財團法人
生技醫療科技政策研究中心
Research Center for Biotechnology and Medicine Policy

社團法人
國家生技醫療產業策進會
Institute for Biotechnology and Medicine Industry

國際健康產業現況與展望

Chung-Liang Chien, Ph.D. (錢宗良)

Professor, College of Medicine, National Taiwan University
CEO, Institute for Biotechnology and Medicine Industry

現職：
國立臺灣大學醫學院解剖學暨細胞生物學研究所教授
社團法人國家生技醫療產業策進會執行長

學歷：
臺灣大學動物學系學士 (1980-1984)
臺灣大學醫學院解剖學研究所碩士 (1986-1989)
美國哥倫比亞大學醫學院病理學博士 (1989-1995)

經歷：
日本東京大學醫學院客座研究員 (1999)
臺灣大學醫學院學生事務分處主任 (2008-2014)
臺灣大學醫學院國際事務中心主任 (2009- 2012)
臺灣大學醫學院副院長 (2011- 2014)
中華民國解剖學會理事長 (2010- 2014)
臺灣幹細胞學會理事長 (2013-2017)
行政院科技會報辦公室副執行秘書 (2012-2014)
國光生物科技股份有限公司監察人(公股代表) (2012-2014)
亞太經合會生命科學創新論壇(APEC-LSIF)委員會委員(2013-2016)
行政院科技部政務次長 (2014-2016)

Institute for Biotechnology and Medicine Industry (IBMI)

Established Year: 2002

Board of Members: Leaders from Academia, Medical Centers, and Biotech & ICT Industries

Founded by the former president of the Legislative Yuan of Taiwan, Mr Jin-Pyng Wang, IBMI is an independent, not-for-profit organization voicing Taiwan-based health care industry, promoting interdisciplinary collaborations through its global platform, and creating policy dialogues between public and private sectors. On top of that, IBMI is also a trusted awarding and certification body to health care providers and an incubator to health care startups in areas of novel technologies, services and innovations.

Founder
Jin-Pyng Wang

Former president of the Legislative Yuan, Taiwan

President
Chi-Huey Wong

Scripps Family Chair Professor of the Scripps Research Institute

Vice President
Barry Lam

Chairman & CEO Quanta Group

Vice President
Pan-Chyr Yang

Academician of Academia Sinica

Vice President
Chang-Hai Tsai

Chairman of the Board of China Medical University & Health Care System

Supervisor
Wei-Jao Chen

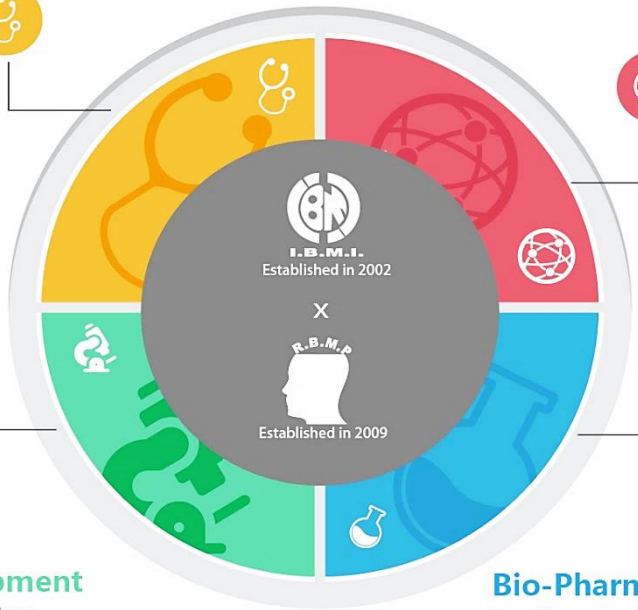
Professor Emeritus, Department of Surgery. National Taiwan University College of Medicine

Board Members

The board members consist of leaders from hospitals and R&D institutes, and C-level representatives from electronics, ICT, biotech and pharmaceutical sectors. Currently, IBMI has more than 400 members from across industries relating to health care.

Healthcare

Chang Gung Memorial Hospital
Changhua Christian Hospital
China Medical University Hospital
College of Medicine National Taiwan University
Hualien Tzu Chi Hospital
Kaohsiung Medical University Hospital
MacKay Memorial Hospital
National Cheng Kung University Hospital
National Defense Medical Center
Shin Kong Wu Ho-Su Memorial Hospital
Show Chwan Memorial Hospital
Taichung Veterans General Hospital
Taipei Medical University
Taipei Medical University-Shuang Ho Hospital
Ten-Chen Medical Group
Tri-Service General Hospital
Wei Gong Memorial Hospital



Electronic & ICT

Advantech Co., Ltd.
Catcher Technology Co., Ltd.
Foxconn health technology business group
iKala Interactive Media Inc.
Pegatron Corp.
Powerchip Semiconductor Manufacturing Corp.
Qisda Corp.(BenQ)
Realtek Semiconductor Corp.
Topco Group
Wistron Corp.

Research & development

Development Center of Biotechnology
Industrial Technology Research Institute
KPMG in Taiwan
National Health Research Institutes

Bio-Pharmaceutical

Bora Pharmaceuticals Ltd.
CHC Healthcare Group
Maywufa Biopharma Group
Missioncare Medicine Co. Ltd.
St.Shine Optical Co., Ltd.
Orient Pharma Co., Ltd.

What We Do

Policy Think Tank

- Act for the Development of Biotech and New Pharmaceuticals Industry
- Cross-Strait Cooperation Agreement on Medicine and Public Health Affairs
- Amendment of the Fundamental Science and Technology Act
- The Human Biological Database Management Act
- Pharmaceutical Affairs Law and Medical Care Act
- 33 biomedical policies

Awards & Certification

- Symbol of National Quality (SNQ) accreditation & certification
- National Innovation Awards

Partnership & Collaboration

- Healthcare + Expo Taiwan
- Taiwan Healthcare + Portal
- MEDTEX Summit Asia
- International Hospital Leadership conference
- Bio Taiwan Highlights

Startup Incubation

- Allied with 36 Universities & Research Institutes
- Startup Angel investment

Source compiled by IBMI, RBMP (2021)

Precision Medicine and Precision Health

【Precision Medicine】

Precision Diagnosis : NGS, Liquid Biopsy, Medical AI, POC devices , Digital Imaging Equipment *etc.*

Precision Treatment : Targeted Therapy, Cell Therapy, Immunotherapy, Surgical Robot, *etc.*

Medical Care: Smart Hospital, Smart healthcare, etc.

【Precision Health】

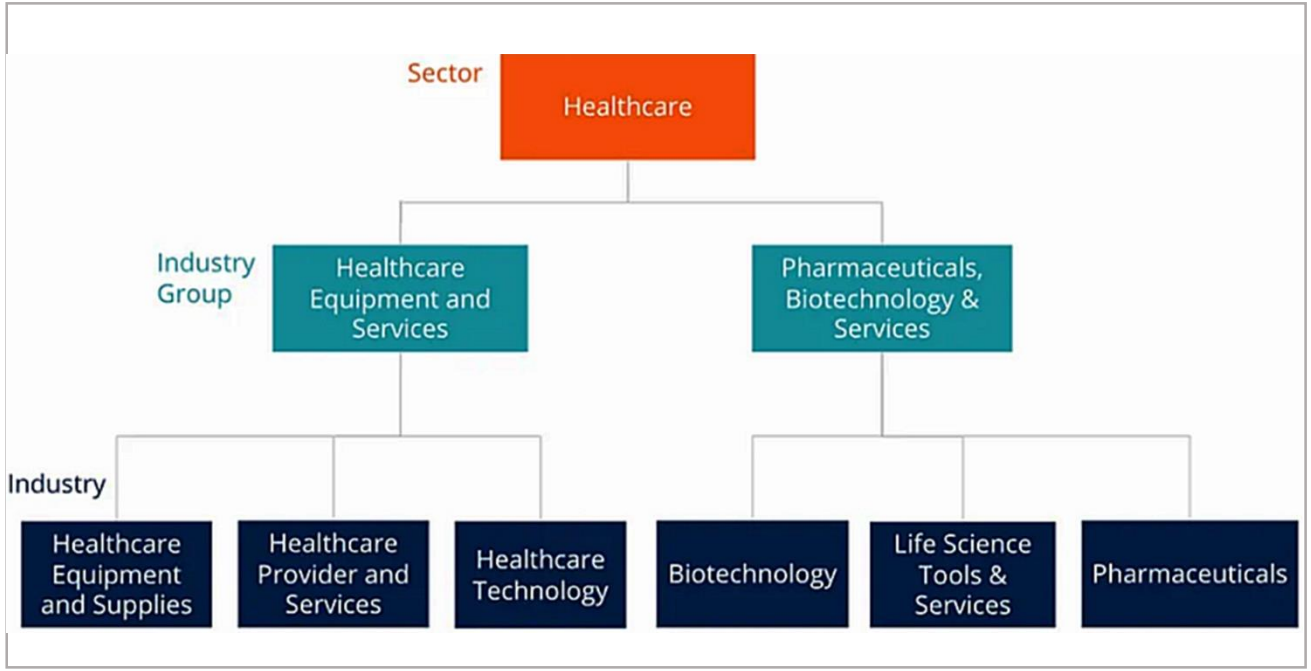
Risk Assessment : Genetic risk, Behavioral Patterns, family history *etc.*

Precision Prevention : Personalized Health Check、AI for Early Detection, Home Screening, Tele Health Consulting Services *etc.*

Health Promotion: Lifestyle, Environmental Adjustments, Personalized Diet, Sport and Exercise, Microbiota, Homecare and Wearable Devices, Health Management, *etc.*

Healthcare sector by GICS definition

- The healthcare sector includes the following subsections, as per Global Industry Classification Standard (GICS)



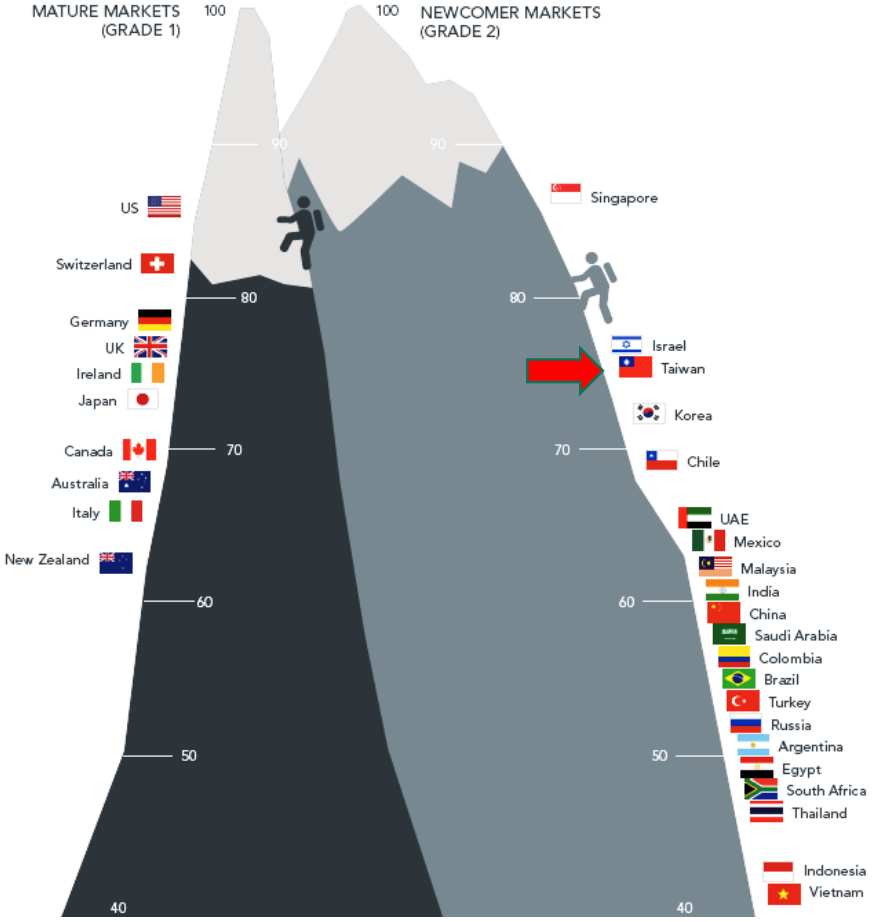
Global Markets:

- International Healthcare
- Bio-pharmaceutical
- Medical device
- Regenerative medicine
- Smart health
- Precision medicine
- Sports medicine

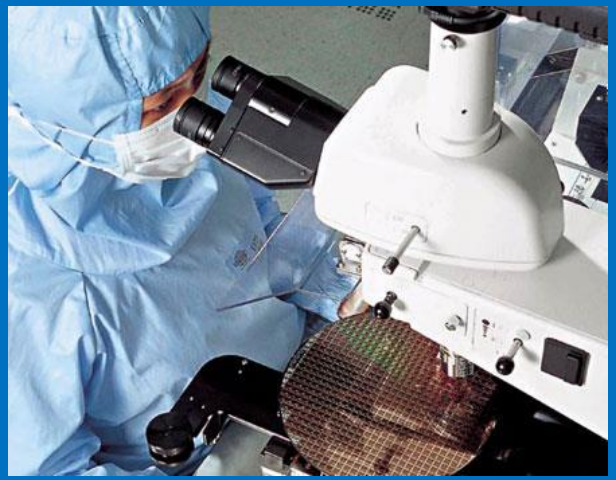
Source compiled by IBMI, RBMP (2021)

Taiwan Core Competences

- Taiwan ranks 3rd in the newcomer markets
- World-class quality of medicine and talent
- The best healthcare system and big data
- High quality clinical trials and R&D capacity
- Well-established research infrastructure
- ICT supply chain, talent and manufacturing
- AI and 5G R&D in national level



Source compiled by IBMI, RBMP (2021)



ICT

Hospital

Smart Hospital

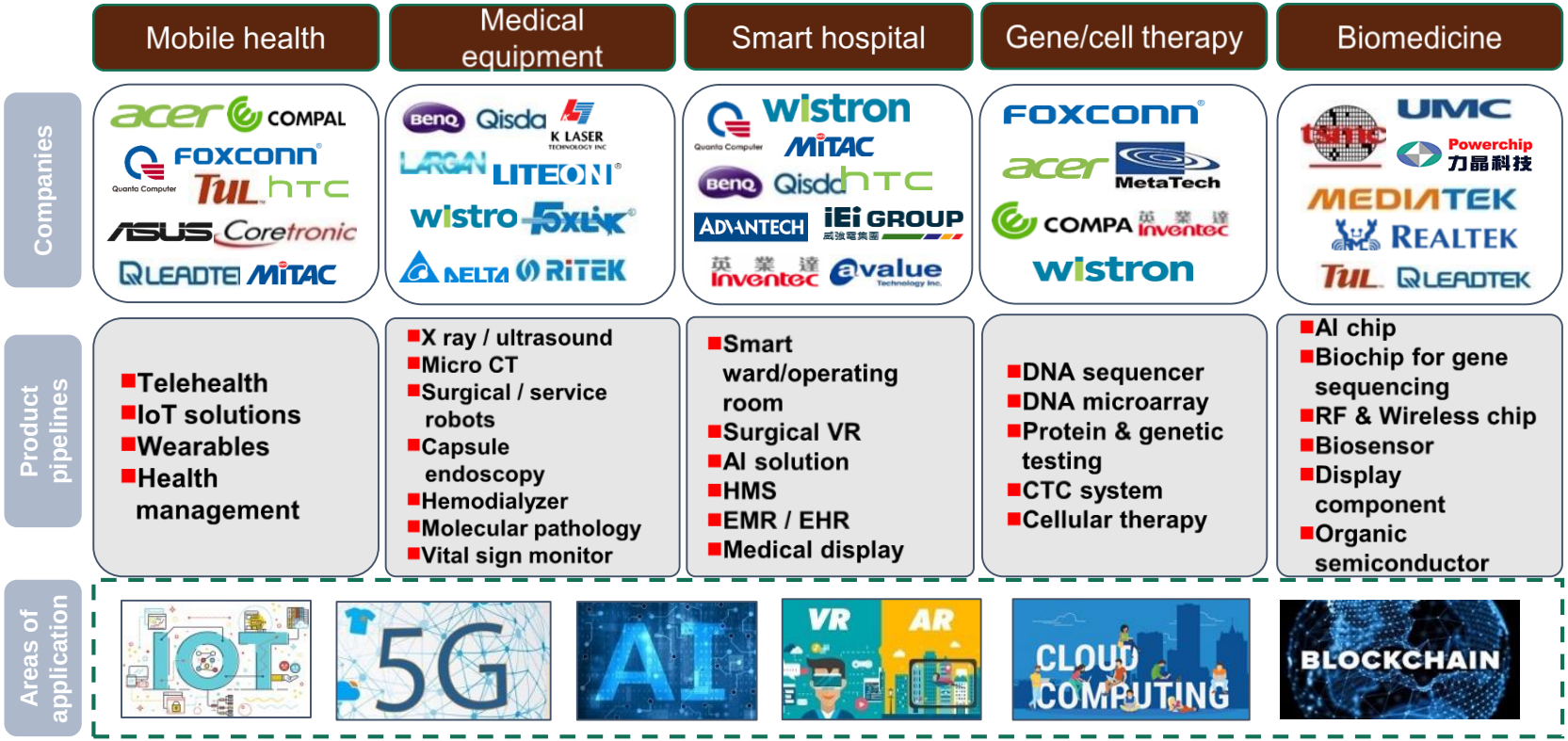
Healthcare IoT Platform

Health AI

Medical & Wearable Devices

Hospital Equipment

Taiwan ICT giants setting foot in healthcare



Source: IBMI

Cross-industry cooperation at a glance

1) AI medical platform
2) Telemedicine / remote care
3) AI-assisted arrhythmia diagnosis
4) AIoT device/equipment

1) Genome database for Chinese
2) Medical wearables
3) Epidemic management products
4) Proton therapy / 8K medical imaging

1) Innovative devices / AI diagnostics
2) Health & chronic disease management
3) Medical imaging for animals
4) Cell therapy / AIoT solutions

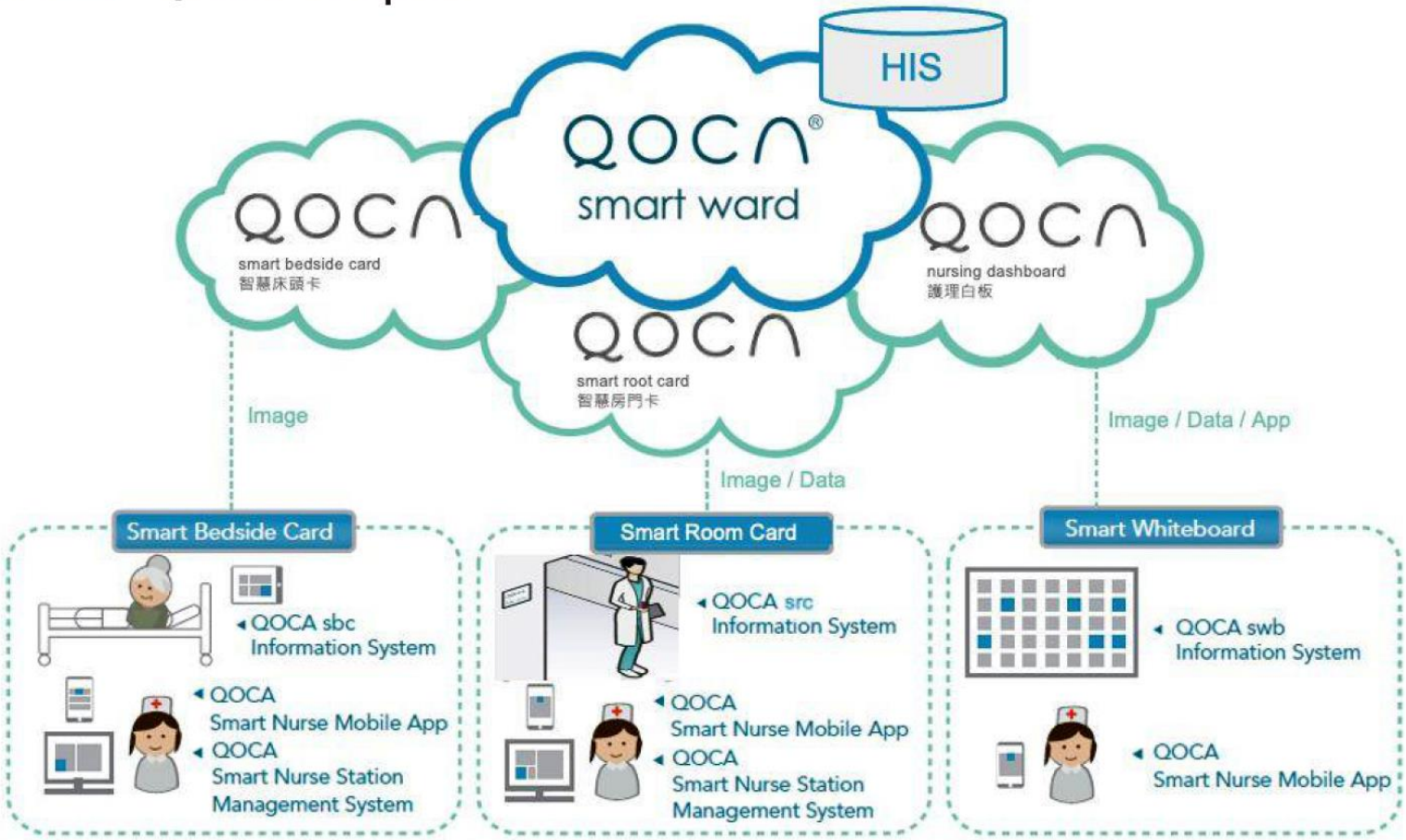
1) Miniaturization of medical equipment
2) Exoskeleton / assistive devices
3) AI dialysis / medical AI imaging
4) Digital pathology / health management

1) Telehealth / IoT products
2) Auto detection of CTC
3) Data integration of sports health
4) AI-assisted detection of disease

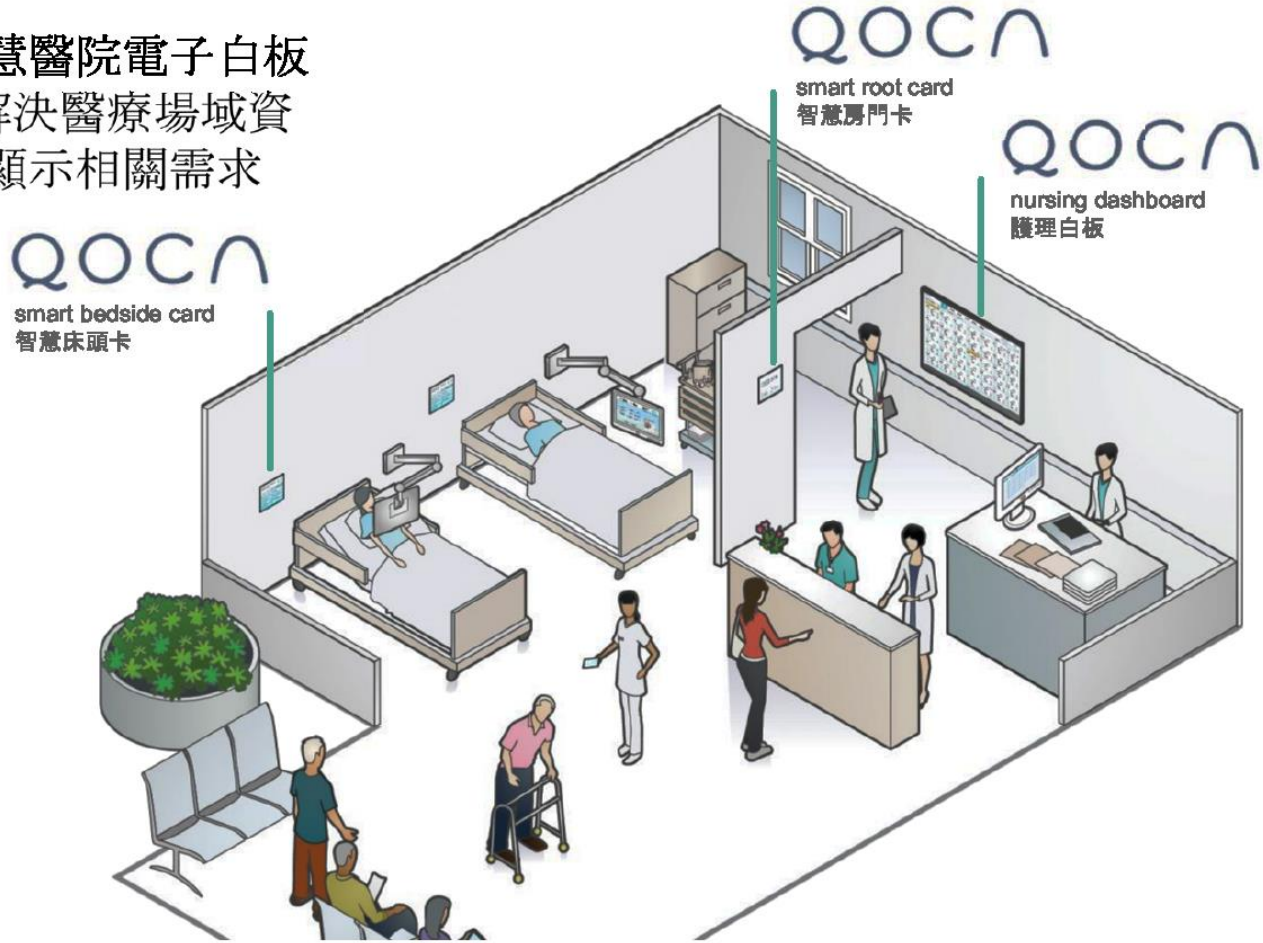
Source compiled by IBMI, RBMP (2021)

廣達電腦 Quanta Computer

QOCA®



導入智慧醫院電子白板方案, 解決醫療場域資訊整合顯示相關需求



QOCA 智慧病房解決方案

Smart Nurse Station: **Nurse Dashboard**

Improvement Nurse Care Quality and Work Flow

- **Nurse dash board (No paper works)**
- **Real time patient information (location, activity, schedule)**
- **Real time nursing shifting**
- **Central nurse control panel**
- **Schedule, Work Flow, and Education**

Featured Products

- **Medical Device**
  - Qflux Dialyzer
  - Hearing
  - Diagnostic Ultrasound
  - Transport Robot
  - Medical Consumables
- **Operating Room**
  - Surgical Tables
  - LED Surgical Light
  - Surgical Monitor
  - iQOR Digital System

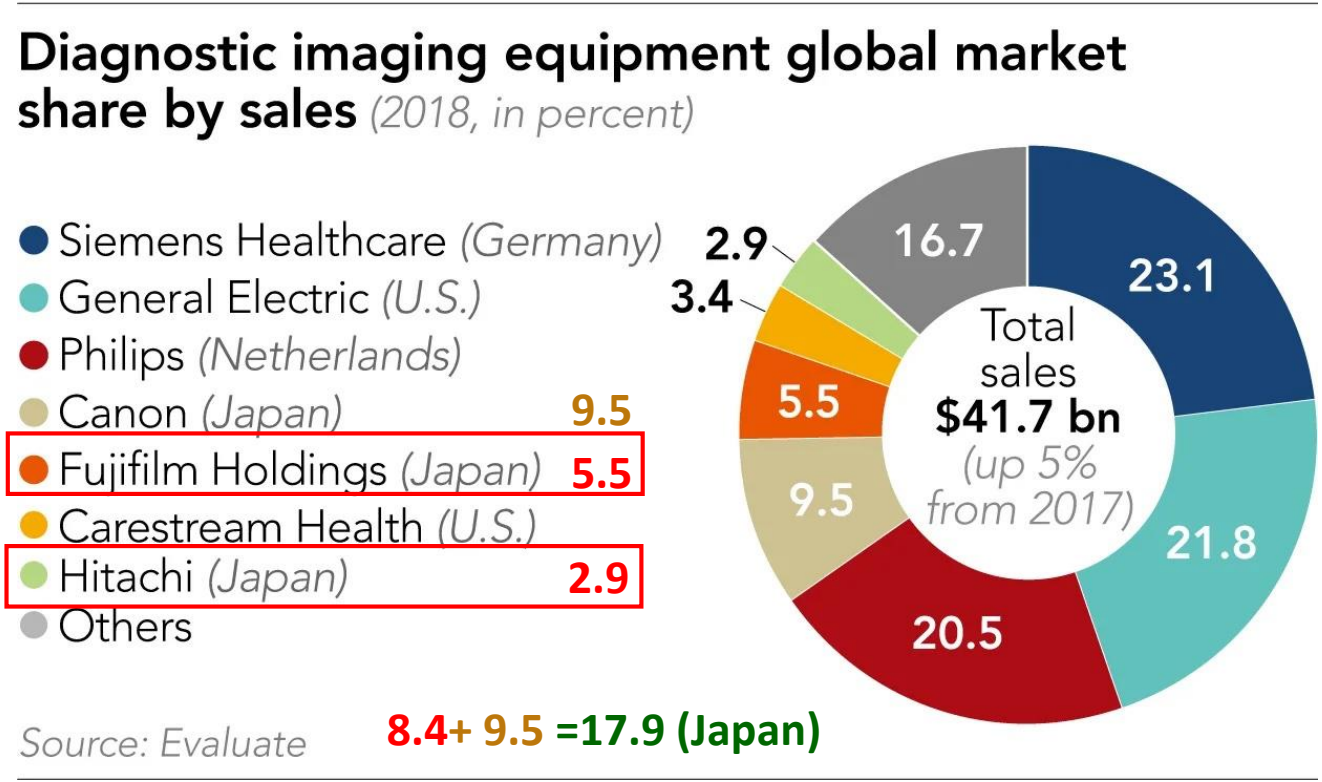
Solutions

Smart Operation Room

ODM / OEM of Medical Device

Other Smart Healthcare Solutions

- Fitness System → Smart Wearables
- Smart Ward
- Health Management System
- Long-Term Care Monitoring Solution



2 月 18 日，富士表示：「兩家企業合併後，會將各自影像處理和人工智慧軟體和日立超音波、MRI 結合，打包販售給醫療機構。」**To provide the total solution!**

Taiwan leading hospitals are expanding their productivity from building smart hospital…

彰化基督教醫院
CHANGHUA CHRISTIAN HOSPITAL

員林基督教醫院
Yuanlin Christian Hospital

U.S. Green Building Council LEED Gold Level Certification on Dec, 2015

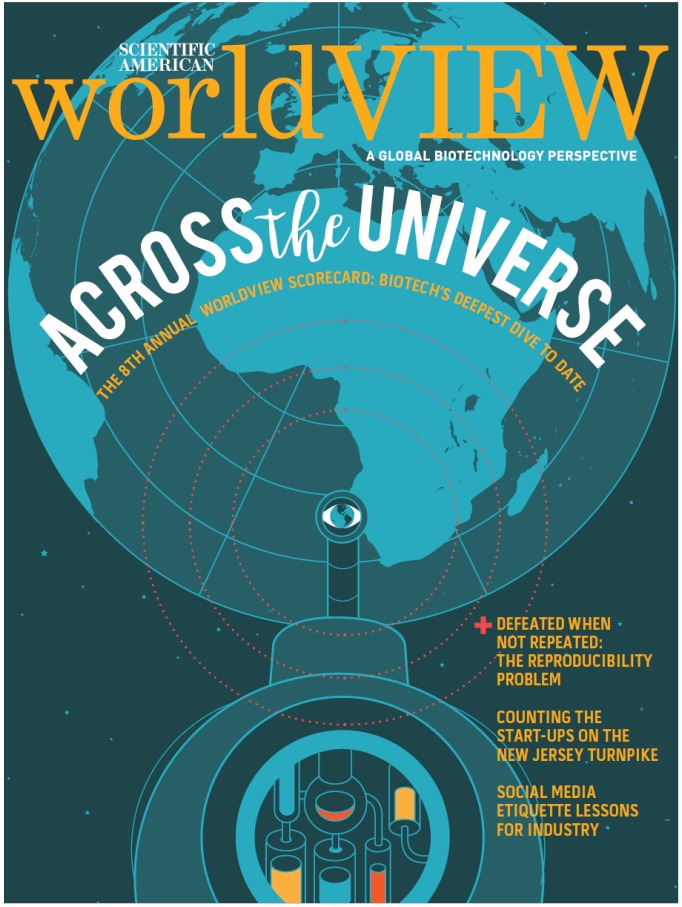
ICT Players launch products and solutions:

- Smart Nurse Station
- Smart Ward
- Smart Clinic
- Smart Counter
- Smart Dialysis
- Smart Operation Room
- Multimedia interaction
- Accompany robot
- Logistics Management
- ⋮

- Taiwan has become the most important exporting Smart Hospital Solution country in Asia.
- Offer total solutions to assist Asia countries to build smart hospitals or improve hospital management effectiveness.

  - Thailand (彰基)
  - Malaysia (長庚、中國醫)
  - India (成大)
  - Vietnam (榮總、高醫)
  - Indonesia (台大、亞東)
  - Philippine (慈濟)
  - Myanmar (新光)

https://nsp.mohw.org.tw/mp-2.html



2016 & 2020 Scientific American

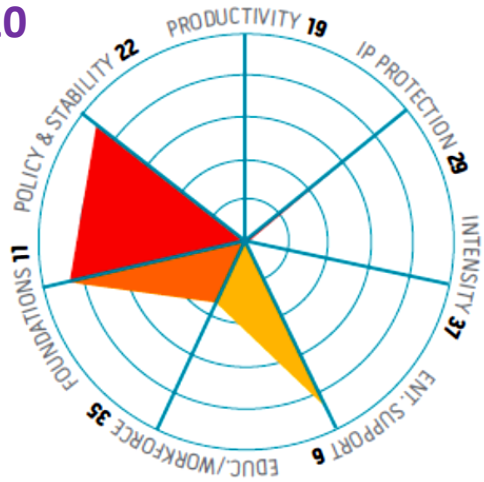
Enhanced with a new guidebook and region-specific ratings, the 2016 Scorecard ventures deeper than ever to track down the latest in biotech innovation

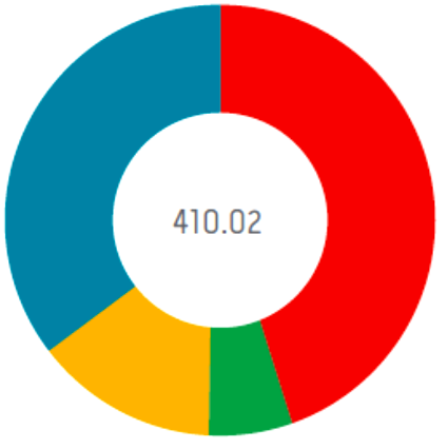
Taiwan,

Country Rank 23 / 54

2020

SAWV SC rank: 23
Population: 23,359,928
GDP: 489
R&D/GDP: 0





With an overall average of 22.4 on the SC, Taiwan's ranking of 23rd in 2016 is just about on par, and it performs even better on the *Nature Index 2015 Global*, with an 18th place overall ranking and its National Taiwan University landing in the top 100. Moreover, Taiwan advertises its biotechnology capabilities through international events, including BioTaiwan 2016. This will be the 14th annual event, and it will include presentations from companies around the world, as well as one-on-one partnering, seminars and workshops. A large exhibition is also expected, including more than 1,200 booths from 600 companies. On August 20, 2015, *Taiwan Today* reported, "A wide-ranging development plan targeting Taiwan's biotechnology-based economy is set to kick off next year, according to Premier Mao Chi-kuo." The report continued: "Focusing on agriculture, biomedicine, food, health care and medical instruments, the 10 year initiative will potentially expand the scale of the local bioeconomy to NT$4 trillion (US$123.2 billion) in 2026." With respectable scores on the SC's Foundations and Enterprise Support categories, Taiwan's commitment to innovation is clear. Like many other countries, however, Taiwan's Education/Workforce category shows room for improvement.

Source data from *Scientific American Worldview* (http://www.saworldview.com)

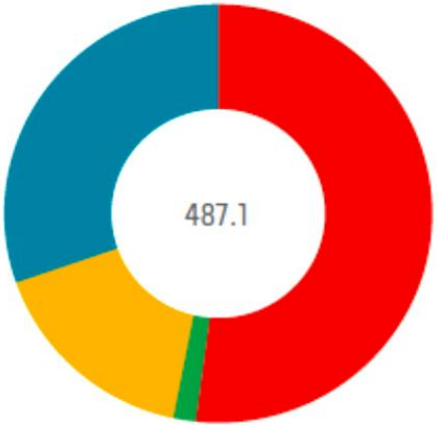
2016 Scientific American Worldview
-A Global Biotechnology Perspective

Asian Countries' Performance

Country	Global Ranking	Productivity	IP Protection	Intensity	Enterprise Support	Education/ Workforce	Foundations	Policy & Stability
Singapore	2	---	8.3	3.8	9.2	4.5	6.6	9.6
Hong Kong	11	0.0	7.1	1.6	8.6	1.6	6.7	9.0
Japan	15	0.1	9.2	0.6	4.5	3.6	7.9	8.0
Taiwan (Score/Rank)	23	0.0/19	5.8/29	0.1/37	7.0/6	2.6/35	6.9/11	7.2/22
South Korea	24	---	5.6	0.6	4.8	3.9	8.3	6.3
Malaysia	27	---	5.5	1.1	8.0	2.1	4.9	5.9
China	41	0.1	4.7	0.6	4.5	1.3	4.0	2.9
Thailand	45	---	2.3	3.0	3.4	2.7	3.0	1.8
India	49	0.0	4.3	0.8	3.5	0.2	1.6	2.0

Source: 2016 Scientific American Worldview

Source data from *Scientific American Worldview* (http://www.saworldview.com)



Singapore

SAWV SC rank: 2
Population: 5,567,301
GDP: 298
R&D/GDP: 2

Singapore can boast a top 10 finish throughout the SC's history, and a top five finish in every year except 2011. It also scores well on other measurements: 15th for output in the *Nature Index 2015 Global*, with more than half of the publications in chemistry; and fifth on the 2015 BCI index, which stated: "Singapore has relatively strong capabilities in R&D and manufacturing, with most of the necessary regulatory frameworks and safeguards in place and in line with international best practices." In part, ongoing investment in science and technology explains Singapore's high ranking. On January 12, 2016, for example, *ScienceInsider* reported, "The government of Singapore has announced that it plans to spend [US$13.2 billion] on research and development between 2016 and 2020." In addition, the National University of Singapore opened a US$25 million synthetic biology center on September 30, 2015. Other news reveals the allure of Singapore as an international leader in science. For instance, Rockefeller University plant molecular biologist Nam-Hai Chua announced plans to move his research—exploring plant RNA's impact on drought tolerance—to Singapore's Temasek Life Sciences Laboratory. Indeed, Singapore is a go-to country for biotechnology research, as well as for R&D in general.

In part, ongoing investment in science and technology explains Singapore's high ranking.

Country Rank

2 / 54

2020

The top-ranked countries in *Government effectiveness* are Singapore, Switzerland, and Finland.

新加坡：非常積極推動生技產業國際鏈結，已成功扮演亞太地區領頭羊的角色。針對國際華人健康市場之拓展，臺灣是可以嘗試與新加坡合作，創造雙贏的機會。

The top-ranked countries in *Regulatory quality* are Singapore, Australia, Canada, Finland, Hong Kong, New Zealand, and the United Kingdom. Source data from *Scientific American Worldview* (http://www.saworldview.com)

2019年5月23日新加坡 Medtech Connect 論壇

SGInnovate interview: https://youtu.be/3ktQSyfe7n0

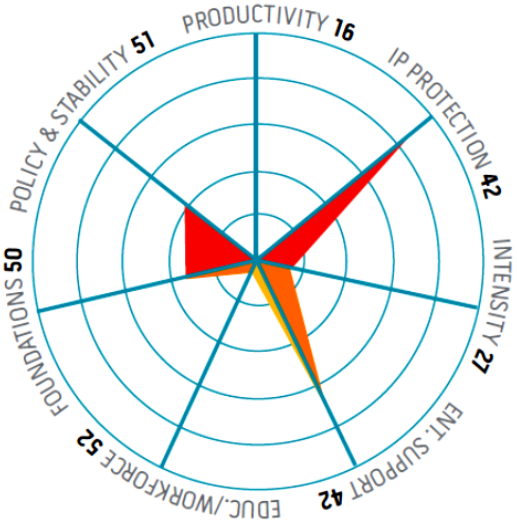
India

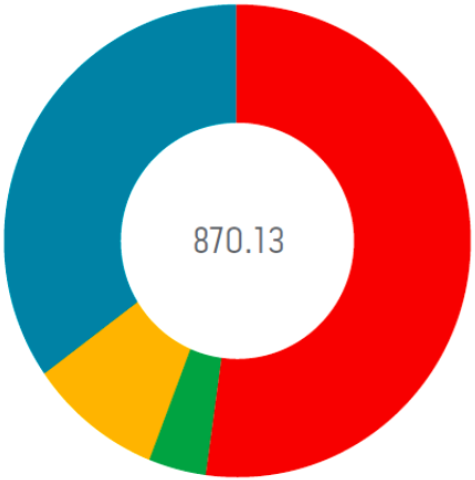
Country Rank

49 / 54

2020

SAWV SC rank: 49
Population: 1,236,344,631
GDP: 1,877
R&D/GDP: 0.82





If effort alone equated with success in biotechnology, India might top the SC and other indices. At the end of 2015, India released a new National Biotechnology Development Strategy, and some of its key goals included generating biotechnology products, increasing bio-manufacturing and producing biofuels. In fact, Shell India Markets plans to build a biofuel plant in Bangalore. Its 13th place ranking on the ***Nature Index 2015 Global*** suggests that some of India's efforts are paying off. Also, on January 8, 2016, an online article from *Nature Biotechnology* reported: "Most new companies emerging in the GM field are based in the United States and in Asia, especially India, whereas public developers of the technology are appearing in India and China." Nonetheless, the 2015 BCI described India as facing a "struggling ability to compete," and noted: "India possesses the foundation and potential for becoming a hub of biopharmaceutical innovation—but currently faces several major structural barriers to moving up from the bottom ranks in biomedical competitiveness. Local executives particularly noted the presence of major regulatory deficiencies and bottlenecks and very limited coverage of medicines, even with costs driven down. In addition, they highlighted major gaps in India's biopharmaceutical IP protection that render the system overall ineffective."

印度：在國際產業市場佈局上是不容忽視的人口大國，特別是與人密切相關的健康產業。與印度還算友善的臺灣可仿效日本模式，先投資在人才，再拓展未來廣大的市場。

India scored 0.03/10, in *Productivity* which places it 17th of the 54 countries studied. India was tied with Finland and Ireland and Taiwan.

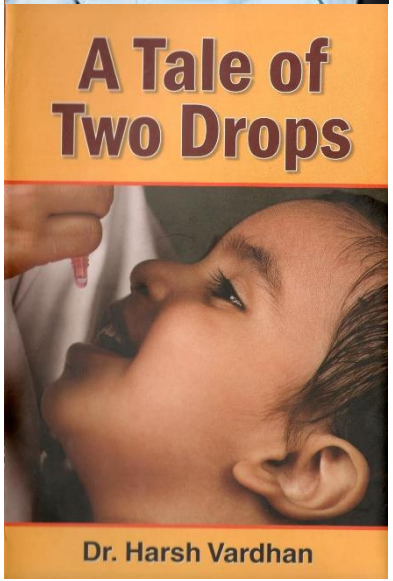
India scored 0.77/10, in *Intensity* which places it 26th of the 54 countries studied. India scored ahead of China and Austria.

Source data from *Scientific American Worldview* (http://www.saworldview.com)

2019年5月14日 參加印度經貿訪問團在Bangalore 的招商活動。並參與竹科管理局在 Bangalore 主辦的 Taiwan-India Medical Cooperation Forum.

Dr. Harsh Vardhan is an Indian Otorhinolaryngologist and the incumbent **Minister of Health and Family Welfare**, **Minister of Science and Technology** and **Minister of Earth Sciences**.

Dr. Harsh Vardhan was elected to the office of Chairperson of Executive Board of the World Health Organization from May 22, 2020.



2015-07-20 科技部錢宗良次長及田中光大使拜會印度科技部長 Hon. Harsh Vardhan。Hon. Vardhan部長並於會中致贈著作” A Tale of Two Drops”予錢次長及田大使。

印度理工學院海得拉巴校區

Indian Institute of Technology Hyderabad is a public technical and research university located in Sangareddy district, Telangana, India.

भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Japan International Cooperation Agency

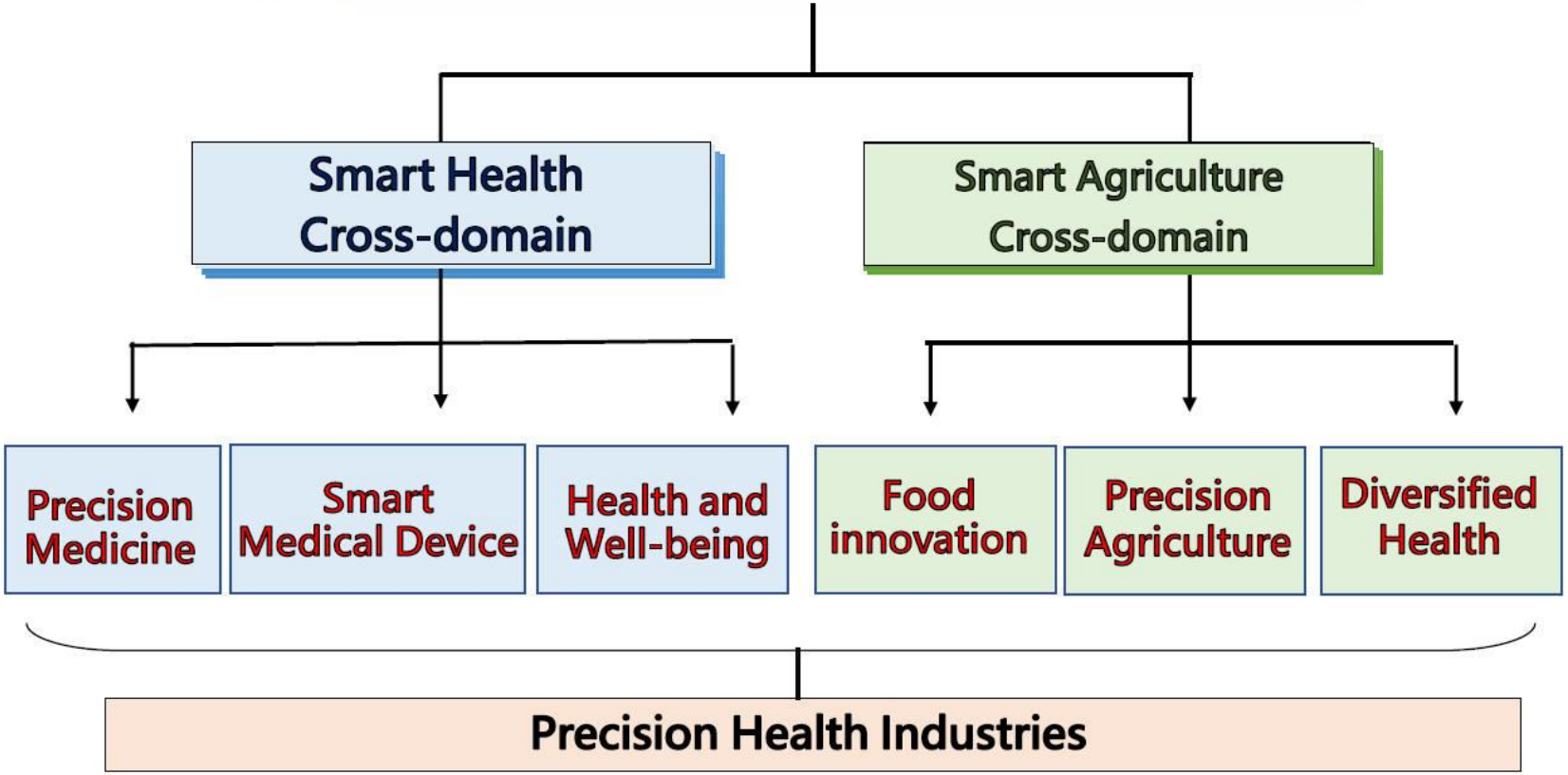
IITH-JICA

PhD Scholarship

精準健康產業跨領域人才培育計畫

Training Program for Interdisciplinary Talents of Precision Health

2022-2025



Healthcare EXPO · TAIWAN Healthcare B2B · TAIWAN

Onsite + Online

Expand Healthcare Markets & Businesses in APAC

Healthcare+ Expo 1 – 4 December 2022, Taipei
Healthcare+ B2B 1 August 2022 – 31 July 2023

Please Book your 2022 calendar: Dec. 1-4

Thank you for your attention!