Cultivating the interdisciplinary Talents for super Aged Taiwan
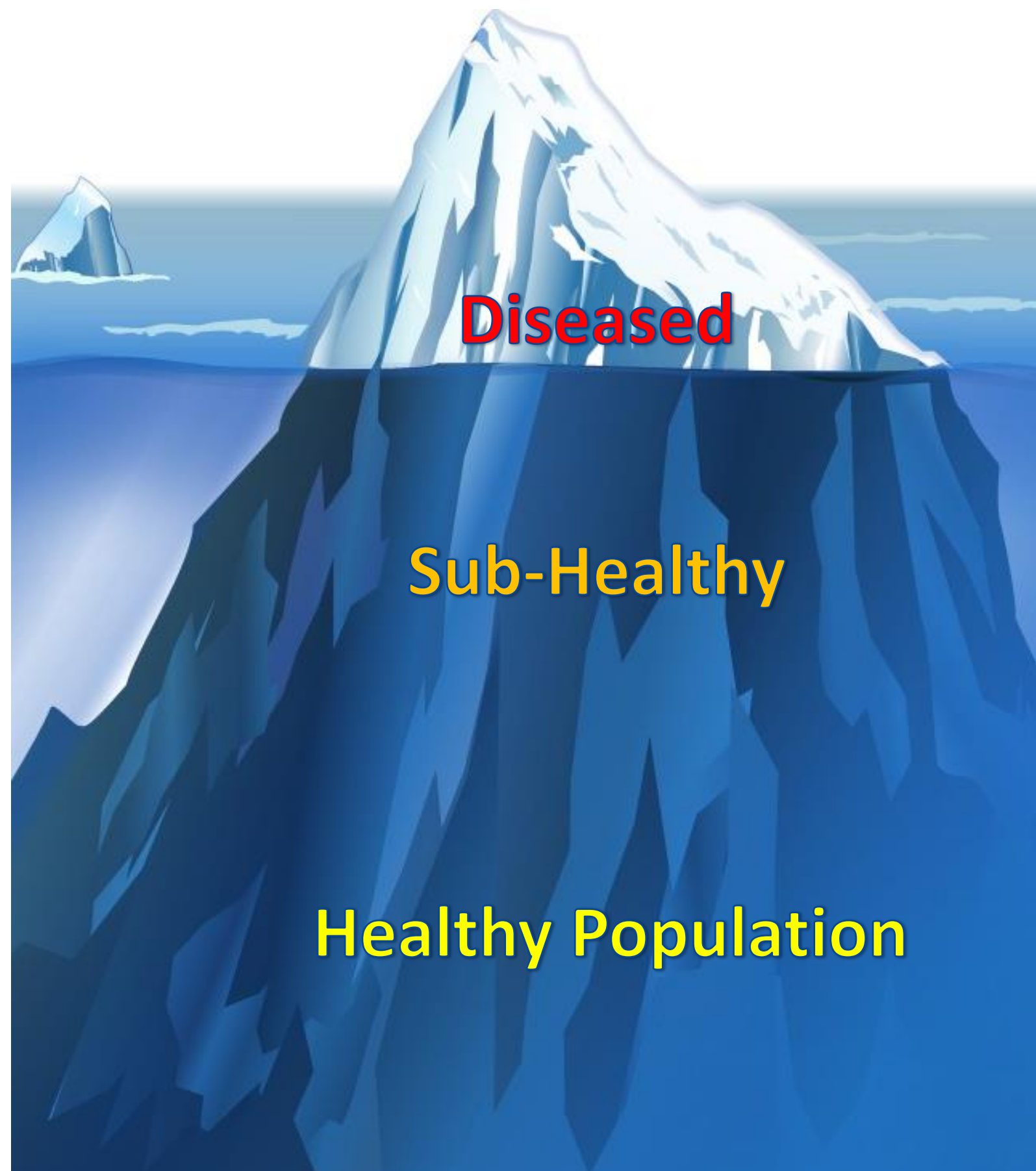
Chung-Liang Chien, Ph.D.

CEO, Institute for Biotechnology and Medicine Industry

Professor, College of Medicine, National Taiwan University

2024-05-02

Precision Medicine and Precision Health

Diseased

Sub-Healthy

Healthy Population

【**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.*
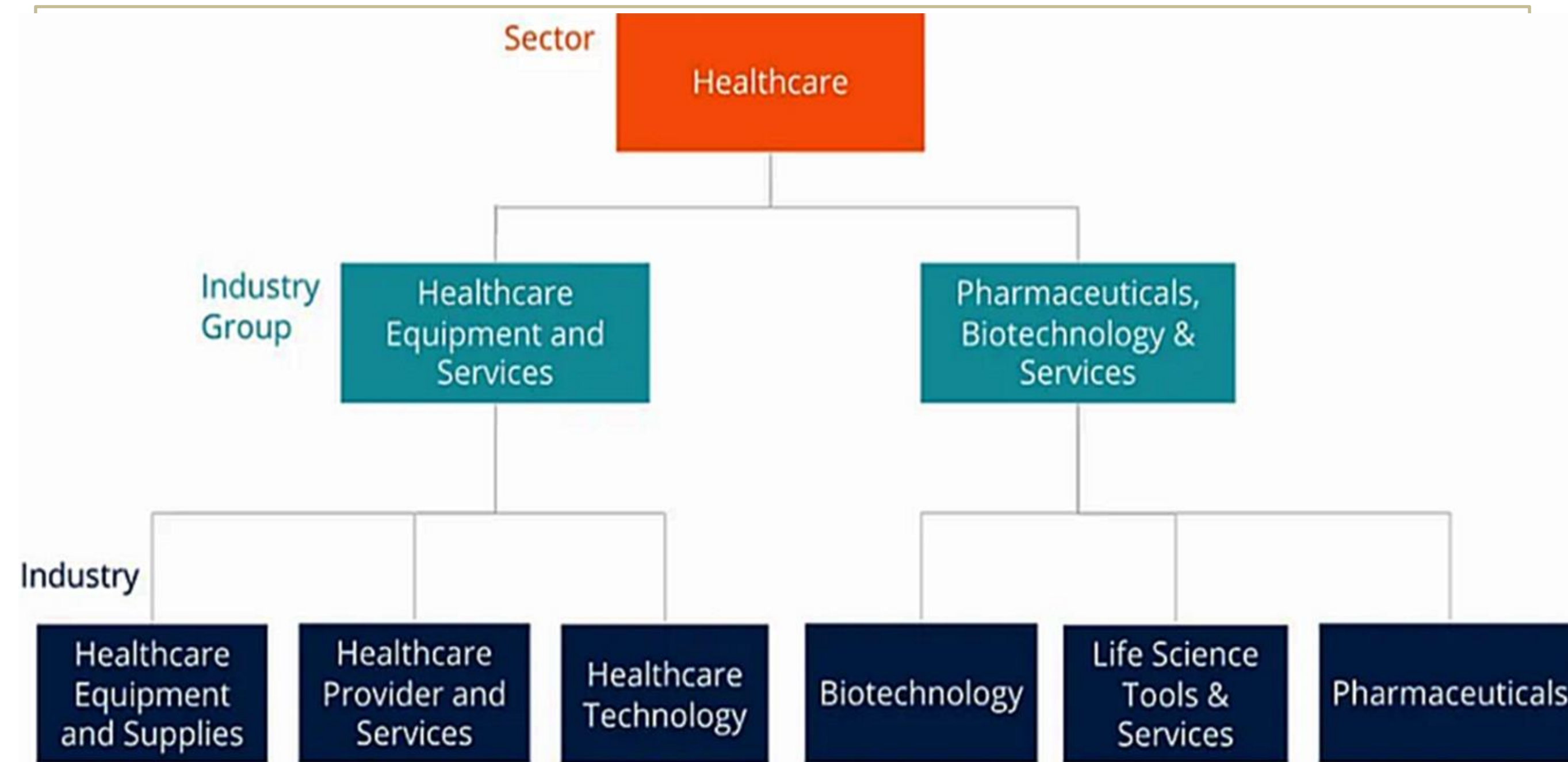
Healthcare from disease treatment to prevention

❑ Healthcare nowadays provides individuals with products and services ranging from prevention, health promotion, diagnosis to treatment.

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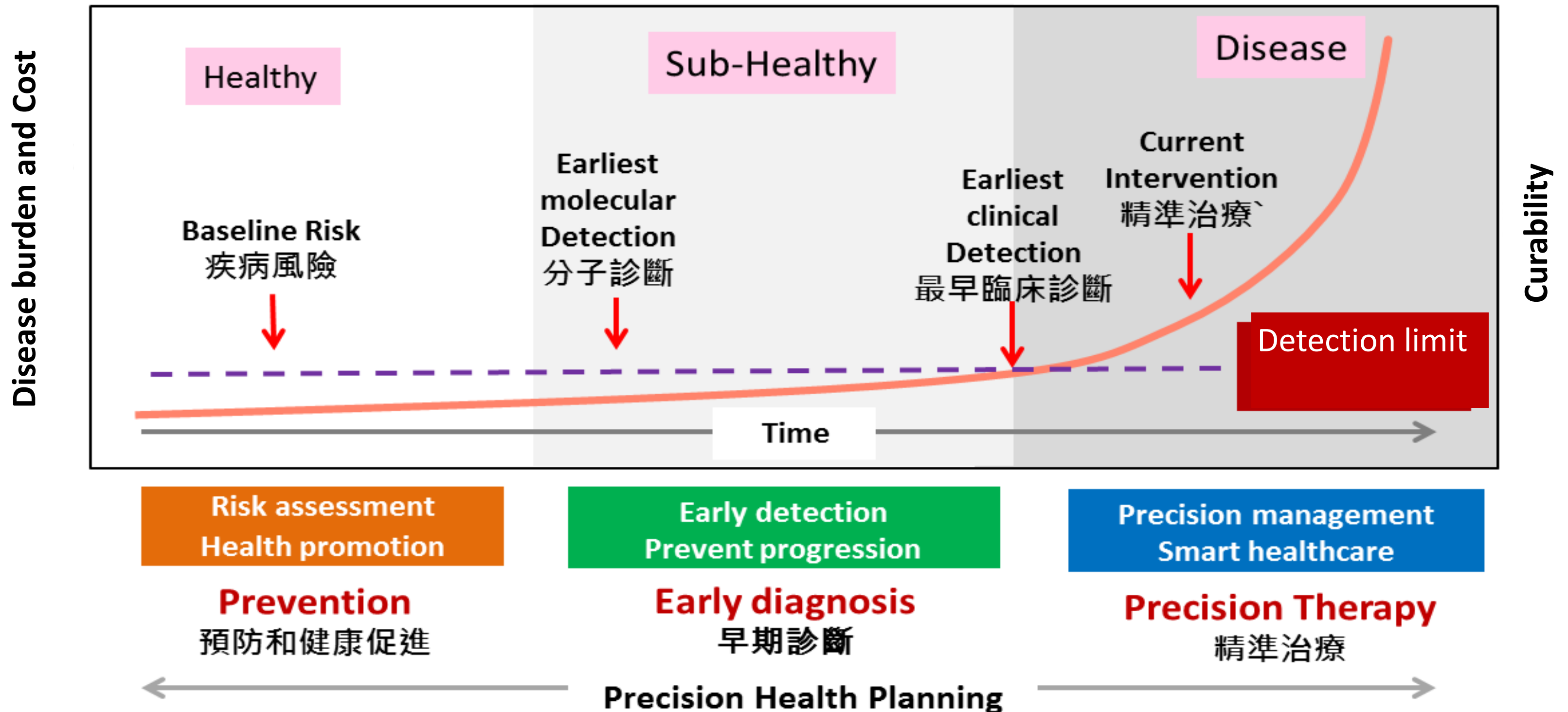
Healthcare sector by GICS definition

☐ 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)
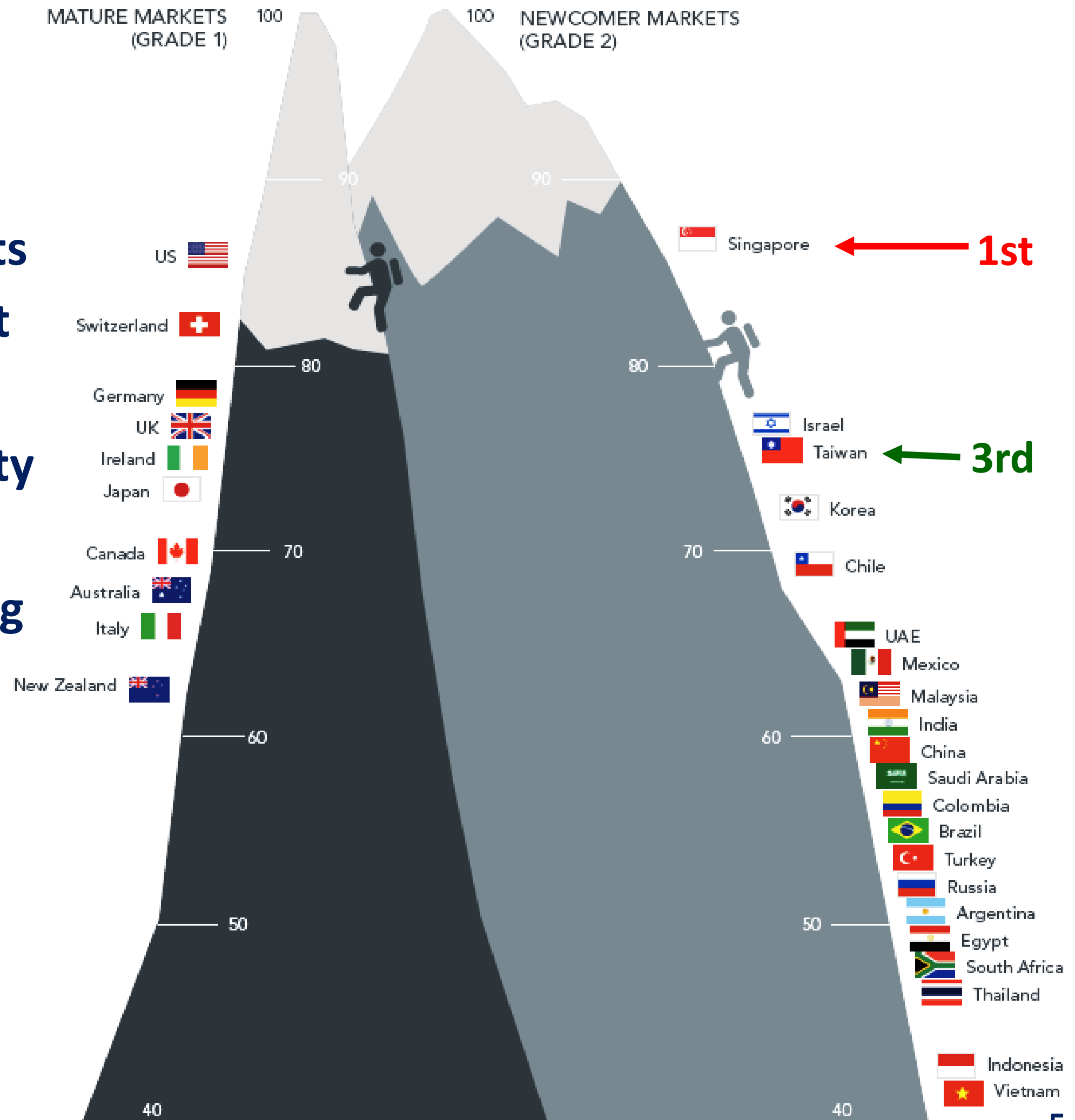
ASCENDING TO THE PEAK OF
BIOPHARMACEUTICAL INNOVATION
Biopharmaceutical Competitiveness & Investment (BCI) Survey, 4th Edition, 2017

MATURE MARKETS (GRADE 1)
NEWCOMER MARKETS (GRADE 2)

Mature Markets: US, Switzerland, Germany, UK, Ireland, Japan, Canada, Australia, Italy, New Zealand

Newcomer Markets: Singapore — 1st, Israel, Taiwan — 3rd, Korea, Chile, UAE, Mexico, Malaysia, India, China, Saudi Arabia, Colombia, Brazil, Turkey, Russia, Argentina, Egypt, South Africa, Thailand, Indonesia, Vietnam

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Taiwan ICT giants setting foot in healthcare

Mobile health	Medical equipment	Smart hospital	Gene/cell therapy	Biomedicine
Companies				
acer, COMPAL, Foxconn/Quanta Computer, TUL, hTC, ASUS, Coretronic, LEADTEK, MiTAC	BenQ, Qisda, K LASER TECHNOLOGY INC, LARGAN, LITEON, wistro, 5xLNK, DELTA, RiTEK	Wistron/Quanta Computer, MiTAC, BenQ, Qisda, hTC, ADVANTECH, iEi GROUP 威強電集團, 英業達 inventec, avalue Technology Inc.	Foxconn, acer, MetaTech, COMPA, 英業達 inventec, wistron	tsmc, UMC, Powerchip 力晶科技, MEDIATEK, REALTEK, TUL, LEADTEK
Product pipelines				
■ **Telehealth** ■ IoT solutions ■ Wearables ■ **Health management**	■ X ray / ultrasound ■ Micro CT ■ Surgical/ **Service Robots** ■ Capsule endoscopy ■ Hemodialyzer ■ Molecular pathology ■ **Vital sign monitor**	■ Smart ward operating room ■ Surgical VR ■ **AI solution** ■ HMS ■ EMR / EHR ■ **Medical display**	■ DNA sequencer ■ DNA microarray ■ Protein & genetic testing ■ CTC system ■ **Cellular therapy**	■ **AI chip** ■ Biochip for gene sequencing ■ RF & Wireless chip ■ Biosensor ■ **Display component** ■ Organic semiconductor
Areas of application				
IoT	5G	AI	VR AR	CLOUD COMPUTING	BLOCKCHAIN

Cross-industry cooperation at a glance

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

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

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

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

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

精準健康產業跨領域人才培育計畫
Training Program for Interdisciplinary Talents of Precision Health

2022-2023:
35 Projects
20 Universities
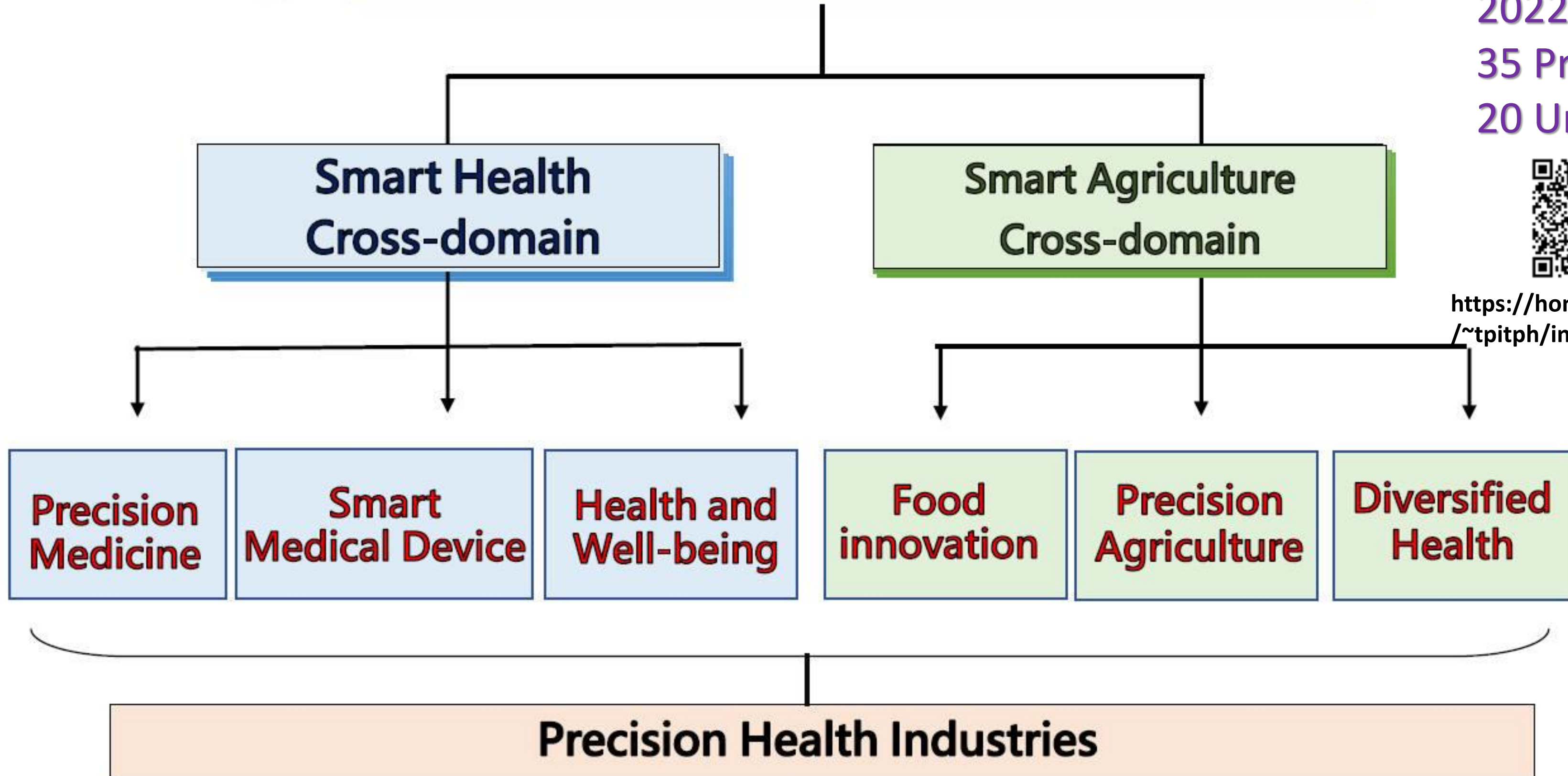
https://homepage.ntu.edu.tw
/~tpitph/index.htm

Smart Health Cross-domain

Smart Agriculture Cross-domain

| Precision Medicine | Smart Medical Device | Health and Well-being | Food innovation | Precision Agriculture | Diversified Health |

Precision Health Industries

精準健康產業跨領域人才培育計畫
Training Program for Interdisciplinary Talents of Precision Health

Program Goals:

1. Establishment of a platform for the collaboration between academia and the industries, specifically ICT and Bio.

2. Develop human resources for the development of precision health industries as well as with entrepreneurship and employment-oriented training.

3. Nurture talents with five core competencies, namely entrepreneurship, critical thinking, problem solving, interdisciplinary integration, and communication.

4. Cultivate talents with the abilities including industrial development and international marketing, the knowledge of regulatory affairs, and the capabilities of international mobility and competitiveness.

5. Training of university faculty with digital technology skills.
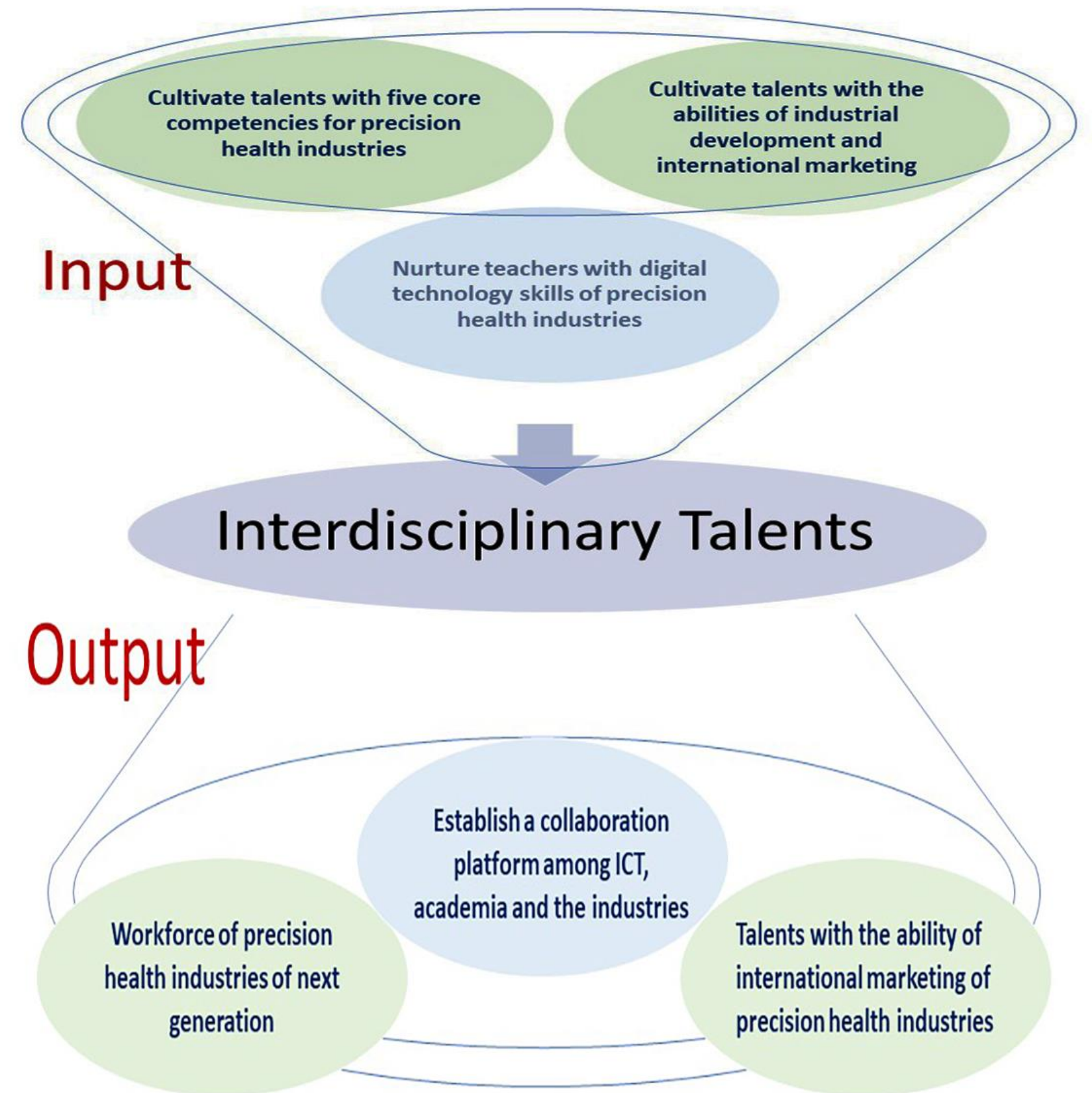
精準健康產業跨領域人才培育計畫

基礎 → 進階 → 轉譯 → 創新創業 → 就業 → 跨領域就業&創業

培育階段 **Cultivation stage**　　　　實作階段 **Implementation stage**

| 生物技術科技教育改進計畫 87-90年 | 生物技術科技教育改進計畫 91-94年 | 生物及醫學科技人才培育先導型計畫 95-98年 | 轉譯醫學及農學人才培育先導型計畫 99-102年 | 生技產業創新創業人才培育計畫 103-106年 | 生醫產業與新農業跨領域人才培育計畫 107-110年 | 精準健康產業跨領域人才培育計畫 111-114年 | 高齡科技產業新創人才培育計畫 113-116年 |

1998 **2002** **2006** **2010** **2014** **2018** **2022**

臺灣動物實驗替代科技計畫 113-116年

2024
1. 產產學跨域
2. 國際鏈結

橋接學用落差

學術界　　產業界
創新研發　　數位應用
核心技術　　國際行銷
跨域能力　　創新創業
學校

園區　法人　地方政府

精準健康產業跨領域人才培育計畫

學校與產業間的合作，可透過法人、園區或地方政府之橋樑鏈結，導引學生至產業發展

具跨領域學用專精之人才與人力投入精準健康產業

透過符合產業需求跨領域核心課程、產業見習與實習、或創新創業團隊之養成，培訓學員國際競爭力

大專校院　法人　園區　地方政府　精準健康產業

高齡科技產業行動計畫
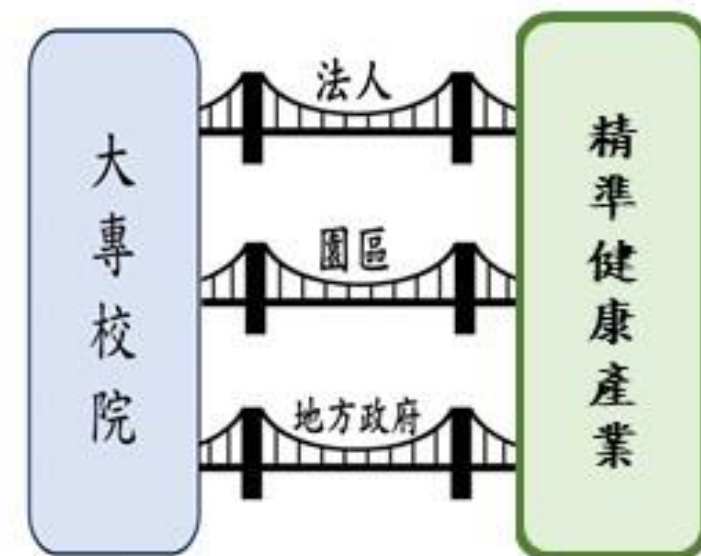
願景及發展目標 Vision & Goals

NSTC

打造長者在地幸福老化	加速高齡科技產業成長
Create happy aging in place for the elderly	**Accelerate the growth of the gerontechnology industry**

➤ 既有基礎上建立跨部會、跨領域共同合作機制，加速發展普惠科技，提供**健康樂齡及高齡族群**健康促進、醫療照護、社會互動、數位學習等多元產品/服務，帶動高齡科技產業發展，打造共融共創、自主樂活的樂齡銀髮世代

高齡科技產業行動計畫

Action Plan for Gerontechnology Industry

帶動高齡經濟 **Promote Healthy Ageing Economy**
健康福祉產業2025年突破**3,000億元**

提升社會參與 **Enhance Social Participation**
高齡者**持續參與**社會和經濟活動

實現幸福生活 **Achieve a Happy Life**
運用**跨域科技**完善健康生活整合服務

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

教育部高齡科技產業跨領域人才培育計畫
Training Program for Interdisciplinary Talents of Gerontechnology

2024-2027

https://homepage.ntu.edu.tw/
~tpitph/index.htm

2024-2025:
41 Projects
23 Universities

Smart Health Cross-domain

Smart Agriculture Cross-domain

| Precision Medicine | Smart Medical Device | Health and Well-being | Food innovation | Precision Agriculture | Diversified Health |

Smart Health Cross-domain

精準健康產業跨領域人才培育計畫
Training Program for Interdisciplinary Talents of Precision Health

Precision Medicine

Innovative application of gerontechnology in precision medicine
Innovative application of Precision screening, diagnosis and treatment
Innovative application of Targeted drug, vaccine and cell therapy
Innovative application of health data for generative artificial intelligence
International marketing management and cross-domain entrepreneurship

Smart Medical Device

Innovative application of gerontechnology in smart medical device
Innovative application of biomedical sensing and information communications
Innovative application of Smart devices and health management
Innovative application of Smart hospital with hardware-software integration
International marketing management and cross-domain entrepreneurship

Health & Well-being

Innovative application of gerontechnology in health and welfare
Innovative application of epidemic prevention and public health services
Innovative application of mobile health service and healthcare system
Innovative application of Health promotion and livable environment
International marketing management and cross-domain entrepreneurship

Smart Agriculture Cross-domain 精準健康產業跨領域人才培育計畫
Training Program for Interdisciplinary Talents of Precision Health

Food Innovation
- Innovative application of gerontechnology in the food innovation
- Innovative application of smart automation in food industry
- Innovative application of Food safety and quality controls
- Innovative application of Precision Nutrition and Health Promotion
- international marketing management and cross-domain entrepreneurship

Precision Agriculture
- Innovative application of gerontechnology in the precision agriculture
- Innovative application in agriculture, forestry, fishery and animal husbandry
- Innovative application Healthy Agriculture and Circular Economy
- Innovative application of resource conservation R&D
- International marketing management and cross-domain entrepreneurship

Diversified Health
- Innovative application of gerontechnology in the diversified Health
- Innovative application of Animal and plant quarantine and vaccine research
- Innovative application of livable environments for Healthy Healing
- Innovative application of Animal health and nutritional care
- Integrate output international marketing and cross-domain entrepreneurship

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Smart Health Cross-domain			Smart Agriculture Cross-domain		
Precision Medicine	Smart Medical Device	Health and Well-being	Food innovation	Precision Agriculture	Diversified Health

Promotion Center University

國立臺灣大學(醫) National Taiwan University (Medicine)	國立成功大學 National Cheng Kung University	高雄醫學大學 Kaohsiung Medical University	國立臺灣海洋大學 National Taiwan Ocean University	國立中興大學 National Chung Hsing University	國立臺灣大學(農) National Taiwan University (Agriculture)

Partner University

國立中興大學 National Chung Hsing University	臺北醫學大學 Taipei Medical University	長庚大學 Chang Gung University	中山醫學大學 Chung Shan Medical University	國立宜蘭大學 National Ilan University	國立中興大學 National Chung Hsing University

高齡科技產業跨領域人才培育計畫
Training Program for Interdisciplinary Talents of Gerontechnology

Partner University

臺北醫學大學
Taipei Medical University

長庚大學
Chang Gung University

國立宜蘭大學
National Ilan University

國立中興大學
National Chung Hsing University

國立中興大學
National Chung Hsing University

中山醫學大學
Chung Shan Medical University

Promotion Center

國立臺灣大學（醫）
National Taiwan University

國立臺灣大學（農）
National Taiwan University

國立臺灣海洋大學
National Taiwan Ocean University

國立中興大學
National Chung Hsing University

國立成功大學
National Cheng Kung University

高雄醫學大學
Kaohsiung Medical University

Taipei

Taichung

Taiwan

Tainan

Kaohsiung

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第一屆 高齡健康產業博覽會
Healthy Ageing Tech Show

To Establish Taiwan Ecosystem for Elderly Health

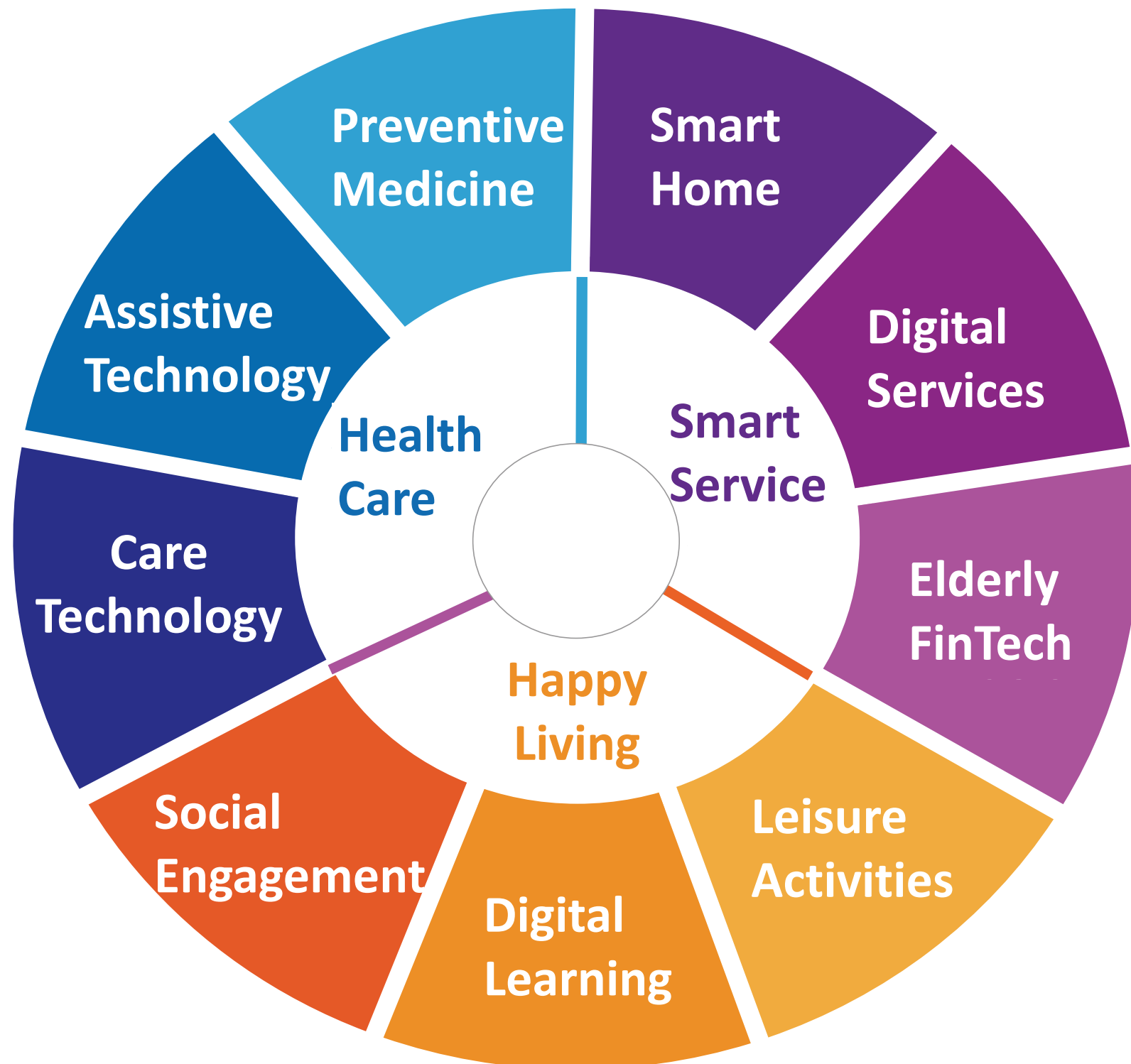**To Integrate Smart Services, Healthcare, and Happy Living for Seniors!**

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第一屆
高齡健康 產業博覽會
Healthy Ageing Tech Show

Exhibition Dates: Aug. 2 (Fri) - Aug. 4 (Sun), 2024
Venue: Taipei World Trade Center Exhibition Hall 1
Exhibition Scale: 800 booths Exhibition

Themes: 3 major themes, 9 major fields

Preventive Medicine
Smart Home
Assistive Technology
Digital Services
Health Care
Smart Service
Care Technology
Elderly FinTech
Happy Living
Social Engagement
Digital Learning
Leisure Activities

Smart Service:

Integrating elderly & friendly designs, digital services, and smart technology, to create a demonstration site for a tech-enhanced elderly lifestyle. Accelerating the widespread adoption of gerontechnology products and services, ensuring peace of mind, health, and convenience in elderly living!

Healthcare:

From health management to assistive and caregiving technologies, linking cloud-based big data and mobile communication tools to promote healthy aging without the need for long-term care! Utilizing technology to enhance caregiving efficiency and outcomes, reducing the burden of care!

Happy Living:

Gathering digital resources, technological learning, and social interaction tools tailored for the elderly, enhancing their skills in using digital technology and strengthen their social connections.

Healthcare+ EXPO · TAIWAN 2024.12.05-12.08

◆ Tech x Medicine: Expo Highlights in Medtech, Biotech and Healthtech

The Expo stands out among exhibitions of its type, fostering accelerated collaborations between the Medtech, Biotech, and Healthtech sectors. It provides a platform for showcasing cutting-edge technologies and solutions, sparking innovation, and fostering partnerships in healthcare.

Medtech
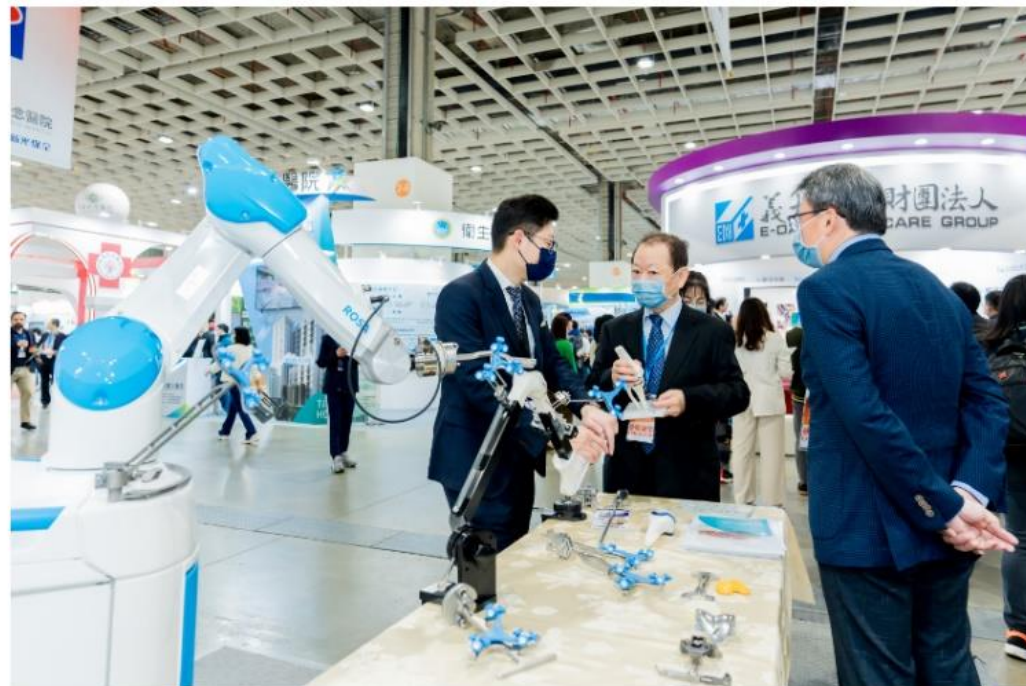
The Expo features upstream-to-downstream supply chains, showcasing innovative technologies, products, and services for therapeutics and patient care.

-Smart Hospital Solutions
-Medical Devices & Equipment
-Digital Health Technologies

Biotech

The Expo showcases supply chains from upstream to downstream, emphasizing diagnostics, labs, and services for screening, prevention, and treatment.

-Diagnostics, Laboratory
-Equipment & Services
-Biopharmaceutical Products & Services
-Regenerative Medicine Products & Services

Healthtech

The Expo presents consumer health products for people in various health states, aiding in immune health, managing risks, and promoting a healthy lifestyle.

-Preventive Medicine
-Consumer Health
-Long-term Care & Assistive Technology

Branding Taiwan

Thank you for your attention