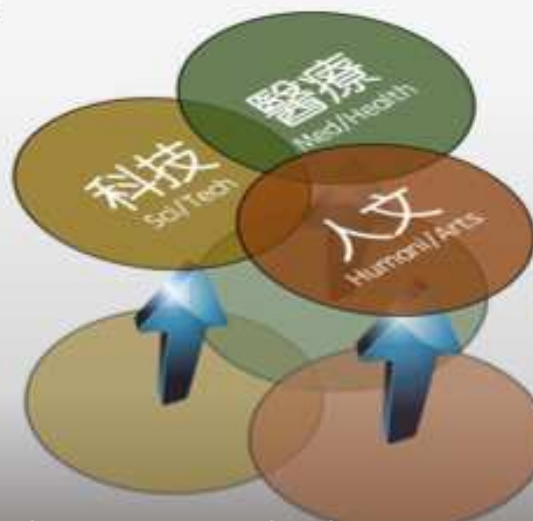
Composition of NYCU

20,412 Students

(1,300 Overseas Students)

8,431 Undergraduates

11,981 Graduates

2,114 Faculties

(135 International Faculties)

1,156 Full-time faculties

958 Part-time faculties

89 Research Staff

937 Staff

Updated: 2024/10

NCTU/NYCU Serves as Cradle for Taiwan's High-Tech Industry

65%

of CEOs and top level

managers in

Hsinchu Science Park

are **NYCU Alumni**

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Industry-Academia Cocreation – Conceptual Frameworks

University's Mission and Social Responsibility

Staging the Stage

循理論述 (Reasoning)　　　　　勇於探索 (Exploratory)

實證為基 (Evidence-based)　　　循環查核 (PDCA)
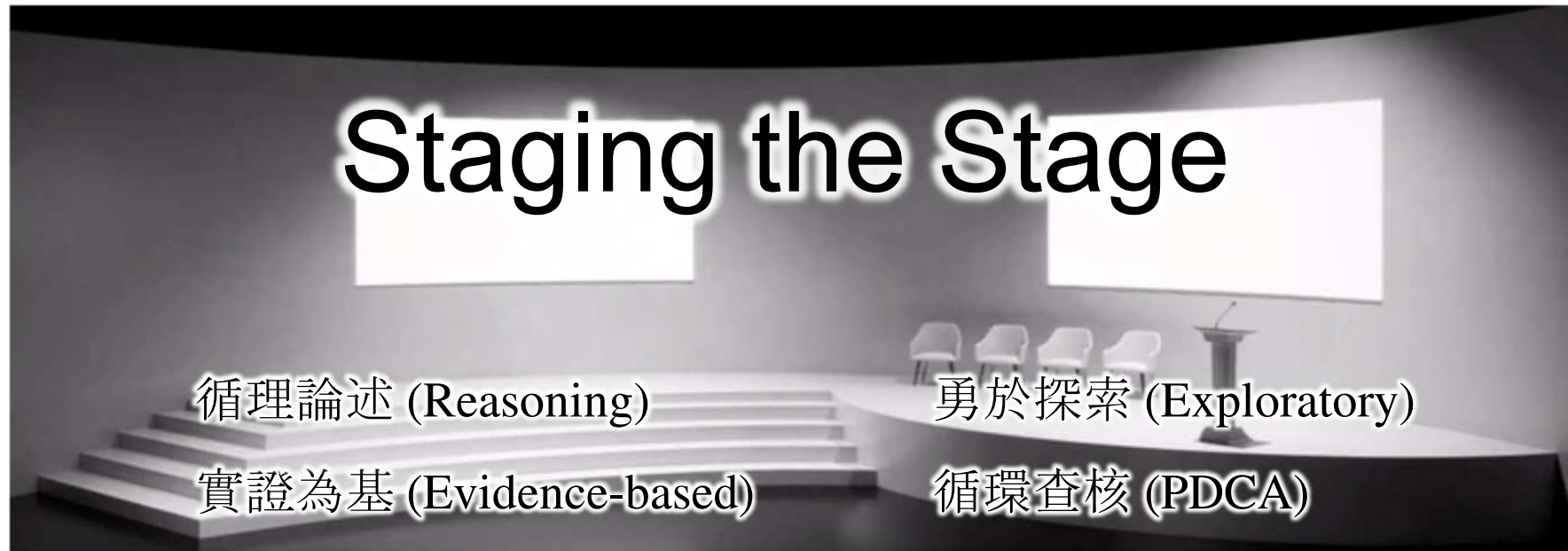
對於目前未知或無解的議題，必須以挑戰現狀的創新思維，探索各種可能的解決方案。 大學的學術與非營利性， 賦予其扮演公共議題之論述者(Definer)、探索者(Explorer)、分析者(Analyzer) 、倡議者(Advocator)、規劃者(Planner) 、協調者(Coordinator) 、甚至檢查者(Checker)的角色，搭建平台以導引各利害關係者參與。

For currently unknown or unsolvable issues, we must explore various possible solutions with innovative thinking that challenges the status quo. The academic and non-profit nature of universities enables them to play the role of definer, explorer, analyzer, advocate, planner, coordinator, and even checker of public issues, building a platform to guide the participation of various stakeholders

Industry-University Co-creation

Defining Co-creation:
- Integrated Knowledge and Resources
- Simultaneous Value Generation
- Beyond Transfer
- Addressing Complex Challenges

Key Characteristics of Co-creation:
- Shared Problem Definition
- Joint Ownership and Responsibility
- Iterative Process
- Interdisciplinary Teams
- Open Communication and Trust

Benefits of Industry-University Co-creation:
- Accelerated Innovation
- Enhanced Relevance and Societal and Economic Impact
- Talent Development (practical experience and academic insights)
- Resource Optimization
- Competitive Advantage
- New Knowledge Creation (interdisciplinary nature of co-creation)

Challenges in Industry-University Co-creation:
- Cultural Discrepancies
- Intellectual Property (IP) Complexity
- Differing Incentives
- Time Horizons
- Communication and Coordination
- Funding Models

Industry-University Co-creation in Taiwan:
- National Key Fields Industry-University Cooperation and Skilled Personnel Training Act (enacted in 2021)
- Focus on Strategic Industries (advanced manufacturing, smart healthcare, circular economy, etc,)
- Government Support

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Academia Industry Cocreation

- 產學共創是組織與法規再造 Organization Reform
- 產學共創是資源的整合應用 Resource Integration
- 產學共創是人才的流動互用 Talent mobility/sharing

Acad-Ind
Collaboration

產學
合作

Academia
學界

Industry
產業界

Topics/Funding

New Tech./New App./New Industry
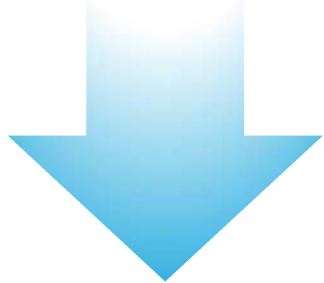
產學
共創

Acad-Ind
Cocreation

Academia
學界

Industry
產業界

組織/設備
學位/人才

經費/研發課題
設備/專業人員

Degrees of
Professional Practice

專業學位

專業師資

Professor of
Professional Practice
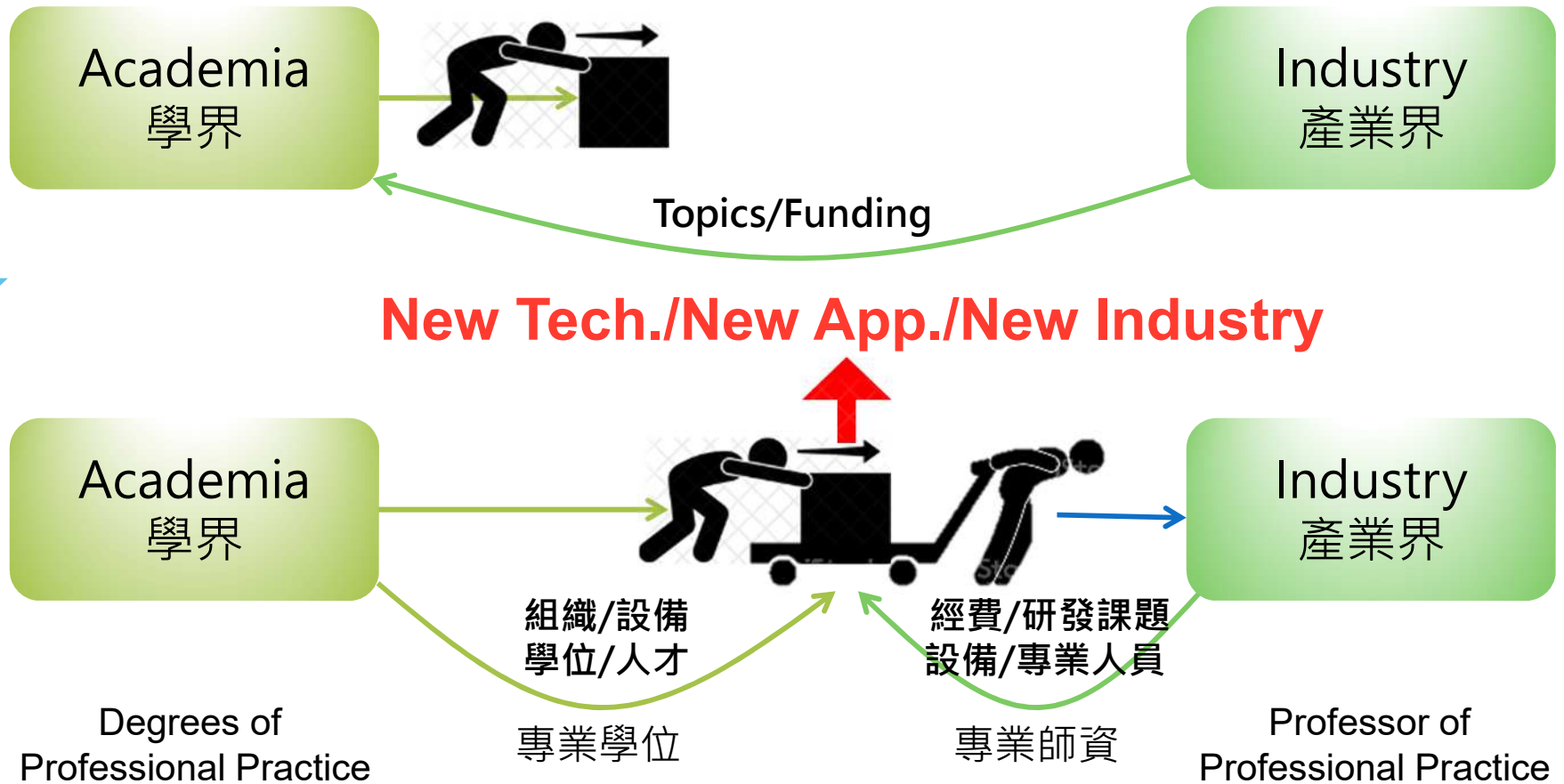
Partnership Between the Industry and the University

Industry

Talent

Innovation

Entrepreneurship ESG/SDGs

Social Responsibility

Employment Continued Edu.

Social Responsibility

Education

Research

University
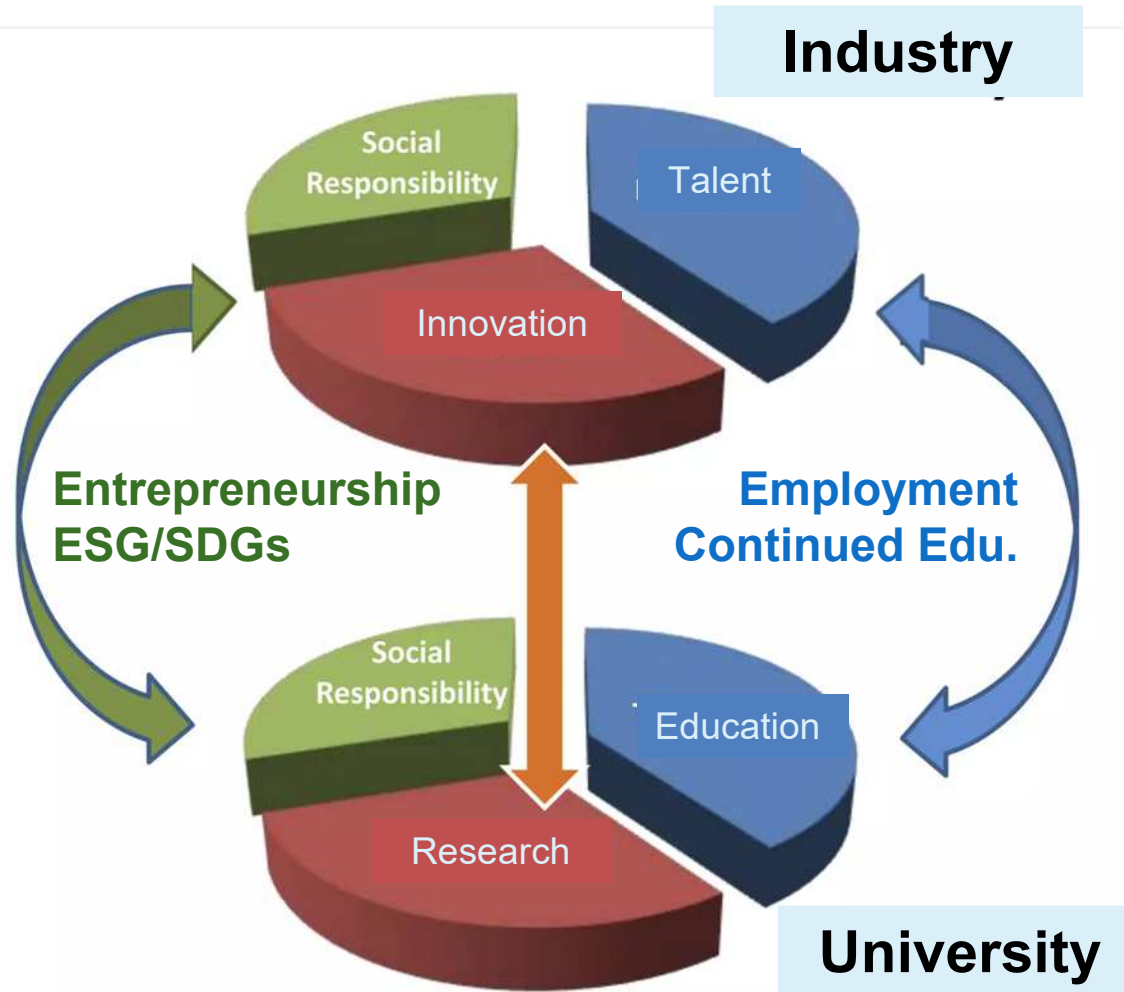
Breaking Barriers, Building Bridges

Taiwan Semi Ecosystem:
From Academic to Industry

ACADEMIA

- Basic science and industrial applied research
- Cultivating semiconductor talents

TSRI (1988*)

- Constructing academic research platforms
- Cultivating tech talents

ITRI (1973)

- Innovating and validating technologies
- Promoting industrial alliance

INDUSTRY

- Advanced technology development
- Commercial production

Science Park and National Institutes Surrounding NYCU

Hsinchu Science Park
- **600+** companies
- **176 K+** employees
- **USD$ >100+** billions (TSMC~$69B)

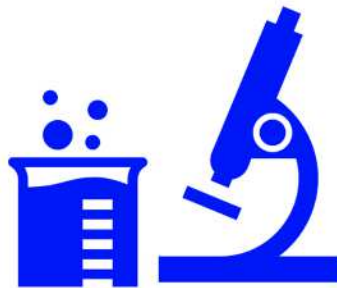**National Measurement Laboratory (NML)**
國家度量衡標準實驗室

NYCU

國立陽明交通大學
光復校區
Guangfu Campus

National Center for High-performance Computing (NCHC)
國家高速網路與計算中心

National Chiao Tung University

Taiwan Semiconductor Research Institute (TSRI)
台灣半導體研究中心

National Synchrotron Radiation Research Center (NSRRC)
同步輻射研究中心

Taiwan Instrument Research Institute (TIRI)
台灣儀器科技研究中心

Taiwan Space Agency (TASA)
國家太空中心

Hsinchu Science Park

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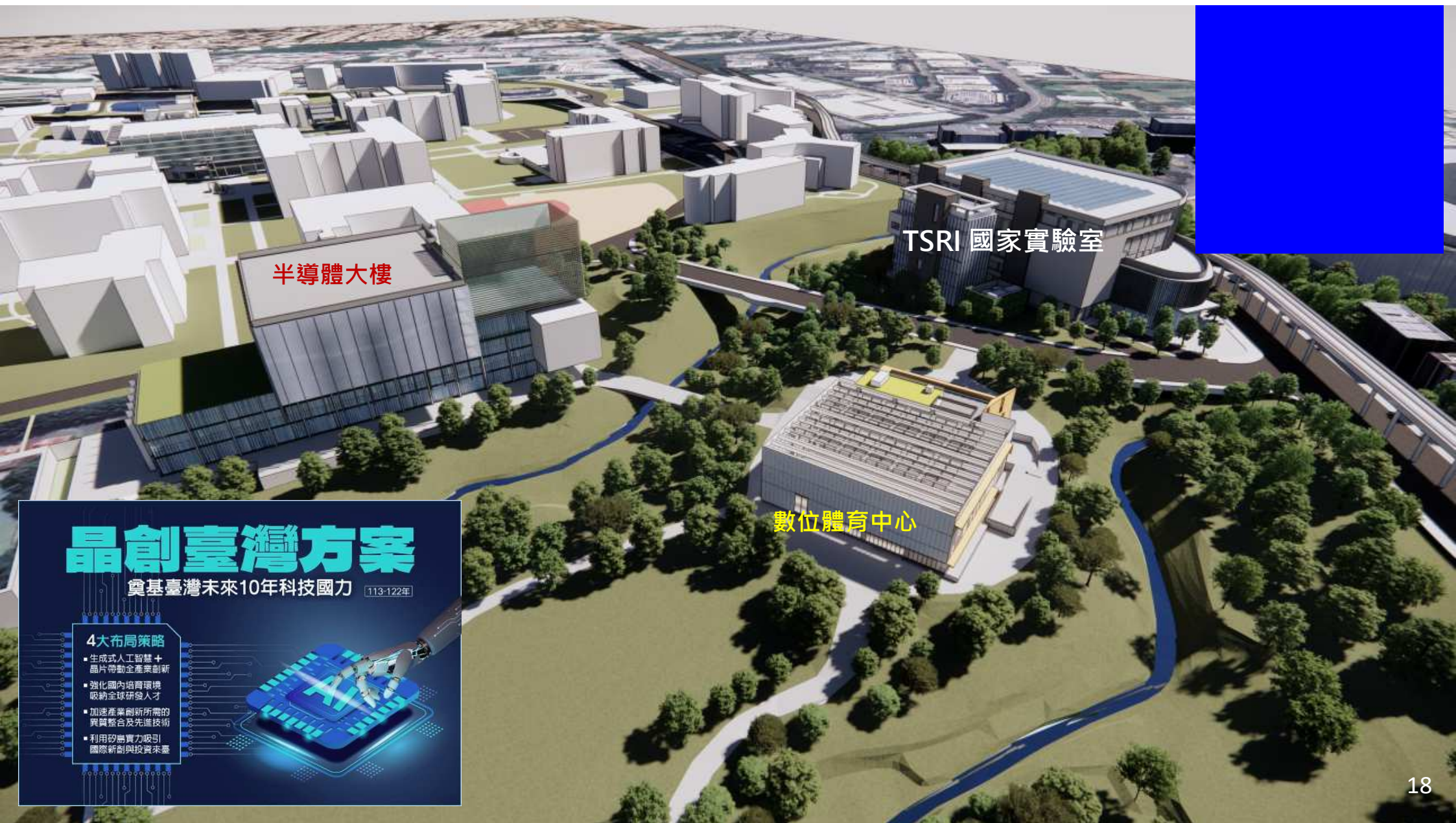
半導體大樓

TSRI 國家實驗室

數位體育中心

晶創臺灣方案
奠基臺灣未來10年科技國力 113-122年

4大布局策略
- 生成式人工智慧＋晶片帶動全產業創新
- 強化國內培育環境吸納全球研發人才
- 加速產業創新所需的異質整合及先進技術
- 利用矽島實力吸引國際新創與投資來臺

National Semiconductor Foundry for Taiwan's Next Phase Talent Cultivation and R&D
台灣下個20年之共享半導體核心設施

Taiwan Semiconductor Research Institute (TSRI)

- A national laboratory with cleanroom-based 8-inch wafer manufacturing capability

- A service platform for semiconductor manufacturing, packaging and testing, integrated circuit design, intellectual property core, and system integration

- **TSRI's 2nd 12-inch laboratory located in the NYCU campus is under construction**

3 Industry-Academia Cocreation – Strategic Approaches

Industry-Academia Cocreation Approaches

1. Talent Cultivation (K12, college, postgraduate, lifelong learning)
2. Workforce Advancement (professional development, continuing education, upskilling, reskilling)
3. Scientific Exploration
4. Advanced Applied Researches
5. USR/CSR Social Awareness and Responsibility

NYCU's Semiconductor Certificate Programs

- **Graduate Program**
  NYCU-Purdue advanced online course program (available in 2025 Fall)

- **Undergraduate Programs**
  (I) TSMC certificate program
  (II) MediaTek Analog/RF IC certificate program

- **Vocational Training Program**
  for people who want to change careers to the semiconductor industry but don't have any semiconductor background

- **K-12 Program**

- **Train-the-Trainer (TtT) Program**

- **Digital Learning Program**

| College of ECE | International College of Semiconductor Technology | College of Science | Industry-Academia Innovation School | College of Engineering | Dept. Microelectronics Engineering |

Dual Degree Programs

- Joint recruiting
- Curriculum development and instructions
- B.S./M.S./Ph.D.
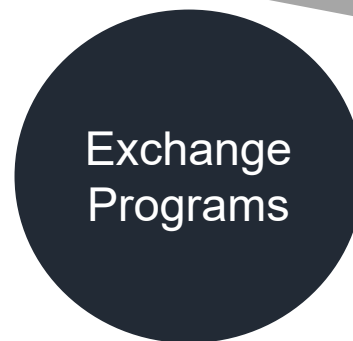
Exchange Programs

- Short/long-term scholar/student exchanges

Joint Research Projects
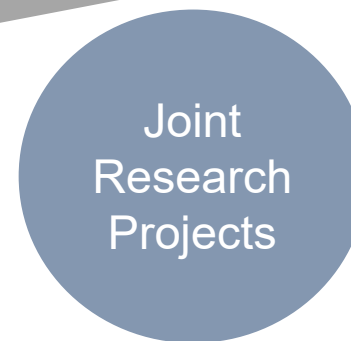
- Seed-money support from both sides
- Industry-involved
- Topics selected
- Bilateral/multilateral workshops

Online + Onsite Courses

- Short, diverse, and certificate-granting online semiconductor course programs
- Technology management strategies and skills
- Industry-partner endorsement, e.g. TSMC
- Build a borderless, virtual world-class semiconductor classroom

From Vision to Reality: NYCU and Purdue Join Hands to Pioneer a New Era of Borderless Semiconductor Education

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NYCU-Purdue
Advanced Online Course Program

Module 1: Chip Design for AI Technology
(**NYCU** & **Purdue**, **5 subjects**)

Module 2: Packaging, Reliability, Characterization
(**NYCU** & **Purdue**, **6 subjects**)

Module 3: IC Design/EDA/Analog
(**NYCU**, **4 subjects**)

Module 4: Semiconductor Materials & Devices
(**NYCU**, **5 subjects**)

Module 5: Advanced Semiconductor Manufacturing
(**TSMC**, **10 subjects**)

Module 6: Supply Chain, Management and
Leadership in Semiconductor Industry
(**NYCU**, **4 subjects**)

Branding/Certificate
NYCU-Purdue co-branded

Content
6 modules/34-course subjects in total

Who fits?
students with backgrounds in science
& engineering

Vision
Create a world-class, borderless
semiconductor classroom

Trendy
AI-powered quizzes and AI teaching
assistants available for each subject
course

NYCU-Purdue
Program Tracks

Prerequisite courses: (I) Calculus (II) Principles of Physics

Curriculum I
Semiconductor Devices & Process Integration

Module 2: Packaging, Reliability, Characterization

Module 4: Semiconductor Materials & Devices

Module 5: Advanced Semiconductor Manufacturing

Module 6: Supply Chain, Management and Leadership in Semiconductor Industry

Prerequisite courses: (I) Calculus (II) Microelectronics

Curriculum II
Design & Methodology for AI Systems

Module 1: Chip Design for AI Technology

Module 3: IC Design/EDA/Analog

Module 5: Advanced Semiconductor Manufacturing

Module 6: Supply Chain, Management and Leadership in Semiconductor Industry

From Vision to Reality: NYCU and Purdue Join Hands to Pioneer a New Era of Borderless Semiconductor Education

Course Production Progress

2024 February
Start Filming

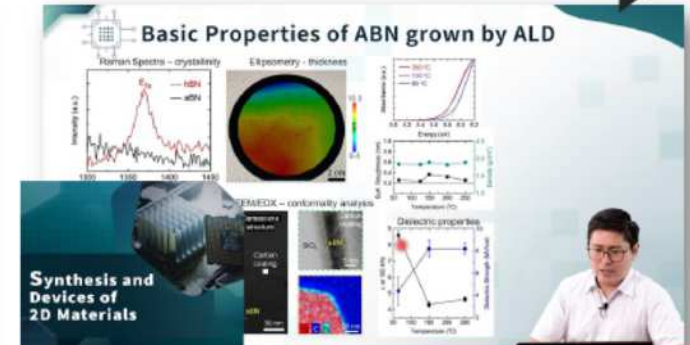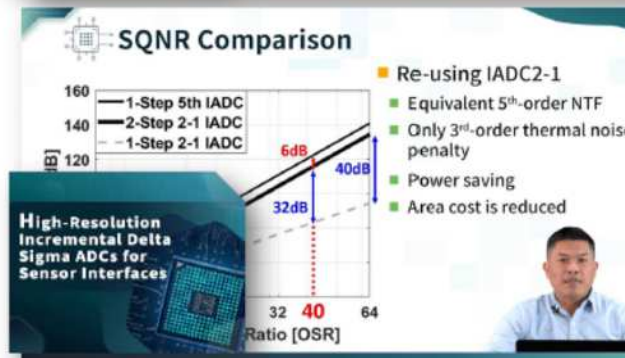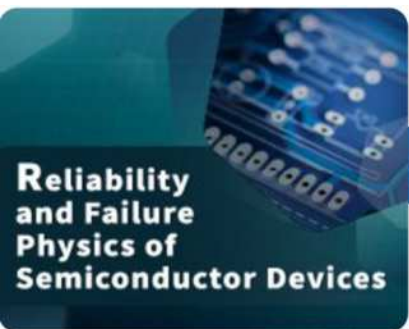**2024 July**
Post-production

2025 February
Production Complete

TSMC Certificate Program

Device Physics & Technology	Semiconductor Process Integration	Material Characterization & Metrology
1. Semiconductor Devices & Physics 2. Int. to Solid State Physics 3. Int. to Quantum Mechanics 4. Semiconductor Devices Design and Simulation 5. Device Measurements 6. Circuit Theory 7. Engineering Mathematics (II) 8. Emerging Memory and Neuromorphic Computing	1. Semiconductor Processing 2. Electronics (I) 3. Electronics (II) 4. Electromagnetics 5. Applied Optical Electronics 6. Introduction to Integrated Circuit Design 7. Thin Film Technology 8. Plasma Engineering 9. Microelectronics 10. Design of Experiment, Statistics Analysis & Applications 11. Advanced Semiconductor Processing 12. Semiconductor Laboratory 13. Extreme Ultraviolet (EUV) Lithography	1. Coherent Light and Electron Diffraction Microscopy 2. Synchrotron X-ray Absorption Spectroscopy 3. Material Characterization, Failure Analysis

tsmc

NYCU's Comprehensive Semiconductor Programs

- Instruction program
- Hands-on program

K-12

Vocational Training Program

Bachelor
- Instruction program
- TSMC certificate program
- MediaTek certificate program
- Hands-on program
- Corporate internship program

Dept. Microelectronics Engineering

Degree Programs

- Instruction program
- Advanced online course program
- TSMC certificate program
- MediaTek certificate program
- Practical training program
- Corporate internship program
- Research project

- Instruction program
- Advanced online course program
- TSMC certificate program
- MediaTek certificate program
- Practical training program
- Corporate internship program
- Research project
- Overseas research project

Master

PhD

IAIS	ICST
College of Electrical & Computer Engineering	College of Engineering
College of Computer Science	College of Science
College of Photonics	

Digital Learning @ NYCU (Customized)

- **Flexible and accessible**: Designed for working professionals and international students, offering both synchronous and asynchronous formats for autonomous learning.

- **Interdisciplinary strengths**: Built on NYCU's excellence in semiconductors, AI, biomedicine, and management.

- **Practice-integrated learning (hybrid)**: Combines theory, hands-on labs, and industry mentorship to bridge academic and real-world applications.

The certificate can be issued either by the partnering institution or by NYCU. If issued by NYCU, it will offer course credits, with the credits being counted for graduation requirements for participants who later enroll as NYCU students.

Industry-Academia Research Centers

NYCU-TSMC Research Center
Taiwan Semiconductor Manufacturing Co., Ltd.

NYCU-MediaTek Research Center
MediaTek Inc.

NYCU-PSMC Research Center
Powerchip Semiconductor Manufacturing Corp.

NYCU-WIN Semiconductors Research Center
WIN Semiconductors Corp.

NYCU-Global Wafers Research Center
GlobalWafers Co., Ltd.

NYCU Laser System Research Center
LIGHTMED Corp.

NYCU-NVIDIA Research Center
NVIDIA Corp.

NYCU-AMD Research Center
Advanced Micro Devices, Inc.

NYCU-Wistron Research Center
Wistron Corp.

NYCU Innovation Ecosystem

End-goal Setting｜Value Cocreation

以終為始｜價值共創

NYCU | OIAC

Office of Industry-Academia Cocreation

Engaging with Global Innovation Ecosystems

Partnering with International Talents

Entrepreneurs

Venture Capital

OIAC **nycu**

Corporate

Government
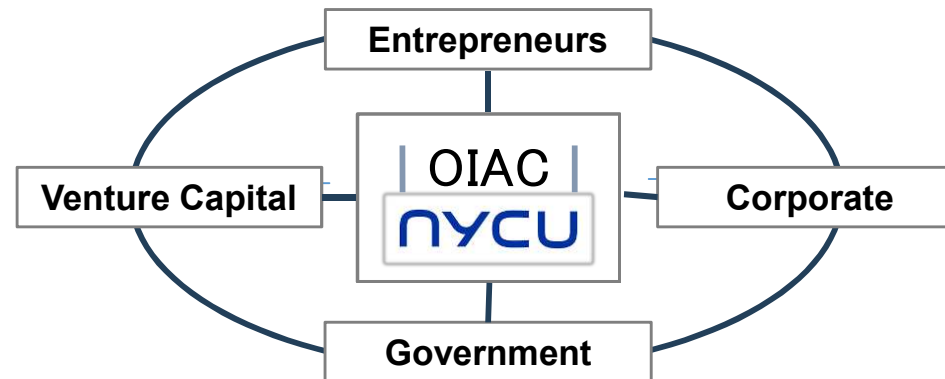
Challenges & Opportunities

- Fast Changing in Technologies

- Global Competition

- Innovation Opportunities

Engaging and Partnering to Cocreate Value

鏈結全球創新生態系統 – 共創價值

"Our goal is to co-create Taiwan's innovation ecosystem, granting it global visibility and enabling contributions to the world by providing startups with a trusted, value-added environment."
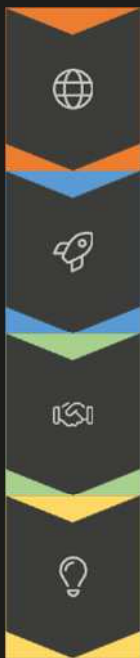
Global Co-Creation Hub
Connecting deep tech innovation with entrepreneurship and international partnerships

Startup Acceleration
Supporting Taiwan's largest university-affiliated startup platform

Asia Pacific Accelerator Network
Linking 15+ accelerators across Asia

Innovation Promotion
Developing IP strategies and global talent pipelines

IAPS Powers NYCU's Startup Community

Innovation Incubation

Converting research into
market-ready solutions

Industry Partnerships

Creating paths to market and
corporate innovation
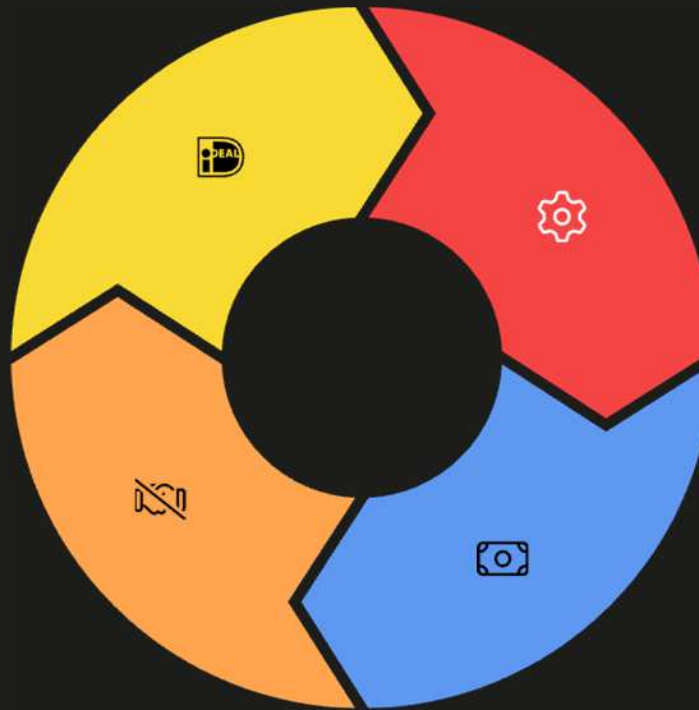
Acceleration Programs

Specialized mentorship and
resource access

Funding Connections

Linking startups with
investors and grants

NYCU's Startup Ecosystem Impact

1,200+

Startups Supported

Taiwan's largest university startup community

$10M+USD

Annual Funding

Raised by startups in our ecosystem yearly

100+

University Labs

Engaged in commercialization projects

Asia Pacific Accelerator Network

Regional Integration
Unified startup ecosystem across Asia

Partner Accelerators
15+ innovation hubs throughout the region

Cross-Border Opportunities
Market entry, funding, and talent exchange

AAN
ASIA PACIFIC ACCELERATOR NETWORK

BEYOND4
DRIVING DIGITAL TRANSFORMATION

BLACKSTORM
CONSULTING

NSTDA

SCITECH PARK

Startup Go!Go!

IAPS
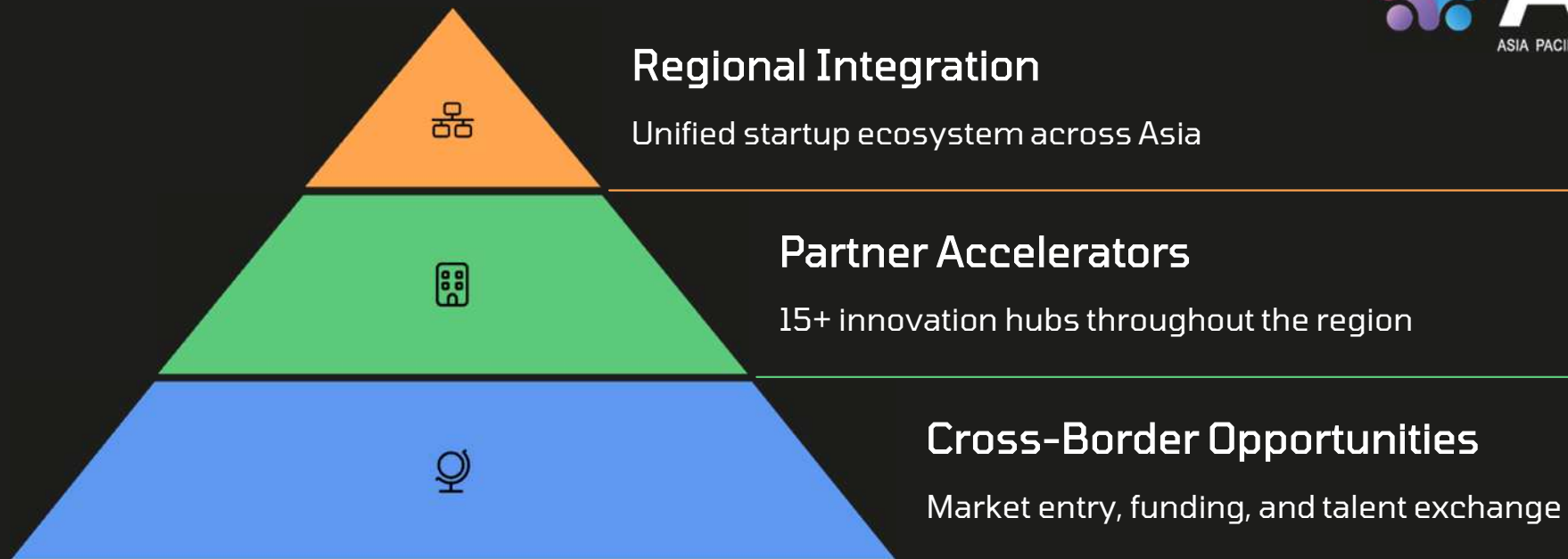
Global Co-Creation Partnerships

Japan Collaborations

Joint research initiatives and startup exchange programs with top universities and accelerators.

India Partnerships

Innovation bridges connecting tech talent and markets through dedicated acceleration programs.

European Connections

Strategic relationships with Belgium innovation hubs and EU research networks for technology transfer.

Partners/Collaborators in Japan

Key Partners @ Kyushu (and Fukuoka City)

Accelerator and funds

Gov.

Assoc.

Corp.

FUKUOKA CITY

PARKS

DCIパートナーズ

Hiroki Narita
CEO

Gomore

20 Universities jointly to boost Kyushu and Okinawa startup ecosystem /
Kyushu University & Kyutech

Startup Go!Go!

一般社団法人 九州経済連合会 Kyushu Economic Federation

JETRO

GxPartners

FiduciaEage

Toshihiro Kishihara
CEO

Tanigawa San

TOHOKU UNIVERSITY

Ayao San

Sendai shi

DLE WIJ WORKLIFE IN JAPAN 日本職活

CHIBA Kazuhiro
President, TUAT

Tokyo

Shibuya Startup Support

Work Capital Inc.

Fukuoka

MERCURIA INVESTMENT

福岡銀行 TOPPAN

QTnet

西日本FH 九州電力

* Have own open innovation programs

Nishitetsu Group 西日本新聞社

Shinji Ohnishi
VP OIP, Kyushu Univ

Okinawa 琉球銀行 Okinawa Startup Festa 2022

Masato Hisamune

Shota Kikuoka
CEO, WCI

ISCO

**Yasuhisa Yamaguchi
VP**

FFG
FFGベンチャービジネスパートナーズ

PARKS: "Promotion of Regional innovation and Creation of Knowledge-based Startups," is a government-led initiative that aims to support the development of regional innovation ecosystems and promote the growth of startups in Japan.

Semiconductor R&D with Social Awareness

Semiconductor Technology
tech-focused, purely R & D

- IP right and use
- CSR - communities
- SDGs of UN

- Tech Management
- Supply chains
- Tech trends forecasting

Trusted Technology

A safe technological society that emphasizes security, privacy, transparency, and traceability

Ethics of Technology
Legal, ethical and clean environment for future technologies

Technology Management
Leadership in the high-tech industry

Ethical decision-making in science & technology

CONCLUSION 1:

Co-Creation is an OPEN, yet Fair & Reasonable eco-system

→ **Joint lab**

→ **Joint campus**

→ **Industry-academia**

consortium

→ **Impact Fund**

→ **Ecosystem**

1. Open is the base – members talk to each other w/o legal concern & hesitation bringing the advantage of efficiency

2. Co-creation is NOT communism

3. Intellectual Property arrangement is a key and fundamental infrastructure

4. Fair & Reasonable IP ownership from : a) trustworthy big player; b) alternative IP tool (e.g. Registered Trade Secret)

5. University plays an important role : SRC (semiconductor research corporation – U.S. based consortium since 1982) as a benchmark

CONCLUSION 2:
Japan - Taiwan Co-Creation in 3 areas

1. Invite Japan to become a strong partner with Taiwan in the "Manufacturing as Service" strategy
2. Based on the NYCU Hsinchu experience, developing the "Next Generation University Technology Consortium" between Japan & Taiwan
3. Jointly cultivate talents with technological capability, creativity, and benevolence to bring new forces for global sustainable development

1. 日本を台湾の「**サービスとしての製造**」戦略の強力な**パートナーに招待する**
2. 国立陽明交通大学新竹の経験を基に、日本と台湾の間で「次世代大学技術**コンソーシアム」を発展させる**
3. 技術力、創造力、**そして善良さを持つ人材を共同で育成**し、地球の持続可能な発展に**新たな力をもたらす**

山重水複疑無路
柳暗花明又一村

陸游 《遊山西村》

Two roads
diverged in a wood,
and I ....
I took the one less
traveled by,
And that has made
all the difference.

Robert Frost,
"The Road Not Taken"

Together,
We Go Far

nycu

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