NARLabs

2020
Annual Report

國家實驗研究院
National Applied Research Laboratories

NARLabs

2020
Annual Report

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MESSAGE FROM THE CHAIRPERSON

董事長的話

國家實驗研究院自 2003 年成立迄今，已進入第 18 個年頭，各中心皆穩健發展。在 2020 年正式對國際公開福爾摩沙衛星七號的觀測資料，提高了全球天氣預報準確度；另外與成功大學合作的半導體中心臺南基地，以及與臺灣大學合作的國震中心增建大樓，也都順利完工啟用，前者對於南部地區半導體、奈米材料及生技醫材的科技研發及人才培育有極大幫助，後者則可為國內提供智慧化的地震減災策略，為推動耐震永續家園奠定基礎。這些以及其他許多亮眼成果，在在顯示國研院對於國內科技發展的重要性。

臺灣 2030 年的願景是創新、包容、永續，我們預期全球未來透過 AI、5G 及物聯網等創新科技的驅動，將改變整體生產、消費、生活模式，因此需要透過「創新」的概念與模式等來達成，並形塑一個互相「包容」及循環「永續」的社會。國研院「創新科技，守護台灣」的營運目標，且以支援學術研究強化原創性研究到下游的產業，將可成為臺灣達成 2030 願景的推手之一。

例如國網中心維運的超級電腦，應用範圍極廣，我們有責任把基礎建設做好，讓各方的新頭腦都願意來運用，才能讓臺灣發光發熱。另外一項重要工作是建好先進網路系統，讓國際大公司都來連網，如此才能為即將來臨的人與萬物聯網的社會，建立蓬勃的生態系，因應未來十年可能產生的重大變化。其他如海洋中心發展的水下技術，對四面臨海的臺灣相當重要，尤其可應用於正在全力發展的離岸風電；動物中心會加強研發民間無法做到的基因改造鼠，成為國內生醫產業、精準醫療的幕後推手；國震中心持續精進抗震、減震、耐震技術，儀科中心以奈米、光機電等先進儀器科技支援前瞻學術研究，半導體中心更是臺灣的重中之重，要串聯上中下游，做好人才培育，讓產業界可以順利接手下一棒。

科政中心要為國家科技發展布局，從社會、科技、經濟、環境、政治等不同角度切入，找到最適合臺灣的位置，前瞻未來 10~20 年在臺灣可以落實執行的科技政策；太空中心則應盡力協助國內太空產業發展，尤其和產學研各界合作開發高階系統，在下一個 10 年創造臺灣的機會。

新創產業是臺灣的未來，國研院將持續在此扮演重要的角色，除了盡力幫助學校教授研究的成果介接產業應用外，同時鼓勵新創業者來與國研院合作，共同促成新創產業生態系蓬勃發展。

盡力做好上述這些工作，擔任好學研界的堅強後盾，就是國研院的價值所在，也是國研院能提供給臺灣社會最好的貢獻！

董事長 吳政忠

Established in 2003, NARLabs has entered into its 18th year of existence. Each of its research centers has been growing and developing steadily over the years. 2020 is a year of significance for NARLabs. In 2020, our FORMOSAT-7 satellites began sharing observational data with the world to help improve the accuracy of global weather forecasts. It is also a year when both the Tainan Base of the Taiwan Semiconductor Research Institute (TSRI) and the Taiwan Center for Research on Earthquake Engineering (NCREE)'s new complex opened its doors to the public.

The TSRI Tainan Base was a joint initiative with National Cheng Kung University (NCKU) that could greatly contribute to the developments of scientific research and talents in the fields of semiconductors, nanomaterials, and biotech medical materials in Southern Taiwan. The NCREE's new research building was completed in collaboration with National Taiwan University (NTU). The new complex could provide smart strategy for earthquake mitigation that could help build more sustainable and resistant homes. These examples, once again demonstrate that NARLabs play a crucial role in Taiwan's scientific and technological development.

Taiwan's Vision 2030 embodies the spirit of innovation, inclusion, and sustainability. We anticipate that technologies such as AI, 5G, and IoT will be the driving forces of the world in the future. They will revolutionize the way we produce, consume, and organize our lives. To achieve this, we not only need the help of "innovative" concepts and models. At the same time, we also need to create an "inclusive" and "sustainable" society to enable this vision. NARLabs operates with a mission to "Safeguard Taiwan with Innovative Technologies". We are committed to supporting academic research by strengthening novel research to industrial application, and become a driving force for Taiwan to realize Vision 2030.

To name one example, the supercomputers maintained by the National Center for High-performance Computing (NCHC) has wide range of applications. We have an obligation to provide a well-developed infrastructure to attract brilliant minds to join us in order to put Taiwan on the spotlight. Another important task is to build an advanced internet system to provide easy access and connectivity for large multinational corporations. So that we can better prepare ourselves for the IoT generation, and create a vibrant and agile ecosystem to face the changes in the next decade.

Other examples of pivotal researches undertaken by NarLabs include the underwater technology

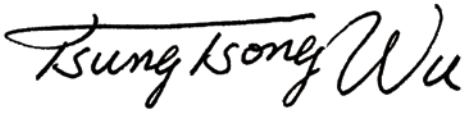
developed by the Taiwan Ocean Research Institute (TORI). The research is especially to an island like Taiwan, as it also plays an important role in the current development of offshore wind energy. Moreover, the National Laboratory Animal Center (NLAC) will continue its research on genetically modified mice to provide for the domestic biomedical and precision medicine industries. NCREE will also carry on its efforts in further developing the technologies on seismic control to improve building resistance. Meanwhile, the Taiwan Instrument Research Institute (TIRI) will also continue to support advanced and pioneering researches with its state-of-the-art Opto-electro-mechanical system and micro/nanostructure service platform. More importantly, TSRI also shoulders a paramount task to integrate the innovation chain and talent cultivation for the semiconductor industry in Taiwan. So that the baton can be passed on to the next generations to come.

From a more holistic perspective, the Science and Technology Policy Research and Information Center (STPI) is tasked to set out the agenda for Taiwan's national science and technology roadmap. It has to find out the best position for Taiwan in the next 10 to 20 years through examining the greater societal, technological, economic, environmental, and political climate. Not least of all, the National Space Organization (NSPO) strives to develop Taiwan's aerospace industry, especially on collaborating with the industry and academia to develop advanced systems. Overall, to create more opportunities for Taiwan in the next decade.

Startups are the future of Taiwan. NARLabs will continue to play an important role in supporting startups. Not only did we help academic researchers commercialize their researches, but we also encourage entrepreneurs to work with NARLabs so that we could co-create a blooming startup ecosystem in Taiwan.

Devoting ourselves to the good work mentioned above is where our value lies. Being the best advocate and strongest support for the science and technology community will continue to be the best way for us to contribute to the Taiwanese society.

Chairperson



MESSAGE FROM THE PRESIDENT

院長的話

國家實驗研究院是科技部轄下的財團法人，未來將持續積極配合國家科技政策，包括蔡英文總統提出的「六大核心戰略產業」，以及科技部吳政忠部長提出的「台灣 2030 科技願景六大加強發展主軸」，積極整合國研院各中心的研發能量，支援學術研究，推動前瞻科技。

國研院各中心都擁有非常強大的研發能量，過去幾年已有一些不錯的合作研究的成果產生，期望未來能進一步整合，來發揮更大的綜效。以智慧機械為例，智慧機械要靠感測器與外界溝通，這是半導體中心的專長；要能連接物聯網，要靠國網中心；再由儀科中心把感測器和物聯網組裝起來，這樣各中心合作，才能真正建構有效的智慧機械。

我們在自主科技的發展方面也有很大的進展，例如海洋中心正自主研製小型 ROV，成本低又可客製化，可成為國內發展離岸風電重要的海底探勘設備。又如太空中心已可自行製

作衛星本體、光學遙測酬載、影像處理系統及衛星操控系統，以後的衛星計畫都將盡量自行研發或採用國內廠商製作的零組件，透過密集的衛星發射，驗證國內太空零組件的可靠度，協助臺灣廠商打入國際衛星產業鏈。

其他如國網中心去年在 COVID-19 疫情爆發後，推出「御守臺灣・科技抗疫」專案，結合許多國際大廠，提供臺灣 AI 雲的高速運算能力供國內學研單位進行 COVID-19 相關藥物研發；動物中心建置「雙向性血管造影系統」，協助臺大醫院新竹分院驗證心血管、腦血管及支氣管疾病的創新精準療法；半導體中心開發出「人工智慧系統晶片設計與驗證平台」，幫助學界加速開發 AI 系統晶片；儀科中心鏈結成功大學與台灣尖端先進生技醫藥股份有限公司，合作開發出全國首創的「牙周致病菌快篩套件」。這些都是國研院在擔任國內重要科研平台這一角色上，非常傑出的表現。

國研院的另一項重要工作是人才培育，過去已經為大學生或研究生開設過許多課程或訓練班，未來將進一步提供實習或參與研究計畫的機會，讓學生有機會學到非常實用的技術，將來進產業界就可以快速上手。同時也會配合科技部的規劃，加強推動向下扎根的科普工作，期能藉由科普活動激起小朋友對科學的興趣，導引他們進一步探索並追尋科學知識，進而成為國家未來重要的科技人才。

院長

Under the jurisdiction of the Ministry of Science and Technology (MOST), NARLabs will continue to play an active role in implementing national scientific and technological policies. Among these include President Tsai Ing-wen's "six core strategic industries", and the "Taiwan 2030 Science & Technology Vision" as proposed by MOST minister, Wu Tsung-Tsong. NARLabs will also continue to establish and maintain R&D platforms to support academic research and promote industrial technology.

Each of our centers is well equipped with strong R&D capabilities, and promising results from cooperative research have been produced in recent years. Further integration will be activated to achieve greater synergy. For example, the intelligent machinery system assembled by TIRI must incorporate the sensors provided by TSRI and be connected to IoT through NCHC. These centers will work hand in hand for smart machines to reach their true potential.

Great progress in the development of domestic technology has also been made, such as the Taiwan Ocean Research Center's self-designed small ROV. Low-cost and customizable, the ROV can become an important seabed exploration tool for the development of offshore wind power in Taiwan. Another example is the NSPO which has developed its own capabilities in the production of satellites, optical telemetry payloads, image processing systems, and satellite control systems. Future satellite projects will continue to use components developed by NSPO or made by domestic manufacturers. The reliability of these domestic space components will be verified through the frequent launching of satellites to assist Taiwanese manufacturers to enter international satellite industry chains.

Other achievements of NARLabs include a cooperative project to combat the ongoing COVID-19 pandemic since last year, "Protecting Taiwan - Anti-Pandemic Technology", in which Taiwan Computing Cloud's (TWCC) high-speed computing capabilities of NCHC was provided for domestic academic and research institutions in conducting COVID-19 related drug research and

development. The National Laboratory Animal Center has built a bi-directional angiography imaging system to assist the National Taiwan University Hospital Hsin-Chu Branch in verifying innovative and precise treatments for cardiovascular, cerebrovascular and bronchial diseases. Meanwhile, TSRI has developed an AI chip design and verification platform to help the academic community accelerate the development of AI system chips, and TIRI joined both National Cheng Kung University and Taiwan Advance Bio-pharmaceutical Inc. to develop the nation's first rapid screening kit for detecting periodontal pathogens. Such exceptional results reflect NARLabs' crucial role as an essential national research platform.

Another important task of NARLabs is to cultivate talent and many courses and training programs have already been opened for both graduate and undergraduate students. In the future, further internships and research projects will be provided, so that students have the opportunity to learn much needed practical skills, thereby getting a head start when entering the industry. At the same time, we will cooperate with the plans set out by MOST to strengthen the promotion of scientific work, in the hopes to arouse children's interest in the field through science-based activities. These efforts will guide them to further explore and pursue scientific knowledge, eventually becoming an essential talent in our nation's industry.

President

年度亮點
Highlights

02

台灣半導體研究中心臺南基地揭牌啟用

為厚植南部地區學術研發能量，協助產業技術發展，培育半導體、奈米材料及生技醫材等領域所需之高階人才，國研院與成功大學結合雙方優勢，攜手打造「國研院台灣半導體研究中心臺南基地」，於 2020 年 12 月 17 日正式揭牌啟用。

Opening Ceremony of TSRI Tainan Base

The TSRI Tainan Base is officially open on December 17, 2020—as a joint effort between the National Applied Research Laboratories and National Cheng Kung University—to deepen local academic research capacity, assist industrial development, and cultivate high-level human resources in semiconductors, nanomaterials, and biotech and medical materials in southern Taiwan.

◀ 台灣半導體研究中心臺南基地揭牌儀式
Opening ceremony of TSRI Tainan Base

▲ 台灣半導體研究中心臺南基地空拍圖
Aerial view of TSRI Tainan Base

國震中心增建大樓啟用

國震中心增建大樓於 2020 年 11 月 9 日正式啟用，透過制震技術、地震速報及智慧聯網科技，打造「耐震智慧建築」，即時監控建築結構與關鍵設施於震時的反應，提供智慧化的地震減災策略，為推動耐震永續家園奠下基礎。

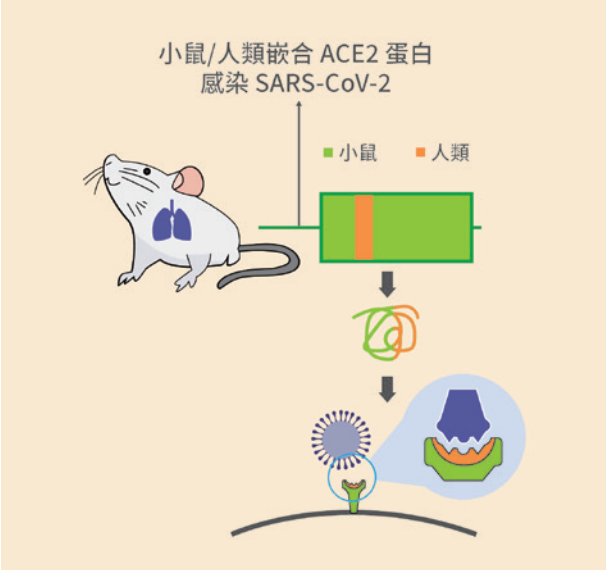
NCREE Extension Building Inaugurated

Inaugurated on November 9, 2020, the extension building of NCREE is a smart earthquake-resistant structure that integrates seismic retrofitting and earthquake resistance techniques, earthquake early warning systems, and Internet of Things (IoT) technology. These technologies enable real-time monitoring of the building and the seismic response of critical facilities and provide smart disaster reduction strategies. The building is envisioned to advance Taiwan towards becoming a sustainable and earthquake-resistant homeland.

▲ 增建後的國震中心大樓外觀
The extended NCREE building

支援生醫研發前線－COVID-19 疫苗開發

以基因編輯技術將人類 *ACE2* 基因的部分序列置換入小鼠中，產出 ACE2 擬人化小鼠後再攻以新冠病毒，嘗試建立感染 COVID-19 的擬人化小鼠動物模式，藉以加速生醫研究並協助疫苗及治療方法的開發。另啟動「實驗鼠方舟服務計畫」，運用輔助生殖技術幫助受疫情影響之動物設施，預防鼠資源斷種。



▲ 以基因編輯技術產出 ACE2 擬人化小鼠
Using gene editing technology to develop ACE2-humanized mouse

Assisting with Frontline Biomedical R&D of COVID-19 Vaccines

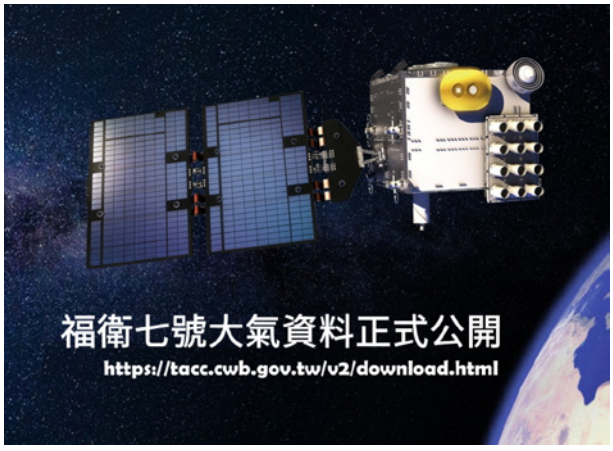
NLAC used genome editing technology to insert a portion of human *ACE2* receptor gene, which the COVID-19 virus binds to, into the mouse ACE2 gene to create humanized ACE2 mice. In turn, these mice can be used in relevant research and help with the development of therapeutics. The center also launched the Laboratory Mouse Noah's Ark Service Program to help animal facilities impacted by the pandemic in preventing the extinction of lab mouse species through assisted reproductive technologies.

福衛七號觀測資料公開

福衛七號於 2020 年 3 月 7 日正式對國際公開觀測資料。受 COVID-19 影響，疫情期間透過機載感應器所收集的大氣資料急遽減少，福衛七號適時地彌補此缺口。福衛七號發射至今已提供超過 2 百萬筆掩星觀測資料，包含美國、歐洲、加拿大等各大氣象作業中心都已證實資料能有效改進全球天氣預報準確度。

FORMOSAT-7/COSMIC-2 Observation Data Released

FORMOSAT-7 data was officially released to the world on March 7, 2020. While the amount of atmospheric data collected by airplane-based sensors shrank considerably during the COVID-19 pandemic, data from FORMOSAT-7 has come to the rescue in a timely manner. Since its launch, FORMOSAT-7 has provided over two million radio occultation data, which have been proven to increase the accuracy of global weather forecasts by major weather agencies in the US, Europe, Canada, and other locations.



▲ 福衛七號大氣掩星資料正式公開
FS7/C2 Neutral Atmospheric Data Release

STPI 科技政策研究與資訊中心

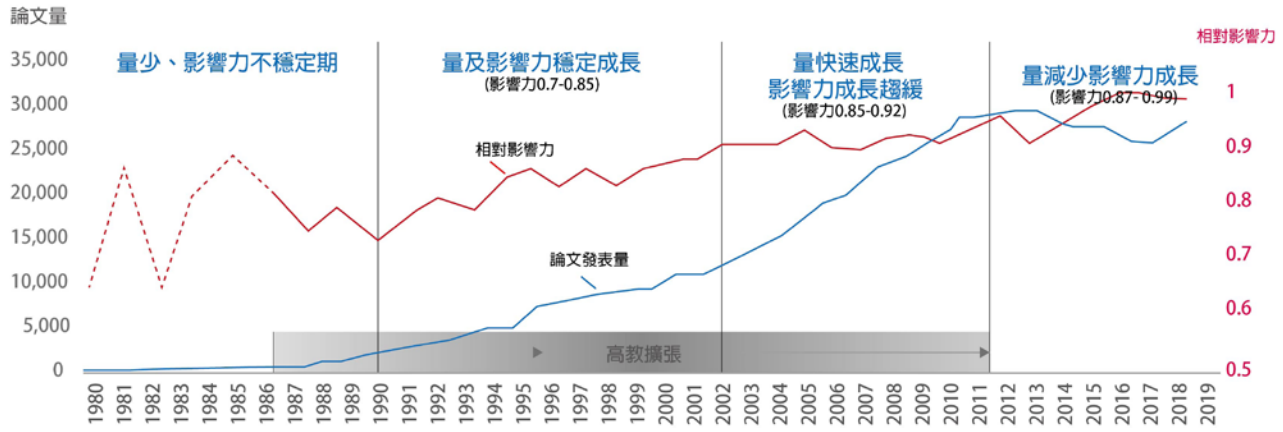
分析發現我國學術能量已轉型為重質不重量

科政中心長期觀測與分析我國學術競爭力發展，結果顯示自 1980 年至今，臺灣的論文發表情形歷經不同階段，發表量雖不如以往，但學術能量的展現已逐步轉型為重質不重量。此分析結果配合政府決策需求提供相關部門參考，期能有效協助臺灣科技決策體系專業化與健全化。

NCHC 國家高速網路與計算中心

AI 超級電腦引領臺灣 AI 發展

國網中心建置與開發臺灣 AI 雲（Taiwan Computing Cloud, TWCC），自 2019 年迄今以國家級軟硬體資源，累計服務產官學研逾 1,600 萬運算小時、上千件計畫，並支援逾 200 家企業與新創團隊使用，加速各應用領域之 AI 智慧應用發展，助其於世界舞台發光發熱。



▲ 臺灣論文發表量、相對影響力長期趨勢圖
Long-term trends between yearly Taiwanese studies published and their comparative impact

Study Shows Taiwan's Strength in Science & Tech Lies in its Quality, Not Quantity

STPI is dedicated to observing and accessing Taiwan's academic performance. According to their study, Taiwan's academic publishing has gone through different phases since 1980. Although publishing saw a decline in quantity, the study found that there has been a gradual shift from quantity to quality when accessing a country's research capacity. This study can serve as a reference for government policy-making sectors to develop a more professional and comprehensive system for science and technology policies in Taiwan.

AI Supercomputers Paving the Way for AI Development

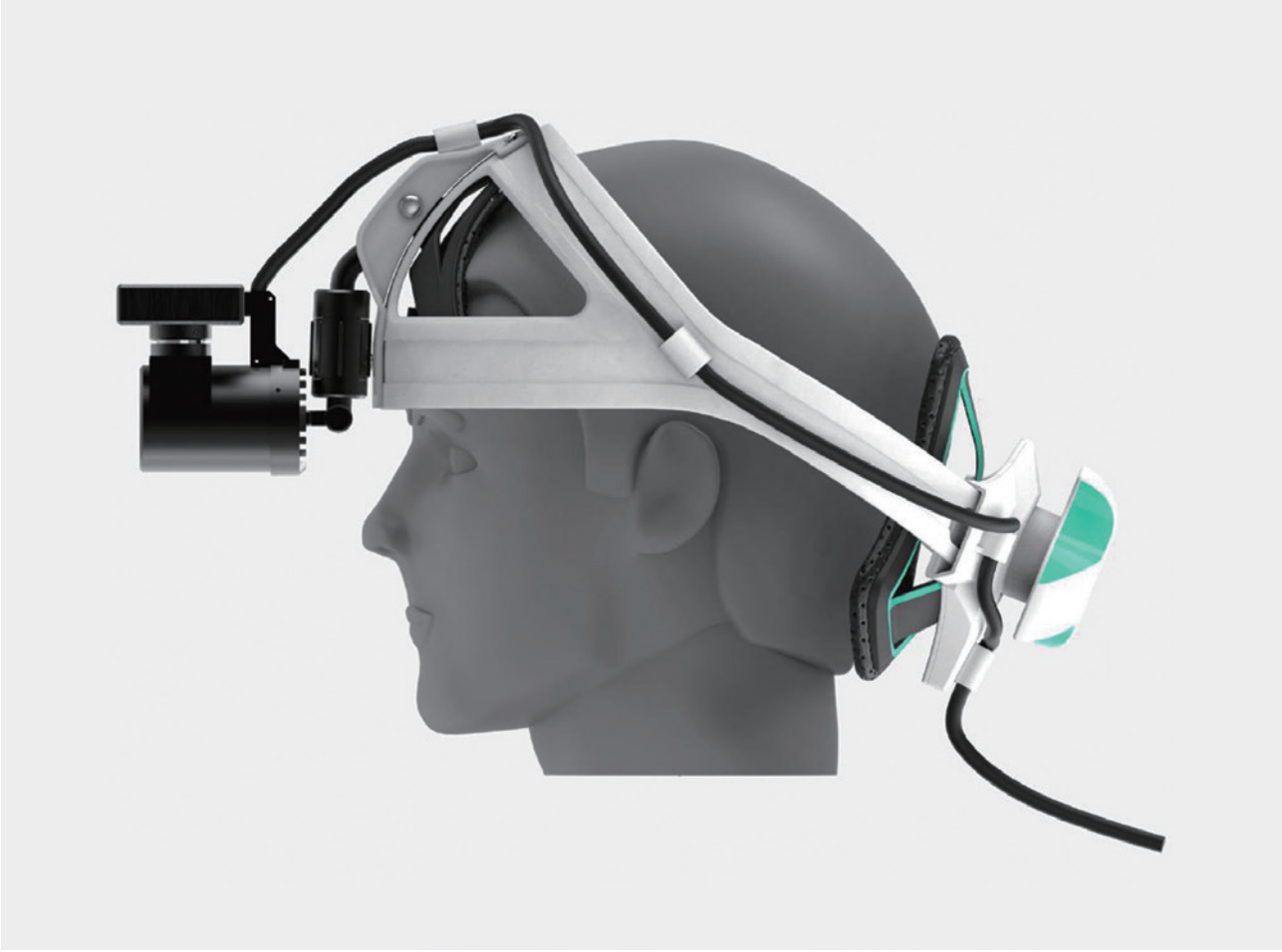
Since 2019, Taiwan Computing Cloud (TWCC), developed and constructed by NCHC, has served over 16 million hours in processor time across a thousand projects for industry, government, academia, and the research community with national-level hardware and software resources. During the same period, TWCC has provided support to over 200 enterprises and business startups, helping them to succeed on the world stage through accelerated AI development in various application domains.

外科醫師縫合心臟細小血管的最佳幫手

儀科中心與臺灣大學陳益祥醫師團隊共同研製臨床醫療設備－同軸手術頭燈，創新系統設計頭燈光源與光學成像鏡組同軸，解決長久以來外科醫師觀察視野與光照區域之影像無法一致的問題，獲頒第 17 屆國家新創獎－臨床新創獎。

Surgeons' Best Aid in Cardiac Microvascular Suturing

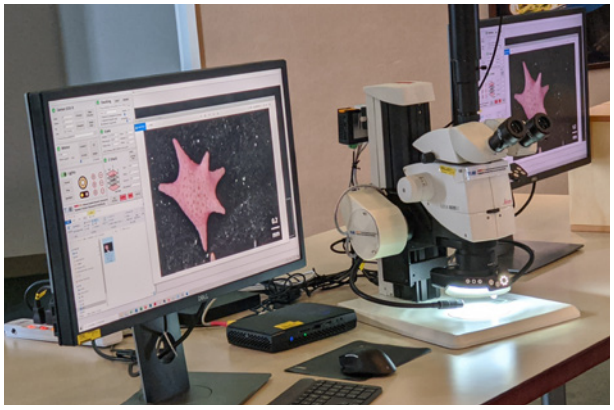
The misalignment between headlight-illuminated areas and the surgeon's vision has been an enduring challenge to the surgical field. To solve the problem, TIRI has joined hands with Dr. Yih-Shurng Chen's team based in National Taiwan University Hospital to develop the LED coaxial headlight, an innovative clinical instrument. This system aligns the light beam of the headlight with the optical imaging lens, a groundbreaking success which has been honored with the 17th National Innovation Award in the Clinical Research Category.



▲ 儀科中心與臺大團隊研製同軸手術頭燈
The medical LED coaxial headlight video recording system developed by TIRI and the NTU team

海洋中心與科博館跨域攜手科研合作

海洋中心與科博館簽署合作備忘錄，結合雙方資源，提供便利學研界之服務：雙方合作於科博館設置海洋中心開發的自動顯微拍照系統（簡稱TORI FOCUS），可以自動拍攝及套疊不同焦距的圖像，組合成一張高景深的清晰照片，大幅減少五成操作時間及三成拍攝失誤。



TORI Joins NMNS in Promoting Scientific Research

Aiming at better resource use and the provision of convenient services to academia and research institutions, TORI and National Museum of Natural Science (NMNS) signed a memorandum of understanding that brings TORI FOCUS, a focus-stacking automatic micrograph system developed by TORI, to NMNS. Based on automatic image taking and image overlay techniques, the system allows the combination of images taken at varying focal points, which results in an image with a greater depth of field, thereby reducing the time of taking micrographs by 50% and the number of errors by 30%.

◀ 海洋中心開發之焦點疊合自動顯微拍照系統（TORI FOCUS）
TORI' s Focus Stacking Automatic Microphotograph System (TORI FOCUS)

臺灣智駕測試實驗室持續精進測試技術與服務項目

科技部委由國研院打造先進智慧交通系統實驗運行試驗場域，成立臺灣首座技術實證樞紐中心「臺灣智駕測試實驗室」（Taiwan CAR Lab），除了成為自駕車整車與零組件系統開發測試與展示場域，並持續建置自駕車相關研發服務平台，精進測試技術與服務項目。2020 年 12 月 28 日舉辦成立兩年以來的成果發表會，邀請財團法人車輛研究測試中心與國網中心等合作夥伴一同說明測試服務流程 2.0 版、影像自動判釋技術與虛擬模擬研發服務平台，期能促進臺灣自駕車技術發展進步。

▶ QRcode：臺灣智駕測試實驗室簡介影片
The introductory video for Taiwan CAR Lab

Taiwan CAR Lab Further Improves Test Accuracy and Services

The Taiwan CAR (Connected, Autonomous, Road-test) Lab is Taiwan's first autonomous vehicle test facility and technology demonstration hub established by NARLabs as comissioned by the Ministry of Science and Technology (MOST). The Taiwan CAR Lab provides a field for the testing and demonstration of autonomous vehicle integration and system component development. It also continues to upgrade available testing technology and services by developing research and development (R&D) service platforms.

研發與服務成果
R&D and Service Accomplishments

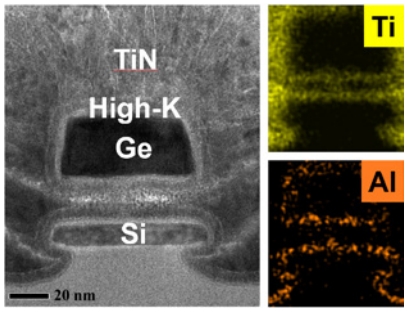
03

下世代半導體製程技術

下世代新型元件結構「閘極全包覆式奈米片結構」(GAA Nano-sheet)可提升元件的閘極控制能力，互補式電晶體(CFET)不僅為 GAA 結構，且可縮小元件所占面積，但其極為複雜的磊晶製程，提升了製作的困難性。因此，半導體中心與日本 AIST 共同開發出「低溫晶片鍵結整合技術」，可將不同材料的基板，直接對貼鍵結成一個基板，可直接應用於 CFET 元件製作。所製作出的雙層奈米片堆疊結構，下層為矽的 N 型元件，上層為鍺的 P 型元件，且在未來可製作出超過三層、或與其他異質材料整合的元件。

Next-Generation Semiconductor Process Technology

The next-generation transistor structure, "GAA Nano-Sheet," can improve the gate controllability of the device. Complementary Field-Effect Transistor (CFET) is not only GAA structure but also can reduce the devices' footprint, but the epitaxial process makes it difficult to manufacture CFET. Therefore, TSRI and AIST Japan have jointly developed the "low-temperature wafer bonding technology," which can directly bond substrates of different materials into one substrate, and then be directly applied for the CFET fabrication. The two-layer nano-sheer stacked structure has Si NFET on the lower layer and Ge PFET on the upper layer. In the future, more than three layers or devices integrated with heterogeneous materials can be fabricated.



▲ Ge/Si 異質互補式電晶體
Ge/Si Complementary Field-Effect Transistor

與 Arm 簽訂 AI 運算矽智財學研專案

半導體中心與 Arm 在 2020 年 11 月簽訂「AI 運算矽智財學研專案」(AFA 學研版)，此專案是 Arm 為臺灣學界客製化打造，內容相較標準 AFA 專案多了最新的類神經網路處理器(NPU)矽智財。半導體中心是全球第一個與 Arm 簽此專案合約的法人機構，將可加速臺灣學界 AI 晶片研發速度，並降低學研新創門檻。

▲ 國研院與 Arm 簽訂 AI 運算矽智財學研專案
NARLabs and Arm sign Arm Flexible Access Research program

TSRI First in Asia to Join Arm Flexible Access for Research Program

In November 2020, TSRI signed a contract with Arm, the world's leading semiconductor IP company, to join the company's Arm Flexible Access (AFA) for Research program, which is tailor-made for the academic community in Taiwan. This program offers the latest neural-network processing unit (NPU) in addition to what the Arm's standard AFA offers. TSRI is the first nonprofit research institute in the world to have signed this deal with Arm, and benefits to the academic community in Taiwan will include much faster development of AI chips and lower barriers for researchers to innovate.

全國首創牙周病 6 分鐘檢測利器

透過儀科中心法人加值服務，輔導成功大學團隊製作出牙周致病菌快篩試片，並鏈結臺灣尖端先進生技醫藥股份有限公司，合作開發出全國首創的「牙周致病菌快篩套件」。該快篩套件可以讓受測者在就診過程中不會感到不適，且於診間 6 分鐘內就可以快速完成檢查。由於檢測效果良好，成功媒合尖端醫與成功大學簽下 880 萬元技轉合約。

6-minute Rapid Periodontal Disease Bacteria Test Kit

Through providing value-added services, TIRI has assisted the research team of National Cheng Kung University (NCKU) in developing a rapid test kit for periodontal disease diagnoses, while also bridging them with Taiwan Advance Bio-Pharmaceutical Inc. (TABP) to create the first-ever Periodontal Pathogens Rapid Test Kit in Taiwan. Using the rapid test kit, the test process can be completed within 6 minutes in the clinic and is free of any discomfort. Thanks to the accurate test results and TIRI's matching efforts, TABP signed an NT$ 8.8 million technology transfer agreement with NCKU.

▲ 儀科中心輔導成大團隊，合作開發「牙周致病菌快篩套件」並進行技轉
TIRI assists NCKU in developing a rapid test kit for periodontal pathogens and in signing a tech transfer agreement

世界首創「太陽能板產線智慧即時回饋檢測設備」

儀科中心與學研界長期深耕智能光學量檢測系統，並擴散學研成果至光電產業，協助上銀集團生產之太陽能板良率提高至 99.2%，遠高於 75~80% 的全球平均值，且檢測時間從 30 分鐘縮短到 1 分鐘，大幅提升生產效能和品質。

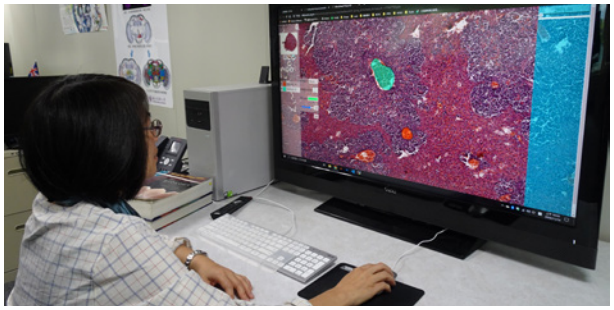
▲ 儀科中心研發「太陽能板產線智慧即時回饋檢測設備」
TIRI develops "Smart Inspection Equipment with Real-time Feedback for Solar Panel Production Lines"

World's First "Smart Inspection Equipment with Real-time Feedback for Solar Panel Production Lines"

TIRI has been devotedly working with the academia and research community in developing smart optical measurement and inspection systems. This time, their research achievements are applied in the optoelectronics industry to improve solar panel production efficiency and quality. Using this system, HIWIN Technologies is able to increase its solar panel production yield rate to 99.2%, which is much higher than the global average of 75%-80%. The inspection time is also shortened from 30 minutes to just 1 minute, representing major improvements to the overall efficiency and quality of inspection.

基因體分析平台助中研院開闢癌症研究道路

國網中心以基因體分析平台之計算與儲存資源，助中研院化學所陳玉如所長帶領之臺灣癌症登月計畫團隊，處理分析巨量次世代基因體定序與蛋白質體質譜資料，結合臨床與資料科學方法，探討肺腺癌成因，發現早期階段的分子結構和腫瘤進展標記，其成果發表於生化及分子生物學領域頂尖的「細胞」(Cell) 期刊，並於該論文中致謝國網中心的協助。



▲ 國網中心基因體分析平台
NCHC’ s genome analysis platform

NCHC’s Genome Analysis Platform Helps Academia Sinica Break New Ground in Cancer Research

Leveraging the computing and storage resources of the genome analysis platform established by the NCHC, Taiwan’s National Cancer Moonshot team led by Professor Chen Yu-Ju of the Institute of Chemistry of Academia Sinica was able to process the massive-scale data of next-generation sequencing (NGS) and mass spectrometry (MS)-based proteomics. By integrating methodologies of clinical and data science, the team has successfully discovered the causes of lung adenocarcinoma along with its early-stage molecular structure and tumor progression markers. The team published their findings in Cell, a top journal in the fields of biochemistry and molecular biology, and credited NCHC for the contribution in their paper.

一站式資料整合服務—DAS 分析大師

國網中心推出新服務 DAS 分析大師，是集資料收集、治理、清理、分析、模型部署與監控管理等功能之一站式環境，亦可整合內外部人員協作，並串接臺灣 AI 雲高效能運算分析，發揮資料整合效率與價值。自 2020 年 8 月開放試用後，已逾 20 家企業與政府單位申請使用，如高雄榮總、台電公司等積極導入 DAS 進行智慧醫療、智慧城市等場域之應用，加速智慧化轉型進程。

TWCC’s DAS Offers One-stop Data Integration Services

NCHC has launched its new Data Analysis Service (DAS). This one-stop platform integrates data collection, management, cleaning, analysis, model deployment, and monitoring. More than 20 enterprises and government entities have joined the service since it was first made available on a trial basis in August 2020. Among these early adopters are Kaohsiung Veterans General Hospital and Taiwan Power Company, which have actively deployed DAS in a number of application areas, including smart healthcare and smart cities. DAS users are expected to progress faster in their transformation with intelligent technology.

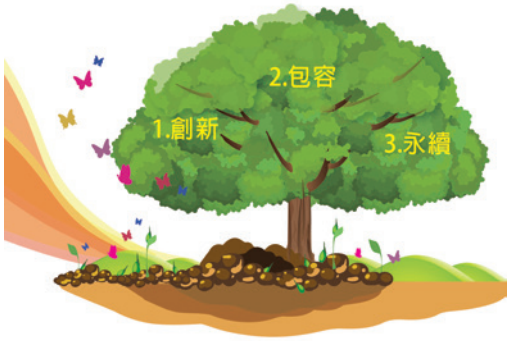
▲ 國網中心 DAS 分析大師提供一站式服務
NCHC's DAS (Data Analysis Services) provides one-stop services

跨智庫合作協助政府擘劃臺灣 2030 科技願景

為因應臺灣未來發展挑戰並提前布局，科政中心與工研院、資策會、台經院、商研院等政策智庫及來自各部會與學研界的社會、經濟、環境等各領域專家合作，採多層多軌之意見徵集及討論交流機制，提出臺灣 2030 科技願景為「創新、包容、永續」，以實現樂活社會、高值經濟、強韌環境、創新教育、普惠科技等五大目標，使臺灣成為人人稱羨的幸福國家・智慧島嶼。

Inter-Think Tank Cooperation Helps Set Taiwan 2030 Science and Technology Vision

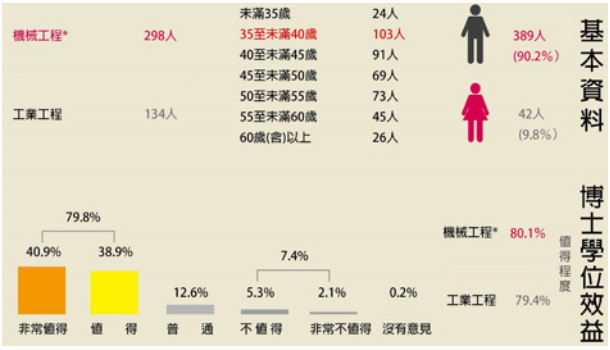
To help the government plan ahead for Taiwan's development in response to future challenges, STPI has gathered information from and exchanged thoughts with the Industrial Technology Research Institute, the Institute for Information Industry, the Taiwan Institute of Economic Research, the Commerce Development Research Institute, and other policy think tanks on a multi-level basis. The group set the Taiwan 2030 science and technology vision of "innovation, inclusiveness, and sustainability" along with the five goals of "LOHAS society, high-value economy, resilient environment, innovative education, and inclusive technology," hoping to transform Taiwan into an admirably prosperous and smart island nation.



▲ 科政中心參與跨智庫合作，勾勒出臺灣 2030 科技願景
STPI works with think tanks to help set the Taiwan 2030 Science and Technology Vision

深度剖析我國博士求學動機與學位效益

博士是國家尖端科技發展的主要角色，也是推動創新發展的關鍵。科政中心為深入了解博士求學動機與博士學位效益，針對我國近 17 年畢業的博士進行大規模調查。整體結果顯示，多數博士肯定學位效益，且博士學位可能越陳越香，畢業越久，越肯定其效益。



▲ 博士學位值不值得，以機械工程與工業工程領域為例
Are PhDs worth it? A look at the fields of Mechanical and Industrial Engineering

▶ QRcode : 完整報告下載
Scan to download report

Long-term Post PhD Career Tracking Uncovers Motivations and Benefits Behind Pursuing a Degree

Doctors play significant roles in leading state-of-the-art technologies and stimulating innovations in a country. In order to understand the motivation behind pursuing a PhD degree and the benefits of obtaining a PhD degree, STPI conducted a large-scale survey on the PhDs who graduated in the past 17 years. The overall results showed that most holders of a PhD recognized and appreciated the benefits of the degree. Moreover, the degree might become more and more valuable as time progresses. Those who graduated earlier tend to view their degrees more positively.

以擴增實境導引介入性肺導管切除病灶

動物中心與臺大醫院新竹分院合作，於全臺唯一實驗動物專用的心導管室，利用實驗豬大體及實驗兔測試「擴增實境導引介入性肺導管」之技術，實驗過程結合透視系統及 3D 影像工作站，搭配使用顯影染劑，利用各式導管精準定位肺部病灶，協助解決胸部電腦斷層篩檢、微創手術及傳統手術觸診在腫瘤發展初期皆無法定位的困境，有效切除病灶，縮小傷口及減少肺功能損失。

▲ 動物中心與實驗團隊進行豬大體胸腔鏡術前定位
NLAC and experiment teams undertake preoperative preparations of swine thoracoscopy

Augmented Fluoroscopy-Guided Lung Surgery

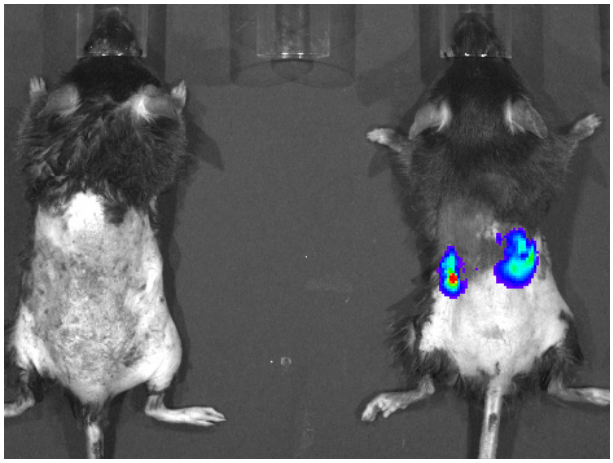
NLAC joined hands with National Taiwan University Hospital Hsin-Chu Branch to set up the fluoroscopy-guided lung surgery in lab swine or rabbit using the first cardiac catheterization platform for experimental animals in Taiwan. With a 3D image processing station, coupled with fluorescent dye and a bronchoscope guided by augmented fluoroscopy, a pulmonary tumor can be precisely located and resected. This provides solutions that had been unachievable by either thoracic computed tomography, minimally invasive surgery, or palpation of conventional surgery at the early stage of the tumor.

神農鼠腎毒篩檢平台

具備早期預測性、高專一性、高靈敏度之特色，以腎臟專一表達的酵素「肌醇加氧酶」（MIOX）為檢測指標，利用動物中心獨有的「大片段基因改造技術」，結合冷光酵素進行細胞標示，採更經濟、有效的分析方法，評估腎臟損傷程度。

Shennong Mouse Nephrotoxicity Screening Platform

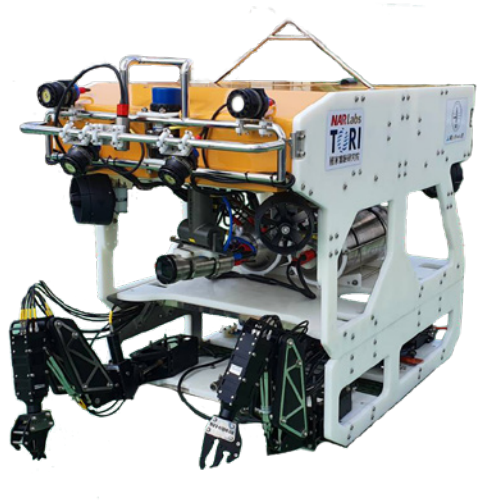
The platform features early predictability, high specificity, and high sensitivity technology that use myo-inositol oxygenase (MIOX), a kidney-specific enzyme, as the detection index. The exclusive large-segment genetic modification technology of the NLAC was used together with cell labeling with luminescence enzymes to assess kidney injury in a more economical and more effective manner.



▲ 以 3D 非侵入性活體影像系統拍攝正常小鼠 (左) 與神農鼠 (右)
Images of a normal mouse (left) and Shennong mouse (right) developed by the minimal, non-invasive 3D imaging system

工作級 ROV 輕量化

海洋中心與中山大學海下所合作研發輕型工作級水下探測載具（ROV），該 ROV 設計長度 1.58 公尺、寬度 1 公尺、高度 1.24 公尺，耐壓水深為 3,000 公尺，重量僅 560 公斤。框架式設計使此 ROV 可以擁有更多空間掛載感測器，主體結構的組裝採用內藏式垂頭螺絲，除了減少儀器組裝的損壞風險，更能使結構之間穩固結合，未來將提供學研界更多深海探測服務。



▲ 海洋中心與中山大學合作進行 ROV 輕量化設計
TORI and NSYSU jointly develop a light ROV design

Work Class ROV Goes Light

TORI cooperated with the Institute of Undersea Technology at National Sun Yat-sen University (NSYSU) in researching and developing a light work class ROV. The ROV measures 1.58 meters long, 1 meter wide, 1.24 meters tall, and can withstand the water pressure at 3,000 meters below sea level while only weighing 560 kilograms. Its frame design was equipped with more space to carry sensors. Also, the main structure of the ROV is assembled with a type of embedded hammerhead screws to reduce damage risk during assembly and to strengthen the structure. In the future, this ROV will be a powerful aid to academia and the research field in conducting more deepwater exploration.

海底電磁儀 OBEM

天然氣水合物資源、離岸風場以及洋流發電等新能源開發同屬國家政策主軸，海洋中心基於海底地震儀所累積的關鍵技術，結合學研界之實驗數據分析與驗證能量，與中研院地球所合作研發海底電磁儀（OBEM）。OBEM 耐壓水深為 6,000 公尺，能測量地下介質所產生之感應電磁場，可用以調查深海油氣田及天然氣水合物分布情形，在新能源的開發任務中扮演重要角色。

Ocean Bottom Electro-Magnetometer (OBEM)

Generating alternative energy using resources such as gas hydrates, offshore wind, and ocean current is a national policy concern. With this in mind, TORI joined forces with the Institute of Earth Sciences of Academia Sinica in developing an Ocean Bottom Electro-Magnetometer (OBEM) by leveraging crucial technologies used to develop ocean-bottom seismometers, and the capacity of the academia and research institutions to analyze and verify experiment data. The OBEM can withstand water pressure at a depth of 6,000 meters and can be used to measure the electromagnetic field generated by underground layers, thereby enabling the investigation on the distribution of deepwater oil and gas fields and of gas hydrate resources. The OBEM plays a vital role in developing new energy resources.

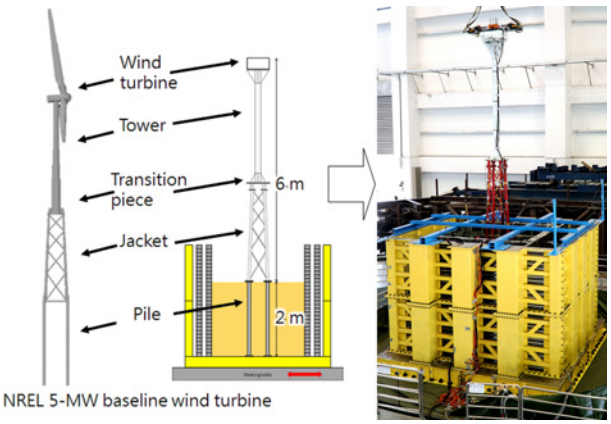
▲ 海洋中心與中研院合作研發之海底電磁儀
TORI and Academia Sinica develop the electro-magnetometer

離岸風機支撐結構與關鍵零組件測試平台

為打造臺灣離岸風機測試基地，國震中心於臺南實驗室設置土壤力學實驗室、水下基礎與地盤試驗平台、風機關鍵零組件測試系統等，建立離岸風機支撐結構與關鍵零組件測試平台，兼具大尺度模型實驗與數值模擬能力，提供全方位離岸風機研發能量，並持續與產官學研合作，推動實驗室認證並建立檢測驗證標準，期能成為國際級驗證單位。

Testing Platform for OWT Supporting Structures and Critical Parts

NCREE had constructed facilities for researching on offshore wind turbines (OWT), supporting structures and critical parts in its Tainan laboratory, including a soil dynamic laboratory, an underwater foundation and ground testing platform, and a critical parts testing platform. With both large-scale model testing capacity and numerical simulation abilities, NCREE provides omnibearing research and development capabilities of OWT, and cooperates with government, industries and universities. With the aim of establishing the world-class OWT verification agency, NCREE will keep promoting laboratory certification and establish testing and verification standards.



▲ 以縮尺風機與地盤模型模擬結構土壤互制效應
Simulating the effect of soil-structure interaction through model test

新一代臺灣地區關鍵設施地震危害評估

為了解臺灣地區既有關鍵設施之耐震性能，以進行耐震安全評估，國震中心受台電公司委託，邀請國內外地震、地質及地球科學專家，以嚴謹且公開的會議討論，重新檢視臺灣地區地震活動參數之合理性。歷經三年時間，在取得各專家共識後，完成高信度之地震危害輸入模型，進行臺灣地區關鍵設施之地震危害重新評估，作為耐震安全提升之依據。

▲ 國震中心舉辦地震危害再評估總結會議
NCREE holds the final meeting of the Taiwan SSHAC Level 3 Project

Next-Generation Seismic Hazard Assessment for Critical Facilities in Taiwan

In order to understand the earthquake resistance performance of existing critical facilities in Taiwan, Taiwan Power Company commissioned NCREE to invite domestic and international experts of seismology, geology, and earth science, to review seismic hazard parameters in Taiwan through rigorous discussion in public workshop. After three years of discussions, a consensus has been reached among the experts to establish a seismic hazard input model with high reliability, which reassesses seismic hazard for critical facilities in Taiwan and serves as the basis for further seismic safety enhancements.

立方衛星群已做好發射前準備

由太空中心主導，產學團隊設計製作的立方衛星群已完成所有測試與遞交，預計於 2021 年搭乘 SpaceX 公司的 Falcon-9 火箭發射。1.5U 玉山衛星的酬載為 AIS 船舶自動辨識系統接收器與 APRS 自動位置回報系統接收器，2U 堅果衛星的酬載為 ADS-B 飛機定位器，3U 飛鼠衛星的酬載為小型電離層探測儀 CIP。（玉山與飛鼠衛星已於 2021 年 1 月 24 日晚間 11 時順利升空，堅果衛星預計於年中發射。）

CubeSat Constellation Ready for Launch

All tests for the CubeSat constellation, designed and produced by an academic-industrial consortium under the auspices of NSPO, have now been completed. The assembly has also been handed over to SpaceX, which is scheduled to launch these satellites in 2021 on behalf of Taiwan with the company's Falcon-9 rocket. The payloads of the 1.5U type YUSAT are the Automatic Identification System (AIS) receiver and the Automatic Packet Reporting System (APRS) receiver. The payload for the 2U type NutSat is the Automatic Dependent Surveillance-Broadcast (ADS-B) receiver, and that for the 3U type IDEASSat (Ionospheric Dynamics Explorer and Attitude Subsystem Satellite) is the Compact Ionosphere Probe (CIP). (On January 24, 2021, at 11:00 pm, YUSAT and IDEASSat were successfully launched into the sky, while NutSat is expected to do so by mid-2021.)

▲ 立方衛星群
CubeSat constellation satellites

衛星操控系統自主發展成功

太空中心自 2009 年起，結合新鼎系統公司的資訊技術能量，共同發展衛星操控系統 XPSOC（Cross-Platform Satellite Operation Control）。100% 自製的 XPSOC 經過福衛七號衛星 1 年多的飛行操控驗證，如今已可完全取代外商公司所提供的系統，並成為未來衛星操控系統發展平台，可大幅減少開發時間，降低建置及維護費用。

▲ 太空中心衛星操控中心
NSPO Satellite Operations and Control Center

NSPO Completes Independent Development of Satellite Operations and Control System

NSPO has been collaborating with CTCI Advanced Systems Inc. since 2009, leveraging its partner's information technology capabilities, to develop the Cross-Platform Satellite Operation Control (XPSOC) system. The XPSOC, now produced entirely domestically, has been tested and verified by FORMOSAT-7 for nearly one year in flight control and operations, and it is all set to replace systems previously supplied by foreign manufacturers. Not only will XPSOC serve as the future development platform for satellite operations and control, but the development cycle, implementation costs, and maintenance expenses will be reduced considerably as well.

重點推動計畫
Development Plans

04

邁向第三期太空計畫第三年

2021 年為第三期國家太空科技發展長程計畫的第三年，獵風者衛星將可完成衛星系統與地面操控系統整合及測試，規劃於 2022 年發射，投入氣象資料觀測服務；福衛八號則將正式進入衛星整合測試階段。持續進行之計畫包括：超高解析度智能遙測衛星及合成孔徑雷達衛星之關鍵技術發展、外太空探索與科學創新。基礎能量整備計畫也同時執行，為太空育才及因應未來衛星任務需求做好充分準備。

Third Phase of National Space Technology Plan Entering Its Third Year

The year 2021 marks the third year of the third phase of the National Space Technology Development Long-term Plan, where TRITON will complete integration and testing of its satellite system and its ground operations and control system. Upon TRITON's successful launch into orbit, scheduled for 2022, it will begin the observation service for meteorological data. Moreover, FORMOSAT-8 will officially enter the satellite integration and testing phase. Other ongoing programs include the development of key technologies for ultra-high-resolution smart remote sensing satellites and synthetic aperture radar satellites. Also being undertaken are the deep space exploration and scientific innovation program, as well as the essential capacity preparation initiative. These programs are necessary to cultivate talent in space technology and to fully prepare the country for future satellite missions.

▲ 獵風者衛星 1：1 模型
A 1:1 model of the TRITON satellite

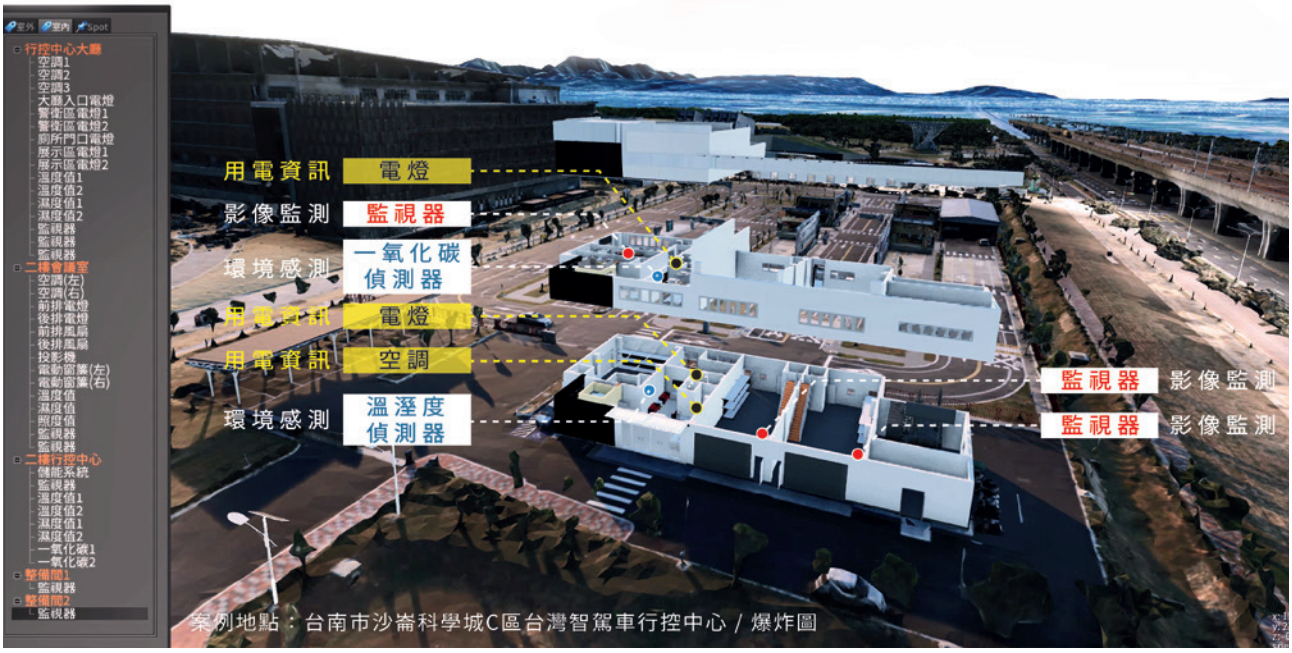
資安暨智慧科技研發大樓竣工

資安暨智慧科技研發大樓於 2020 年 5 月 14 日竣工，是資安暨智慧科技產業發展基地。該大樓以鑽石級智慧建築與鑽石級綠建築規格興建，每年可生產 94 萬度綠電、減少 480 噸 CO_2 排放，其社區能源管理系統（Community Energy Management System, CEMS）可進行大樓與智駕實驗室之間的綠電轉供。建置中的智慧環境維管系統，可整合區內建物及戶外的感測器於一平台，進行可視化智慧管理，以提高管理效能；各感測器資訊也將彙整運用於優化管理模式與相關研發。

The Cyber Security and Smart Technology R&D Building Completed

On May 14, 2020, the construction of the Cyber Security and Smart Technology R&D Building was completed, and it will serve as a base for developing research into smart technology and data safety. Built to the specifications of both the Diamond Class Intelligent Building and the Diamond Class Green Building, the new structure is capable of generating 940,000 kWh of green electricity while reducing 480 tons of CO_2 emissions annually. Moreover, the Community Energy Management System (CEMS) is designed to enable the transfer of green electricity between the building and the Taiwan CAR Lab. A smart maintenance management system for the environment, currently under construction, will provide a single platform for integrating data of sensors deployed outdoors and in buildings across the zone, with a smart interface that enables data visualization, thereby boosting management efficiency. Data collected from the sensors will also be used to improve management models as well as for research in related areas.

▲ 資安暨智慧科技研發大樓鳥瞰圖
The Cyber Security and Smart Technology R&D Building



▲ 智慧環境維管系統－智駕車行控中心各層資訊監測
Smart Environment Management System – multilayer display of smart car testing center

STPI 科技政策研究與資訊中心

新創整合系統平台

科政中心以理論結合實務見長，除新創生態系研究外，亦執行科技部創新創業激勵計畫、研發成果萌芽計畫、SPARK Taiwan 等，使實務經驗持續回饋政策研究。為擴大新創服務的範疇，刻正著手規劃新創整合系統平台，彙整我國多元類型的新創團隊、業師、創投等資訊，以完善我國科技創業生態圈。

Data Guides Taiwan's Transformative Innovation

By combining theory with practice, STPI not only works in startup ecosystems, but also executes the From IP to IPO Program (FITI), the MOST Germination Program, SPARK Taiwan and other projects of the Ministry of Science and Technology (MOST). Through its practical expertise, STPI continually provides feedback concerning government policy research, expanding types of innovative services it provides by setting up an integrated systems platform to consolidate data from Taiwan's diverse new venture teams, industry experts and venture capitalists, all of which results in the perfecting of the country's startup ecosystem in science and technology.

◀ 科政中心打造整合平台完備臺灣科技創業生態圈
STPI establishes integrated platform, perfecting Taiwan's start-up ecosystem

勵進研究船赴南太平洋執行科技部卓越領航計畫

中研院地球所為執行科技部卓越領航研究計畫，擬於 2021 年與日本東京大學合作，使用勵進研究船進行國際探測航次，預計停泊馬紹爾群島共和國首都馬久羅，於其經濟海域與美屬威克島（Wake Island）經濟海域佈放國人自製之海底地震儀與海底電磁儀，並進行生態、水文資料收集及調查。回程預計停泊帛琉港補給與人員替換，並沿途進行資料收集及調查。（本計畫囿於 COVID-19 疫情，擬延後至 2022 年執行）

R/V LEGEND to Sail to South Pacific on Science Vanguard Research Program

The Institute of Earth Sciences, Academia Sinica will be collaborating with the University of Tokyo in 2021 on a research project funded by the ministry's Science Vanguard Research Program. The project will involve international exploratory missions conducted by the R/V LEGEND. The planned voyage will include a mission to deploy ocean-bottom seismometers and electro-magnetometers, which are independently developed in Taiwan, in the exclusive economic zones of Majuro, the capital of the Republic of the Marshall Islands and around Wake Island (U.S. territory). The vessel will also conduct surveys and collect ecological and hydrological data. The return voyage is expected to include a stop at Palau for resupply and crew replacement, as well as data collection and surveys en route. Due to the COVID-19 pandemic, this project will be carried out in 2022.

▲ 海洋中心之勵進研究船
Legend: TORI' s research vessel

自駕車虛擬模擬研發服務平台

科技部委由國研院營運之臺灣智駕測試實驗室、半導體中心與國網中心共同合作，結合商用車輛模擬軟體與國內學研成果，完成虛擬模擬研發服務平台，將於 2021 年開始提供服務。於國網中心 TWCC 平台上建置的模擬環境中，導入了汽機車混流模組，並加入臺灣特有號誌、機車 3D 模型與國內常見交通意外樣態，供廠商進行各種測試，除可與實測場域進行交互參照，亦可藉由虛擬系統提供比實測場域更豐富之測試情境，降低國內產學界於技術開發初期之門檻。亦將陸續開辦相關人才培訓與實作課程，吸引國內青年科學家與傳統車輛零組件業者聚焦，在臺南沙崙形成自駕車研發聚落。

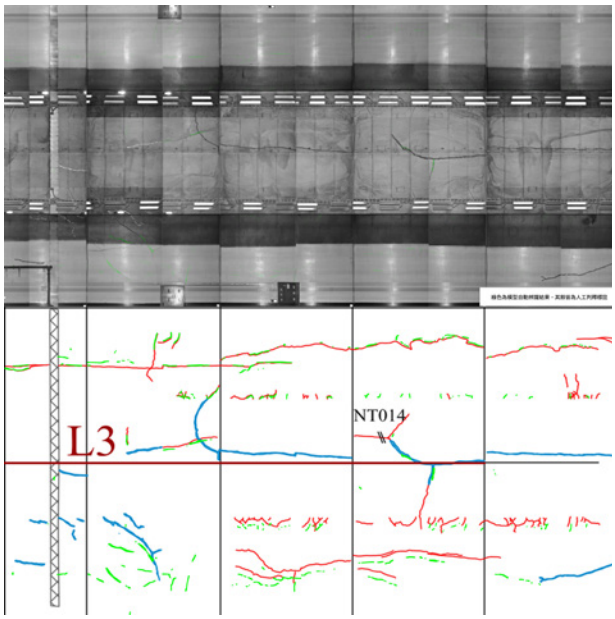
Autonomous Vehicle Virtual Simulation R&D Service Platform

By leveraging commercial car simulation software and domestic research outcomes, MOST commissioned NARLabs to operate the Taiwan Car Lab. Together with TSRI and NCHC, NARLabs has estabished a virtual simulation R&D service platform, which would come into operation in 2021. The simulation environment built upon the NCHC's Taiwan Computing Cloud (TWCC) platform has integrated various resources to be utilized by car companies to perform a wide range of tests. These resources include the mixed-fleet module, Taiwan-specific traffic signs, 3D motorcycle models, and typical local traffic accident patterns. Not only can the virtual simulation environment serve as a reference for physical test facilities, but it can also provide more diverse testing scenarios for industries and academia in Taiwan to initiate early-stage technology development at a lower cost. Relevant talent cultivation and hands-on courses will also be scheduled to attract young scientists and conventional auto parts and components manufacturers to gather in Shalun, Tainan, to form an R&D cluster of autonomous vehicles.

▲ 自駕車虛擬模擬研發服務平台
Smart car virtual simulation platform

地震工程
人工智慧發展與應用

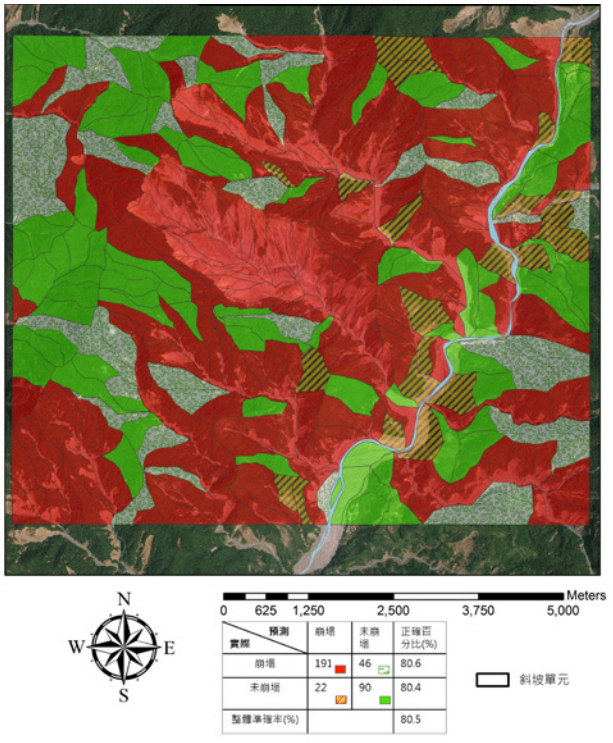
國震中心與臺大土木系共同成立之「國震中心－臺大土木合設人工智慧研究中心」，推動人工智慧在地震工程、防救災與土木工程相關領域之應用合作。至 2020 年已深入探討坡地災害預測、結構裂縫辨識、結構受震預測、工地鋼筋查驗等議題，並陸續產出豐碩成果。未來規劃進一步將 AI 技術應用擴展至建物震損辨識、橋梁預警、設備健康監測、斜面滾動隔震支承、耐震風險評估、防災平台建立等研究項目，期能藉由 AI 技術全面提升地震防減災能量。



▲ AI 辨識隧道裂縫
AI recognition of tunnel cracking

AI Development and Application in Earthquake Engineering

Co-established by NCREE and the National Taiwan University Civil Engineering Department (NTUCE), the NCREE - NTUCE Joint Artificial Intelligence Research Center is aimed at promoting applications of artificial intelligence (AI) in areas such as earthquake engineering, disaster reduction, and civil engineering. As of 2020, the center has conducted in-depth research on topics such as land-slide predictions, structural crack detection, structure seismic response predictions, and on-site reinforcing bar inspections, and has yielded significant results. With the hope of enhancing comprehensive seismic disaster prevention and reduction capabilities, future AI application areas will also include building seismic damage detection, bridge hazard early warning systems, equipment health monitoring, rolling-type bearings, seismic risk evaluations, and the establishment of disaster prevention platforms.



實際＼預測	崩塌	未崩塌	正確百分比(%)
崩塌	191	46	80.6
未崩塌	22	90	80.4
整體準確率(%)			80.5

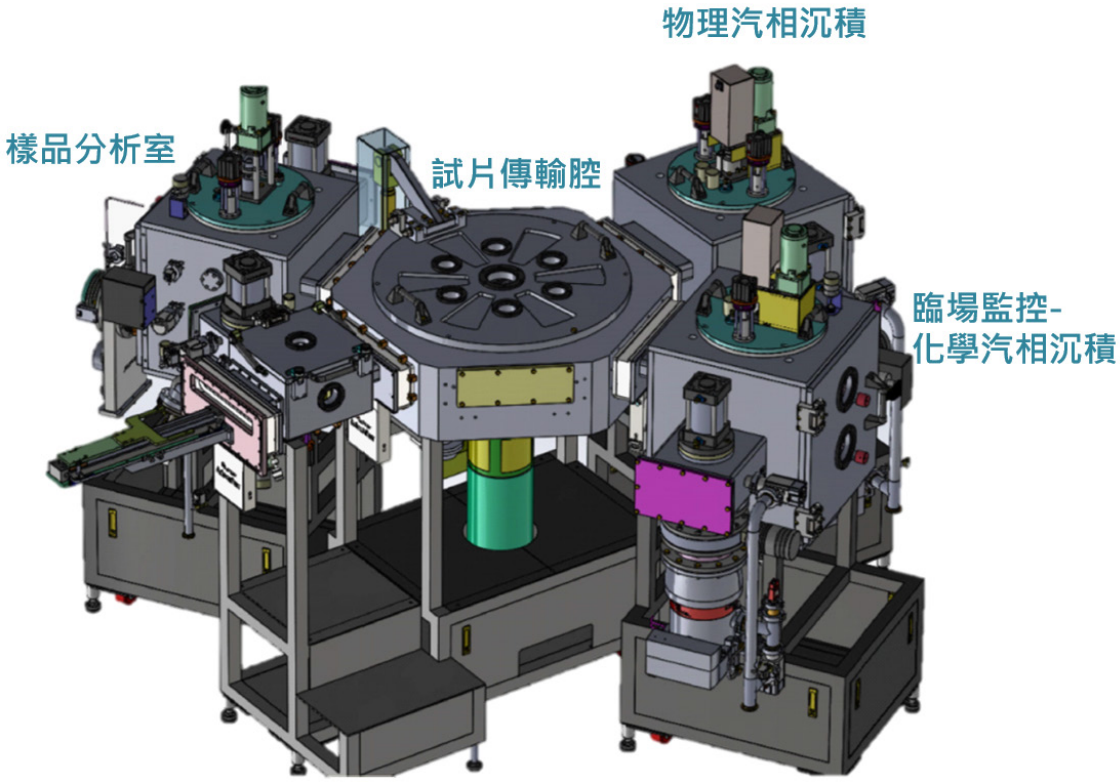
▲ AI 預疊崩塌區域
Pre-stacked AI display of regional landslide

自研自製半導體臨場檢測設備

儀科中心深耕下一個十年技術，發展半導體前瞻臨場檢測設備，協助國內半導體廠及學研單位透過此服務平台，進行新穎元件與材料臨場檢測先期研究，俾利強化國內半導體設備專業技術並提升國際競爭力。

Self-developed In-situ Semiconductor Inspection Equipment with Enhanced Functions

TIRI has been dedicated to developing technologies for the next decade and advanced semiconductor in-situ inspection equipment. On the same note, TIRI has established a service platform that assists domestic semiconductor manufacturers and academic and research institutions in conducting preliminary studies on in-situ inspection of novel devices and materials with the equipment. The platform is envisioned to enhance the functions of semiconductor equipment in Taiwan, thereby boosting the global competitiveness of the local semiconductor industry.



▲ 儀科中心自研自製半導體臨場檢測設備規劃示意圖
Illustration of TIRI-made semiconductor in-situ testing equipment

提升跨網介接之多元化與傳輸效率

國網中心持續提供高速計算、高效能儲存、高品質網路、大資料分析及科學工程模擬等雲端整合服務，推動各界研究與開發進程。未來亦將打造先進網路建設，建置網路交換中心，提升跨網介接之多元化與傳輸效率。

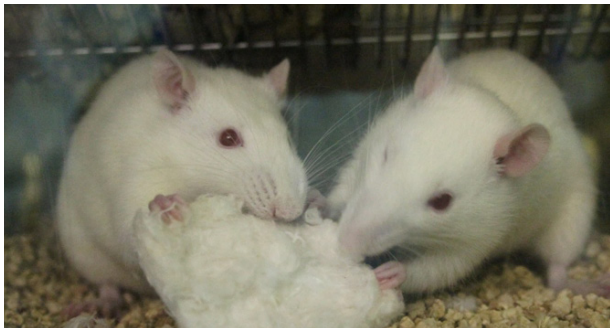
Envisioning a Smart Nation with Advanced Internet Infrastructure

NCHC has been providing cloud integration services such as high-speed computing, high-performance storage, high-quality network, big data analysis, and scientific/engineering simulation, to support the research and development of different entities and industries. With more advanced networks in mind, NCHC also plans to establish internet exchange points that can diversify exchange paths and increase routing efficiency in the future.

◀ 國網中心持續提供雲端整合服務，並打造先進網路建設
NCHC continues to provide cloud integration services and build advanced internet infrastructure

持續開發多種疾病模式動物

聚焦國內生醫研發之重點疾病需求，動物中心除開發 ACE2 小鼠支援 COVID-19 治療方法的研究，另持續進行原發性肝癌、非酒精性肝炎、原位大腸癌轉移、關節炎、腦中風、神經退化等模式動物開發，在動物福祉優先的基礎上，支援臨床前生醫研究發展。



Further Developments in Animal Models for Multiple Disease Testing

To facilitate biomedical research in Taiwan, NLAC has developed the ACE2 mouse model for COVID-19 therapeutic study, and animal models tailored to primary lung cancers, nonalcoholic steatohepatitis, metastatic colorectal cancer, arthritis, stroke, and neural degeneration diseases. Developed in breeding conditions ensuring animal welfare, these models serve to support preclinical biomedical research and development.

◀ 動物中心提供一站式疾病模式鼠臨床前試驗
NLAC provides one-stop preclinical test with mouse

鏈結產學研合作

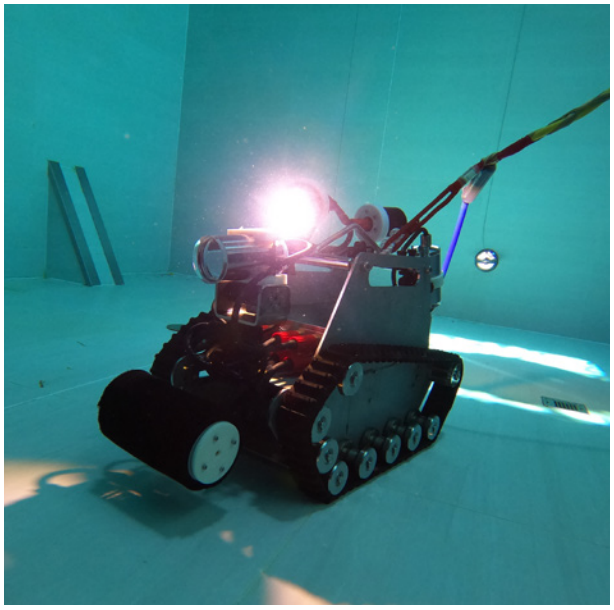
Collaboration Connecting Industry-University-Institute

05

TORI 台灣海洋科技研究中心

客製化設計工作型履帶車

海洋中心接受委託，設計工作型水下履帶車，可以讓使用者利用控制搖桿遠端操控位於 25 米深水池中的履帶車，輕鬆執行危險深水池中的清掃與障礙物跨越等工作。履帶車搭載兩顆高畫質鏡頭，並備有兩顆 10,000 流明 LED 燈源以克服深水光線不足問題；配置升降臂及滾輪刷，可以閃避障礙物及抬升滾刷；而履帶輪則用來確保於不平坦的地形作業時仍維持高穩定度。



▲ 水下工作型履帶車工作實景
Work class ROV on assignment underwater

Custom-built Tracked Vehicles

TORI was commissioned to design an underwater tracked vehicle that allows users to remotely control for performing the dangerous tasks such as cleaning up deep pools and removing obstacles at 25 meters deep. The tracked vehicle carries two high-resolution lenses and is equipped with two 10,000-lumen LED lights to compensate for low illumination in deep waters. The vehicle also has robotic arms and attached rollers which can help it avoid obstacles and roll upwards. Another specification is its continuous track system, which provides great stability while the vehicle operates on rough terrains.

NSPO 國家太空中心

台灣太空輻射環境驗測聯盟

太空中心與長庚醫院、長庚大學、核研所、宜特科技、中研院物理所及清大原科中心等國內輻射測試與分析單位共組「台灣太空輻射環境驗測聯盟」，於 2020 年 7 月 21 日簽署合作備忘錄，建立國內完整的太空電子零組件 / 元件輻射測試環境、測試規範與驗證機制，並提供輻射測試與分析報告，向完備我國太空環境檢測能量邁進一大步。

Taiwan Space Radiation Environment Verification & Testing Alliance

On July 21, 2020, seven domestic units specializing in radiation testing and analysis jointly signed a Memorandum of Understanding, marking the formation of the Taiwan Space Radiation Environment Verification & Testing Alliance. These seven units are NSPO, Chang Gung Memorial Hospital, Chang Gung University, Institute of Nuclear Energy Research of Atomic Energy Council, Integrated Service Technology, Institute of Physics of Academia Sinica, Nuclear Science & Technology Development Center of National Tsing Hua University. Together, they provide a full range of space services, which encompasses a radiation testing environment for space electronic parts and components, relevant testing guidelines and certification mechanisms, and the publication of radiation tests and analysis reports. This milestone signifies a giant leap forward in realizing the full potential of Taiwan's space environment testing capability.

▲ 台灣太空輻射環境驗測聯盟七單位合影
Representatives of the Taiwan Space Radiation Environment Verification & Testing Alliance' s seven member institutions

NCHC 國家高速網路與計算中心

以 AI 實現個人化醫療照護

為強化 2019 年初所推出的醫療照護對話機器人「蘭醫師」，HTC 健康醫療事業部 DeepQ 與彰化基督教醫院攜手國網中心，以臺灣 AI 雲加快 7 倍運算能力，加速 DeepQ 發展深度強化學習技術，原需一週的大型訓練大幅縮減至一天內完成，成功助「蘭醫師」升級，建構彰基醫院完整醫療照護網，讓每位病人都能享有 AI 醫療照護，實現視病猶親的時時關懷。

▲ 醫療照護對話機器人「蘭醫師」介面示意圖
Interacting with the automated medical care service, “Dr. Lan”

Accomplishing Personalized Medical Care with Deep RL

Dr. Lan is an AI medical care chatbot launched jointly by HTC’s health care division DeepQ and Changhua Christian Hospital (CCH) in 2019. To upgrade the capacity of Dr. Lan, the National Center for High-performance Computing (NCHC) joined the team to help boost its deep reinforcement learning (deep RL) speed. In particular, NCHC brought in the Taiwan Computing Cloud (TWCC) with 7-times faster computing power than before, which accelerated the completion of large-scale AI training from one week to a day. As a result, an upgraded Dr. Lan is now available to bring well-rounded AI care to every patient, thereby weaving a more comprehensive CCH medical care network.

TIRI 台灣儀器科技研究中心

落實感測器技術在地化發展

國研院推動科技部「AQI 氣體與智慧機械感測器服務平台」專案計畫，於期中成果發表會上與中山大學、精密機械研究發展中心簽署三方合作協議，以鏟花工藝傳承為開端，透過學研與法人協同合作模式，落實感測器技術在地化發展。

Localizing Development of Smart Machinery Sensors

NARLabs has entered into a cooperation agreement with National Sun Yat-sen University and the Precision Machinery Research & Development Center (PMC) in the implementation of a Ministry of Science and Technology (MOST) project entitled Air Quality Index (AQI) Gases and Smart Machinery Sensor Service Platform. With the transfer of knowledge in the craft of scraping serving as a starting point of this new venture, this partnership among the academia, the research community and non-profit organizations, aims to foster the development of sensor technology in Taiwan.

▲ 「鏟花工藝傳承．感測器扮演要角」合作協議簽署儀式
Signing of “Legacy of the Shoveling Process: the Key Role of Sensors”

科技人才培育

Fostering of Scientific and Technological Manpower

06

2020 HPC 功夫－國網 3D 動畫全國大賽

由科技部、經濟部及文化部跨部會合作，國網中心攜手經濟部加工處共同主辦之「2020 HPC 功夫－國網 3D 動畫全國大賽」邁入第九屆，已深耕培育許多優秀動畫人才。2020 年計 136 組隊伍、409 人同場競逐，創歷年新高。國網中心算圖農場讓參賽者得以完成作品並精進優化，以科技結合文化創作，並由經濟部深化產學對接，共育數位產業高階創價人才。

2020 HPC Kung Fu - NCHC 3D Animation Challenge

Ever since it was launched, the annually-held HPC Kung Fu—NCHC 3D Animation Challenge has cultivated numerous talented animation artists. Entering its ninth year in 2020, the contest was held NCHC and the Export Processing Zone Administration of the Ministry of Economic Affairs. This event was made possible by the joint direction of the Ministry of Science and Technology, the Ministry of Economic Affairs (MOEA), and the Ministry of Culture. This year, 136 teams participated, totalling 409 contestants and hitting a record high. With the services provided by the NCHC Render Farm, the contestants were able to create and optimize their animations. By facilitating the implementation of technologies in cultural products, the NCHC and MOEA together deepen the collaboration between industries and academia, fostering talents in digital content industries.

▲「2020 HPC 功夫－國網 3D 動畫全國大賽」嘉賓與得獎團隊合影
Guests and Awardees at the 2020 HPC Kung Fu—NCHC 3D Animation Challenge

實驗動物獸醫師工作坊

動物中心匯集各實驗動物設施從業人員，建立實驗動物專科獸醫師之訓練與交流機制，短期目標在形成國內實驗動物獸醫師在職進修與經驗分享平台，中長程目標則是建立專業人才培育方案以及人才庫，提升國內實驗動物獸醫師職能，以支援生醫研究。

NLAC Lab Animal Veterinarians Workshop

NLAC has mobilized its professionals to develop a series of training programs for laboratory animal veterinarians, that provide in-service training and an experience-sharing platform for veterinarians in the short run. The long term goal is to establish talent cultivation programs and a talent pool of professional veterinarians to support biomedical sciences research.

◀ 實驗動物獸醫師工作坊「人道試驗終點」課程
NLAC veterinary workshop holds its Humane Endpoint Laboratory course

第 1 屆「榮耀資戰－重裝上陣」資安大賽

為培育國家資安人才，由行政院資通安全處指導、合勤基金會與國網中心共同主辦的第 1 屆「榮耀資戰－重裝上陣」資安大賽，計有 190 組、409 人參賽，含括國中至研究所等不同年齡之隊伍激烈角逐。此競賽可活絡產學界之間的資安交流，讓學子貼近實戰演練，並發揮國網中心集雲端運算、高速網路及資安環境整合資源之最大效益。

The 1st Zyxel Cyber Thrones Data Security Competition

The inaugural Zyxel Cyber Thrones Data Security Competition co-sponsored by the Department of Cyber Security under the Executive Yuan, the Zyxel Foundation, and NCHC welcomed 409 contestants from 190 teams, ranging from junior high to graduate school students. The competition aims to link up security experts from both industry and academia and provide young students the opportunity to perform real-time drills, at the same time creating a synergy between NCHC's computing cloud, high-performance computing, and security training platform.

◀ 第 1 屆「榮耀資戰－重裝上陣」資安大賽決賽合影
Finalists of the 1st Zyxel Cyber Thrones competition

從太空中心走入校園

太空中心主辦國際太空站 KIBO 機器人程式設計挑戰賽預賽，並支援臺灣預賽冠軍復興實中參加國際決賽，勇奪亞軍。太空中心長年規劃、主辦各年齡層活動與課程，致力培育下一代太空科技人才：寒暑期的國小營隊，勾勒學童對太空計畫的夢想；福衛五號小論文競賽，培訓高中職種子教師，帶領學生學習運用衛星觀測資料；太空科技與工程學程，培養有志於此的大學生成為太空科技產業發展的生力軍。

▲ 復興實中勇奪全球 KIBO 機器人程式設計挑戰賽亞軍
Taipei Fuhsing Robotics Omega won 2nd place at the global KIBO Robotics Programming Challenge

From NSPO to Campuses

NSPO organized the preliminary round of the Kibo Robot Programming Challenge in Taiwan, and supported the winning team from Taipei Fuhsing Private School to enter the final round to compete on the international stage. The team successfully bagged the first runner-up prize. Over the years, NSPO has been devoting efforts to cultivating the next-generation of space talent by organizing activities for students of different ages. For instance, the winter and summer boot camps for elementary students aim to inspire their space dreams; the FORMOSAT-5 Short Essay Competition aims to nurture seed teachers from senior and vocational high schools to guide students in utilizing satellite observation data; and the Space Technology and Engineering Program is established to train aspiring college students as the new forces of Taiwan's space technology industry.

第 12 屆國研盃 *i*-ONE 儀器科技創新獎

儀科中心自 2009 年開始舉辦「國研盃 *i*-ONE 儀器科技創新獎」，鼓勵年輕學子發揮創意，應用科技解決問題，落實儀器自製觀念。2020 年第 12 屆競賽結果由國立勤益科技大學團隊奪得專上組首獎及獎金 10 萬元，中學組由桃園市立內壢高級中學獲得首獎及獎金 8 萬元。

The 12th *i*-ONE NARLabs Instrument Technology Innovation Competition

First held in 2009, the *i*-ONE NARLabs Instrument Technology Innovation Competition aims to encourage students' creativity to solve problems with technology and to make instruments on their own. This year, National Chin-Yi University of Technology and Taoyuan Municipal Nei Li Senior High School won the first prize of the College and Above Group and the High School Group, respectively, along with NT$100,000 and NT$80,000 as prize money.

▲「國研盃 *i*-ONE 儀器科技創新獎」長期培育儀器自製人才
The 12th *i*-ONE NARLabs Instrument Technology Innovation Competition promotes long-term talent training for self-made instruments

國際合作

International Cooperation

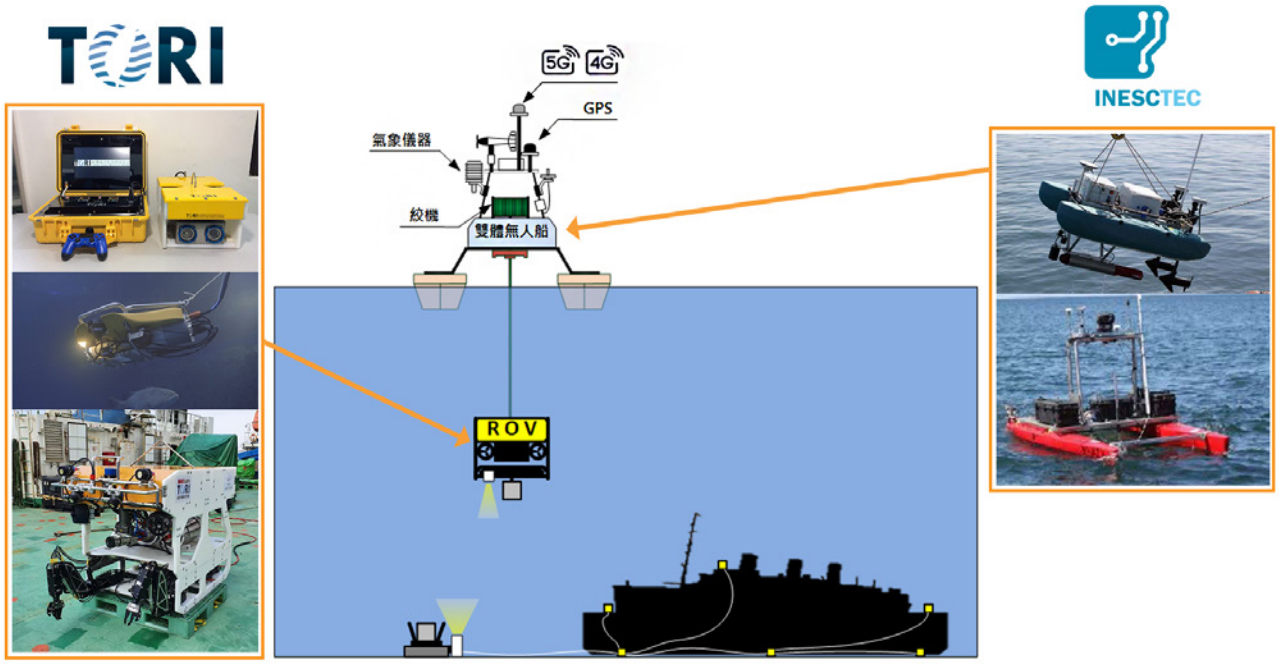
07

前進葡萄牙拓展跨域合作

國研院與葡萄牙系統與資訊工程科技研究所（Institute for Systems and Computer Engineering, Technology and Science, INESC TEC）簽署合作備忘錄，源於國網中心在高速電腦之相關發展及海洋中心在水下載具之研發與該單位轄下中心所建立之合作關係。國研院原擬於 2020 年 6 月訪葡萄牙時簽署，囿於 COVID-19 疫情，改以通訊簽署，並於 11 月 20 日召開雙方合作之線上啟動會議，未來將以水下載具、離岸風電、資訊安全等議題展開跨域合作。

To Portugal for Interdisciplinary Collaboration

NARLabs and Portugal's Institute for Systems and Computer Engineering, Technology and Science (INESC TEC) signed an MOU founded on high-speed computer developments by NCHC and underwater research undertaken by TORI, as well as the cooperative relations established by these two entities. The MOU was planned to be signed in Portugal while NARLabs visits INESC TEC in June this year. However, due to the COVID-19 pandemic, the signing was changed to online communication channels. On November 20, the first meeting to initiate the cooperation was held online. In the future, interdisciplinary cooperation will be undertaken on topics such as underwater vehicles, offshore wind power, and cyber security.



▲ 海洋中心與 INESC TEC 合作研發水下無人載具
TORI and INESC TEC cooperate in developing unmanned underwater vehicle

深化臺灣與巴拉圭之太空合作

巴拉圭太空署於 2018、2019 年訪臺後，太空中心於 2019 年與該署簽署合作備忘錄。為建立更具體的合作計畫、推動系統性的學習，以發展巴國之太空科技，經過 1 年多的線上交流後，於 2020 年 12 月 9 日辦理臺巴太空合作雙邊會議暨訓練工作坊，邀請巴拉圭駐臺大使、外交部拉美司代表、巴拉圭獲外交部獎學金之在臺學生（於中央大學及成功大學就讀）參加，我國駐巴拉圭大使亦出席線上會議。未來合作規劃將聚焦於資料立方（Data Cube）及衛星影像應用、立方衛星（CubeSat）以及人才培訓。

Deepening Taiwan-Paraguay Space Tech Collaboration

After their visits to Taiwan in 2018 and 2019, the Paraguayan Space Agency signed an MOU with NARLabs' NSPO in 2019. Both sides will strive to deepen collaborative projects and foment systematic education to develop Paraguay's space technology. After one year of online discussions, on December 9, 2020, a webinar of joint meeting and workshop was held between both nation's space organizations and attended by the Paraguayan ambassador in Taiwan, the head of the Ministry of Foreign Affairs' (MOFA) Department of Latin American and Caribbean Affairs, and the awardees of MOFA scholarships for Paraguayans studying in Taiwan's National Central University and National Cheng Kung University, as well as the online attendance of Taiwan's ambassador to Paraguay, José Han. Future collaborative projects will focus on Data Cube and satellite imaging application, CubeSat, and talent training.

▲ 臺巴（拉圭）太空合作雙邊會議後，在臺灣出席之人員合照
Taiwanese representatives after attending the Taiwan-Paraguay joint meeting for space cooperation

展開與泰國之雙邊研究計畫及地震防災技術輸出

國研院 2019 年於泰國曼谷設立駐外辦公室，持續與泰國國家科學院 (National Science and Technology Development Agency, NSTDA) 針對高速網路、儀器檢測、運用福五影像鏈結 DataCube、半導體教育訓練等議題進行交流。國研院與 NSTDA 之 NARLabs-NSTDA Joint Research Program 由太空中心、儀科中心與泰方共同提出兩件計畫，於 2020 年 10 月開始執行。另國震中心與泰國亞洲理工學院 (Asian Institute of Technology, AIT) 及吞武里國王科技大學 (King Mongkut's University of Technology Thonburi, KUMTT) 合作，針對泰國校舍建築擬定耐震補強計畫，並進行耐震補強工法有效性實驗研究，建立校舍補強示範案例。

New Frontiers in Taiwan-Thailand Joint Projects and Earthquake Disaster Prevention

In 2019, NARLabs established an overseas office in Bangkok, continuing its exchanges with Thailand's National Science and Technology Development Agency (NSTDA) on matters such as high-speed internet, instrument testing, the FORMOSAT-5 satellite imaging technology DataCube, semiconductor education and training, and more. Under the NARLabs-NSTDA Joint Research Program, NSPO and their Thai counterpart have set out two plans which will be begin implementation in October, 2020. Additionally, NCREE and Thailand's Asian Institute of Technology (AIT) and King Mongkut's University of Technology Thonburi (KUMIT) have joined together to design earthquake-resistant dorm buildings for Thai universities and conduct research on effective earthquake-resistant construction methods, providing models of reinforced dormitory structures.

▲ 國研院團隊參訪泰國現有之補強校舍
The NARLabs team visited Thailand's currently reinforced campus dorm structures

國際策略與合作夥伴
International Strategies and Global Partners

布局全球，發展永續
International Strategies and Sustainable Development

透過多元國際事務推動機制，提升國際夥伴鏈結強度與國際學群參與深度，成為「追求全球頂尖、開創在地價值」的國際科研機構。

By putting our diverse global structures to use, we are constantly strengthening our international partnerships and boosting international academic participation. This brings us closer to our goal of becoming an international science and technology institution achieving “global excellence, local impact.”

美洲 America

智慧城市，航太科技
Smart City, Aerospace Technology

研發：鏈結國際頂尖 推動前瞻科技
R&D: Connecting the global elite Promoting frontier technology

服務：共裕共榮服務 打造永續社會
Service: Providing complete services Building a sustainable society

育才：建構交流平台 培育科技人才
Talent: Creating exchange platforms Cultivating technology talent

參與多元國際事務機制

藉由雙邊互訪、共同主持合作計畫、共用設施、人員駐點支援、參與並舉辦相關學門研討會與參與國際學會等，多元參與國際事務。

Engaging in Diverse Global Affairs

NARLabs is committed to bilateral cooperation/exchange visits, jointly managing collaborative programs, sharing facilities, stationing supportive personnel abroad, participating in and arranging academic forums and participating in global scholarly institutions.

歐洲 Europe

資通訊科技，海洋探索
Information & Communication Technology
Ocean Exploration

東北亞 Northeast Asia

人工智慧，科技政策
Artificial Intelligence
Technology Policies

東南亞 Southeast Asia

災防科技，生醫科技
Disaster Prevention Technology
Biomedical Technology

大洋洲 Oceania

資通訊科技，地球觀測
Information & Communication Technology
Earth Observation

提升學術產能

透過共同發表具影響力的論文、提供核心技術與服務平台、建立雛形模組、申請專利與商品化等，提升學術產能。

Elevating Academic Capacity

NARLabs' international collaborations are geared towards jointly publishing impactful academic papers, providing core technologies and service platforms, creating prototype modules, patent applications and bringing products to the market.

支持全球永續發展

隨著全球化發展，國際間面臨共同或相似挑戰。藉由技術交流與整合來解決新興問題，以謀求共同利益，創造更安全、更優質的生活環境。

Bolstering Global Sustainable Development

As the world becomes ever more globalized, different nations face and share similar challenges. We are able to solve today's problems by exchanging and integrating our technology, building towards mutual gains, creating a safer, better world.

美洲 America

智慧城市，航太科技
Smart City, Aerospace Technology

美國 UNITED STATES
- Argonne National Laboratory
- BROAD Institute
- Duke University
- iCAIR, International Center for Advanced Internet Research, Northwestern University
- NCSA, National Center for Supercomputing Applications
- NOAA, National Oceanic and Atmospheric Administration
- Stanford University
- UCB, University of California, Berkley
- UCF, University of Central Florida
- UCLA, University of California, Los Angeles
- UCSD, University of California, San Diego
- University of Hawaii System
- University of Houston
- University of Texas MD Anderson Cancer Center
- UW, University of Washington
- WHOI, Woods Hole Oceanographic Institution

加拿大 CANADA
- NRC, National Research Council Canada
- University of Toronto
- WATERLOO. AI, Waterloo Artificial Intelligence Institute

巴拉圭 PARAGUAY
- AEP, Paraguayan Space Agency

歐洲 Europe

資通訊科技，海洋探索
Information & Communication Technology Ocean Exploration

奧地利 AUSTRIA
- AIT, Austrian Institute of Technology

比利時 BELGIUM
- imec, Interuniversity Microelectronic Centre

捷克 CZECH REPUBLIC
- CAS, Czech Academy of Sciences

法國 FRANCE
- CEA-Leti, Laboratoire d'électronique des technologies de l'information
- Ifremer, Institut français de recherche pour l'exploitation de la mer; R/V Marion Dufresne
- CNES, National Centre for Space Studies
- Inserm

德國 GERMANY
- GEOMAR, Helmholtz Centre for Ocean Research Kiel; R/V Sonne
- HLRS, High-Performance Computing Center Stuttgart
- MARUM, Zentrum für Marine Umweltwissenschaften

波蘭 POLAND
- PAS, Polish Academy of Sciences

葡萄牙 PORTUGAL
- INESC TEC, Institute for Systems and Computer Engineering, Technology and Science

俄羅斯 RUSSIA
- RAS, Russian Academy of Sciences

土耳其 TURKEY
- TÜBİTAK, Scientific and Technological Research Council of Turkey

英國 UK
- MRC, Medical Research Council

東北亞　Northeast Asia

人工智慧，科技政策
Artificial Intelligence Technology Policies

日本 JAPAN

- AIST, National Institute of Advanced Industrial Science and Technology
- CIEA, Central Institute for Experimental Animals
- ERI, Earthquake Research Institute, University of Tokyo
- JAMSTEC, Japan Agency for Marine-Earth Science and Technology
- JAXA, Japan Aerospace Exploration Agency
- Kumamoto University
- NICT, National Institute of Information and Communications Technology
- RIKEN, The RIKEN Center for Computational Science
- Tohoku University
- Tokyo Institute of Technology

韓國 KOREA

- KISTEP, Korea Institute of S&T Evaluation and Planning
- KISTI, Korea Institute of Science and Technology Information
- NST, National Research Council of Science and Technology
- sesteC, Seismic Simulation Test Center

大洋洲　Oceania

資通訊科技，地球觀測
Information & Communication Technology Earth Observation

澳洲 AUSTRALIA

- ANFF, Australian National Fabrication Facility
- ANU, Australian National University
- CSIRO, Commonwealth Scientific and Industrial Research Organization
- Flinders University
- University of Technology Sydney

紐西蘭 NEW ZEALAND

- QuakeCoRE, The NZ Centre for Earthquake Resilience

東南亞　Southeast Asia

災防科技，生醫科技
Disaster Prevention Technology Biomedical Technology

印度 INDIA

- IIT, Indian Institute of Technology, Roorkee
- ISR, Institute of Seismological Research

菲律賓 PHILIPPINES

- De La Salle University
- DOST, Department of Science and Technology
- University of the Philippines

新加坡 SINGAPORE

- NAMIC, National Additive Manufacturing Innovation Cluster

泰國 THAILAND

- AIT, Asian Institute of Technology
- GISTDA, Geo-Informatics and Space Technology Development Agency
- KUMTT, King Mongkut's University of Technology Thonburi
- NARLabs Bangkok Office
- NSTDA, National Science and Technology Development Agency

越南 VIETNAM

- MONRE, Ministry of Natural Resources and Environment
- VNU, Vietnam National University, Hanoi

社會參與
Social Engagement

08

「科學家的秘密基地」中部開展

為讓民眾對艱深的科技有感，國研院與中興大學聯手於中部地區舉辦「科學家的秘密基地」科普活動，並邀請臺中市政府教育局、彰化縣政府教育處與南投縣政府教育處共襄盛舉。「科學家的秘密基地」齊集國研院八個中心與中興大學的科學家，規劃了「天空基地」、「奇幻基地」、「探測基地」、「智慧基地」與「 科學興樂園」等五大主題，藉由動手做科學與活動體驗，讓參與民眾感受國家級科研單位所展現的科學樂趣。

Secret Base of Scientists Exhibition Opens in Taichung

NARLabs joined hands with National Chung Hsing University (NCHU) to hold the Secret Base of Scientist exhibition in Taichung for engaging the general public in science learning. The event invited the Education Bureau of Taichung City Government, the Department of Education of Changhua County Government, and the Department of Education of Nantou County Government to pitch in. Brainstormed by NARLabs' eight centers and the scientists from NCHU, the exhibition featured five themes : Space Base, Fantasy Base, Exploration Base, Smart Base, and Science Playground. Visitors were able to experience and enjoy the wonders of science and learn more about NARLabs through fun, hands-on activities.

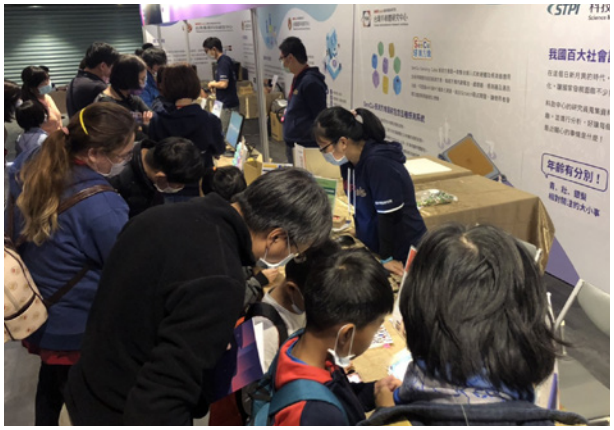
▲ 民眾熱情參與 2020 年「科學家的秘密基地」
Visitors at the 2020 "Secret Base of Scientists"

國研院轄下八中心熱情響應「臺灣科學節」

由教育部主辦、科技部協辦的「臺灣科學節」活動，精選出十大科普基地，其中包括國研院的太空中心及國震中心，分別規劃「太空基地大進擊」及「安全耐震的家－認識地震工程」探究活動。而動物中心、國網中心、科政中心、半導體中心與儀科中心共同在臺北擺設「科學家的秘密任務」攤位，海洋中心則在屏東設計「身『勵』其『進』」攤位，期望民眾能透過有趣的科學體驗活動，認識最新科技中的簡單科學。

NARLabs' Eight Research Centers Take Part at the Taiwan SciFest

Jointly hosted by the Ministry of Education (MOE) and the Ministry of Science and Technology (MOST), the Taiwan SciFest showcased ten "SciBases", among which are NSPO and NCREE which organized the events "Space Base Open House" and "Earthquake safety activities - popular science in earthquake engineering", respectively. The NLAC, NCHC, STPI, TSRI and TIRI all joined together to establish the "Secret Task of Scientists" event in Taipei. Meanwhile in Pingtung, TORI designed the event "Legend-ary Adventures". Through these hands-on activities, visitors will hopefully learn the basics about the latest in scientific research.



▲ 臺灣科學教育館「科學家的秘密任務」攤位
The National Taiwan Science Education Center's kiosk "Secret Task of Scientists"

臺灣 AI 雲集結國際夥伴 NVIDIA、IBM、QIAGEN、Schrödinger 響應臺灣科技抗疫

國網中心自 2020 年 4 月因應 COVID-19 疫情，啟動科技抗疫專案，釋出國家級資源免費供各界提案申請運用。而美國 IC 設計大廠 NVIDIA、全球科技龍頭 IBM、全球最大生物資訊解決方案暨診斷檢測方案商 QIAGEN，生物模擬計算大廠 Schrödinger 亦響應，分別釋出旗下專業資料庫與分析開發軟體工具，結合臺灣 AI 雲共同抗擊疫情，支援新冠相關藥物研發，加速抗疫進程。

▲ 臺灣 AI 雲科技抗疫
Taiwan Computing Cloud's tech-savvy fight against the pandemic

NVIDIA, IBM, QIAGEN, Schrödinger Join Forces with TWCC in Fighting Pandemic with Technology

NCHC launched a technology program to fight COVID-19, freeing national resources for the public's use and application. The leading American IC design company NVIDIA, global technology giant IBM, the biggest provider of bioinformatics and diagnostics solutions QIAGEN, and biological simulation leader Schrödinger all participated in the program, releasing their professional databases, as well as analytical and software development tools. Their cooperation with the Taiwan Computing Cloud (TWCC) in fighting the pandemic supports COVID-19 drug development and accelerates the fight against the virus.

「地震島大冒險」特展於桃園展出

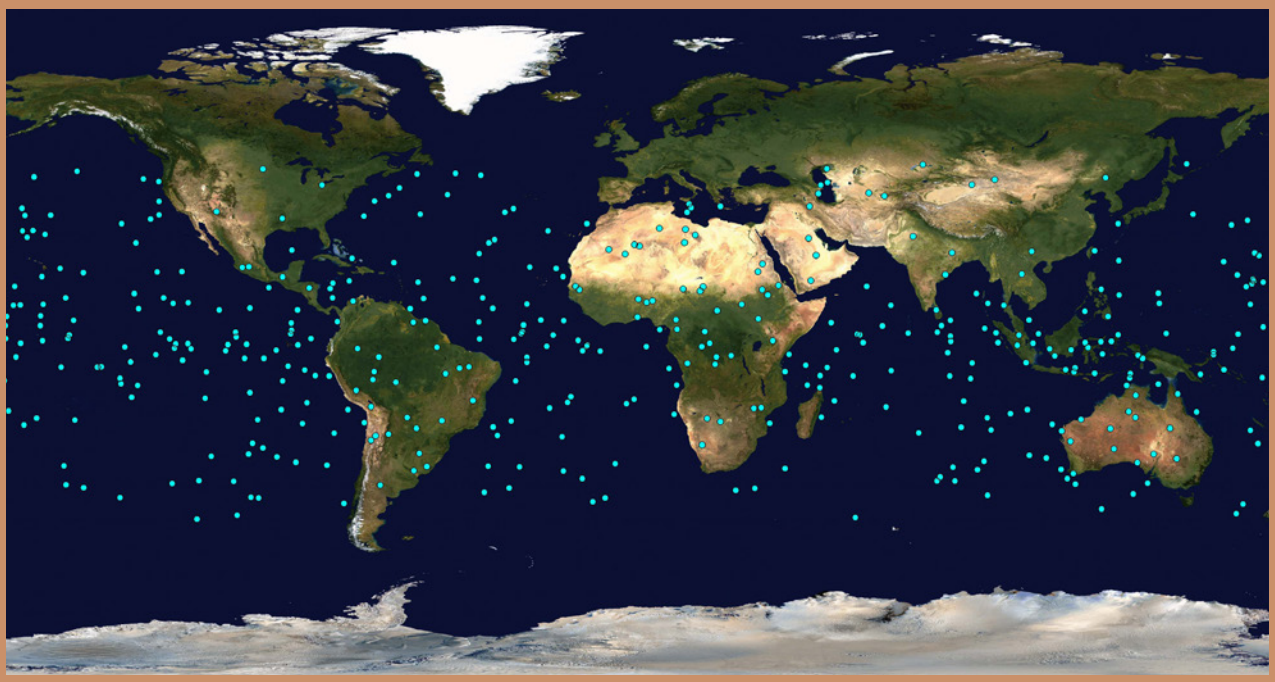
配合前瞻計畫「民生公共物聯網」計畫推動，由行政院科技會報、科技部及交通部指導，民生公共物聯網推動小組協同國震中心、交通部中央氣象局、桃園市政府消防局防災教育館及國家災害防救科技中心，於 2020 年 9 月 1 日至 12 月 5 日在桃園市政府防災教育館展出「地震島大冒險」，透過與七大怪獸對抗的冒險故事，運用多媒體互動，讓大、小朋友身歷其境地在地震島冒險體驗，藉此了解包含地震原理、複合式地震速報服務等科學原理與防災科技，進而能將地震減災知識落實於日常生活中。

Adventure on Earthquake Island Exhibition

In response to the pioneering Civil IoT Taiwan program, the Adventure on Earthquake Island Exhibition was held from September 1 to December 5 in Taoyuan City's Disaster Education Building. The exhibition was supported by the Executive Yuan's Board of Science and Technology, the Ministry of Science and Technology (MOST), and the Ministry of Transportation and Communications (MOTC), and organized by the Civil IoT Taiwan promoting team, NCREE, MOTC Central Weather Bureau, Taoyuan Fire Department Training Center and Disaster Education Center, and the National Science & Technology Center for Disaster Reduction. The exhibition was organized as an adventure story against seven monsters and allowed both adults and children to venture into the Earthquake Island using multimedia. During the adventure, visitors learned about the causes of earthquakes, the knowledge of the hybrid earthquake early warning system, and disaster prevention technologies. This disaster-mitigation knowledge can, in turn, be implemented in their daily lives.

▲ 專屬 QR Code 手表紀錄「地震島大冒險」闖關成績
Use your QR Code watch to earn points as you experience the "Earthquake Island Adventure"

大事紀



由臺灣科學家提議創立的 SYNAPSE（Synchrotrons for Neuroscience–An Asia Pacific Strategic Enterprise）於新加坡舉行亞太六國人腦圖譜合作計畫簽約儀式，國網中心以先進運算力成為 SYNAPSE 關鍵單位之一。

NCHC's partner, SYNAPSE (Synchrotrons for Neuroscience–An Asia Pacific Strategic Enterprise), attends six-nation signing of MOU on brain research.

01.15

福衛七號大氣掩星資料正式公開。

FORMOSAT-7 atmospheric occulation data release.

03.07

科政中心建置「防疫科技資訊平台」，一站式掌握國內外 COVID-19 最新狀況及各式防疫觀測。

STPI launches “COVID-19 Information Platform”, providing latest updates on COVID-19 news and prevention methods.

03.25

Milestones

因應 COVID-19 疫情，國網中心啟動「御守臺灣科技抗疫專案」，免費釋出國家級資源供各界提案申請，合作夥伴 NVIDIA、IBM、QIAGEN、Schrödinger 跨國響應，並以此協辦行政院及美國在台協會（AIT）合作舉辦之「台美防疫松」。

Faced with the COVID-19 pandemic, NCHC opens free national information database for applicants, helping international partners NVIDIA, IBM, QIAGEN, Schrödinger, and holding the “Co-hack” summit together with Executive Yuan and AIT.

04.02

福爾摩沙衛星三號除役。

FORMOSAT-3/COSMIC satellite constellation officially retires.

04.30

半導體中心開發出「人工智慧系統晶片設計與驗證平台」，加速國內 AI 晶片研發進程。

TSRI has developed an “AI SoC design and verification platform” to accelerate the design cycle of AI chips.

06.16

儀科中心推出《科儀新知》行動閱讀 app，讓學習不設限，儀器新知一手掌握。

TIRI launches the journal “Instruments Today” app for learning about scientific instruments on the go.

06.18

太空中心啟動 B5G 低軌通訊衛星先期開發計畫。

NSPO initiates B5G low-orbit communication satellite’s early development plan.

07.01

太空中心成立「台灣太空輻射環境驗測聯盟」。

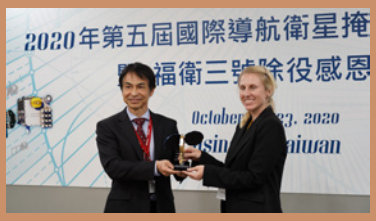
NSPO establishes the "Taiwan Space Radiation Environment Verification and Testing Alliance".

07.22

國研院與中興大學共同主辦「科學家的秘密基地」科普展，臺中市、彰化縣、南投縣政府參與協辦。

NARLabs and NCHU hold the Secret Base of Scientists exhibition; Taichung, Changhua, Nantou officials among attendees.

08.14-08.18



太空中心舉辦第 5 屆國際導航衛星掩星觀測研討會。

NSPO holds the 5th International Conference on GPS Radio Occultation.

10.21

海洋中心與科博館跨域攜手簽署科研合作備忘錄。

TORI and the National Museum of Natural Science sign an MOU in cross-domain research.

08.27

儀科中心發表 12 吋叢集式原子層沉積先進設備。

TIRI unveils 12-inch Cluster ALD Advanced Equipment.

09.08

動物中心開發「神農鼠腎毒篩檢平台」，提供腎毒檢測與護腎產品開發的工具鼠。

NLAC develops animal model specifically for nephrotoxicity testing and kidney treatment products, the"Shennong Mouse Nephrotoxicity Screening Platform".

10.27

動物中心生物相容性測試實驗室，北竹南三據點皆通過 OECD-GLP 認證查核。

NLAC's Biocompatibility Testing Laboratory in Taipei, Hsinchu, Tainan branches acquire international OECD-GLP certification.

10.28

國震中心增建大樓啟用。

Opening ceremony of NCREE's new extended building.

11.09

半導體中心與成功大學攜手打造之「國研院台灣半導體研究中心臺南基地」揭牌啟用，擴大支援區域性學研界特色研究項目，推動產學鏈結。

Collaborating with NCKU, TSRI found the Tainan Base to expand the support of regional research capacity, and promote the linking between the academia and industry.

12.17

年度概況
Annual Profile

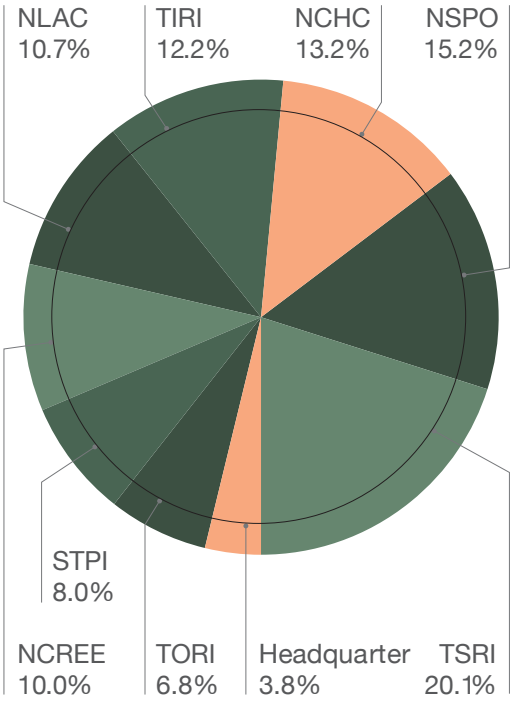
10

人力配置 Human Resources

總人數 1,385 人

單位分佈
Number of employees in laboratories

Headquarter	院本部	53 人
TORI	台灣海洋科技研究中心	94 人
STPI	科技政策研究與資訊中心	111 人
NCREE	國家地震工程研究中心	139 人
NLAC	國家實驗動物中心	148 人
TIRI	台灣儀器科技研究中心	169 人
NCHC	國家高速網路與計算中心	183 人
NSPO	國家太空中心	210 人
TSRI	台灣半導體研究中心	278 人



學歷分佈
Education Level

博士
Doctoral Degree
26.4%（366人）

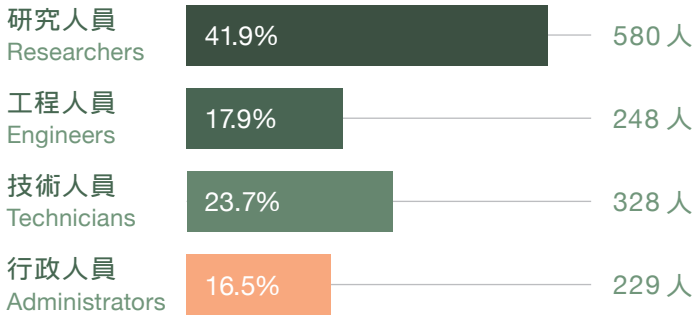
碩士
Master's Degree
48.4%（671人）

學士
Bachelor's Degree
18.8%（260人）

專科
Associates
5.2%（72人）

其他
Others
1.2%（16人）

職務分佈
Human Resources Profile



財務資訊 Financial Information

民間單位自籌款
Funds Raised from the Private Sector

10%

政府單位自籌款
Funds Raised from Government Agencies

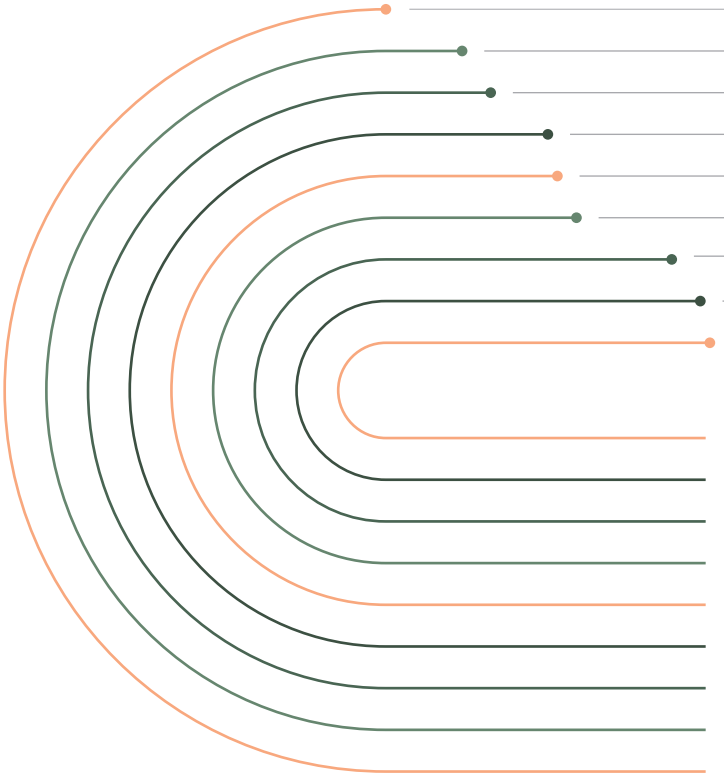
16%

政府補助款
Grants

74%

總收入合計
Total

Revenue (FY 2020) (Rate: 1 USD = 28.53 NTD)



院本部 Headquarter
249 百萬元 / USD $9 Million

台灣海洋科技研究中心 TORI
369 百萬元 / USD $12 Million

國家實驗動物中心 NLAC
528 百萬元 / USD $19 Million

國家地震工程研究中心 NCREE
711 百萬元 / USD $25 Million

科技政策研究與資訊中心 STPI
714 百萬元 / USD $25 Million

台灣儀器科技研究中心 TIRI
757 百萬元 / USD $27 Million

台灣半導體研究中心 TSRI
1,247 百萬元 / USD $44 Million

國家太空中心 NSPO
1,350 百萬元 / USD $47 Million

國家高速網路與計算中心 NCHC
1,352 百萬元 / USD $47 Million

設置地點 Location

總部 Headquarters

臺北 Taipei

國家實驗研究院院本部
NARLabs Headquarter
國家實驗動物中心
National Laboratory Animal Center
國家地震工程研究中心
National Center for Research
on Earthquake Engineering
科技政策研究與資訊中心
Science & Technology Policy
Research and Information Center

高雄 Kaohsiung

台灣海洋科技研究中心
Taiwan Ocean Research Institute

新竹 Hsinchu

國家太空中心
National Space Organization
國家高速網路與計算中心
National Center for
High-performance Computing
台灣半導體研究中心
Taiwan Semiconductor
Research Institute
台灣儀器科技研究中心
Taiwan Instrument
Research Institute

分部 Branches

新竹 Hsinchu

國家實驗動物中心
National Laboratory Animal Center

臺中 Taichung

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

臺南 Tainan

國家實驗動物中心
National Laboratory Animal Center
國家地震工程研究中心
National Center for Research
on Earthquake Engineering
國家高速網路與計算中心
National Center for
High-performance Computing
台灣半導體研究中心
Taiwan Semiconductor
Research Institute

組織架構 Organization

董監事會
Board of Directors & Supervisors

董事長	吳政忠
Chairperson	Tsung-Tsong Wu
董事	吳益群、周美吟、周景揚、林一平、林建煌、孫元成、徐清祥
Directors	馬國鳳、郭耀煌、陳東升、賀陳弘、謝達斌、劉佩玲、蘇慧貞
	(依中文姓氏筆劃排序)
	Yi-Chun Wu, Mei-Yin Chou, Jing-Yang Jou, Yi-Bing Lin, Chien-Huang Lin, Yuan-Chen Sun, Charles Hsu, Kuo-Fong Ma, Yau-Hwang Kuo, Dung-Sheng Chen, Hong Hocheng, Dar-Bin Shieh, Pei-Ling Liu, Huey-Jen Su
	(In order according to Chinese surnames)
常務監事	廖玉燕
Executive Supervisor	Yu-Yen Liao
監事	林嬋娟、吳正己
Supervisors	Chan-Jane Lin, Cheng-Chih Wu
稽核室 / 主任	王泰享
Auditing Office / Director	Tai-Hsiang Wang

院長室
President's Office

院長	吳光鐘
President	Kuang-Chong Wu
副院長	林博文 (代理)
Vice President	Bou-Wen Lin (Acting)
營運長	徐玉學
Chief Operating Officer	Yu-Hsueh Hsu

院本部 / 主任
Headquarters / Directors

策略企劃室	陳維鈞
Strategy & Planning Office	Way-Jin Chen
營運推廣室	陸璟萍
Operation & Promotion Office	Ching-Ping Lu

組織架構 Organization

國際事務室 International Affairs Office	陳明智 Ming-Chih (Franz) Cheng
行政服務室 Administration Office	陳穎萱 (代理) Ying-Hsuan Chen (Acting)
財務會計室 Finance & Accounting Office	林淑貞 Shu-Chen Lin
人力資源室 Human Resources Office	林君玲 Chin-Ling Lin
資訊服務室 Information Technology Services Office	蔡俊輝 Jyun-Hwei Tsai

實驗研究單位 / 主任
Laboratories / Director Generals

國家實驗動物中心 National Laboratory Animal Center (NLAC)	秦咸靜 Hsian-Jean Chin
國家地震工程研究中心 National Center for Research on Earthquake Engineering (NCREE)	黃世建 Shyh-Jiann Hwang
國家太空中心 National Space Organization (NSPO)	余憲政 (代理) Shiann-Jeng Yu (Acting)
國家高速網路與計算中心 National Center for High-performance Computing (NCHC)	史曉斌 Shepherd Shi
台灣半導體研究中心 Taiwan Semiconductor Research Institute (TSRI)	葉文冠 Wen-Kuan Yeh
台灣儀器科技研究中心 Taiwan Instrument Research Institute (TIRI)	楊燿州 Yao-Joe (Joseph) Yang
科技政策研究與資訊中心 Science & Technology Policy Research and Information Center (STPI)	林博文 Bou-Wen Lin
台灣海洋科技研究中心 Taiwan Ocean Research Institute (TORI)	王兆璋 Chau-Chang Wang

中心簡介
Our Laboratories

沿革 Evolution

2003

國研院正式成立，6 個國家實驗室改制納入

- 國家晶片系統設計中心
- 國家高速網路與計算中心
- 國家地震工程研究中心
- 國家奈米元件實驗室
- 國家實驗動物中心
- 國家太空中心

National Applied Research Laboratories (NARLabs) was established with six founding labs:

- National Chip Implementation Center (CIC)
- National Center for High-performance Computing (NCHC)
- National Center for Research on Earthquake Engineering (NCREE)
- National Nano Device Laboratories (NDL)
- National Laboratory Animal Center (NLAC)
- National Space Organization (NSPO)

2005

2 個國家實驗室納入國研院

- 儀器科技研究中心
- 科技政策研究與資訊中心

Two more labs joined NARLabs:

- Instrument Technology Research Center (ITRC)
- Science & Technology Policy Research and Information Center (STPI)

2008

台灣海洋科技研究中心成立

Taiwan Ocean Research Institute (TORI) was established.

2011

台灣颱風洪水研究中心成立

Taiwan Typhoon and Flood Research Institute (TTFRI) was established.

2019

- 台灣颱風洪水研究中心併入行政法人國家災害防救科技中心
- 國家晶片系統設計中心與國家奈米元件實驗室整併為台灣半導體研究中心
- 儀器科技研究中心更名為台灣儀器科技研究中心

- Taiwan Typhoon and Flood Research Institute (TTFRI) was merged into National Science and Technology Center for Disaster Reduction (NCDR).
- National Chip Implementation Center (CIC) and National Nano Device Laboratories (NDL) were merged into Taiwan Semiconductor Research Institute (TSRI).
- Instrument Technology Research Center (ITRC) was renamed Taiwan Instrument Research Institute (TIRI).

STPI 科技政策研究與資訊中心

科政中心以成為具有學術基礎和實證研究特色、完備快速回應議題能力的國家級科技政策智庫為定位與願景，掌握全球科技發展趨勢，提供及時、專業、客觀之分析與建議，擔負支援政府科技政策規劃、協助科技計畫審評與管理、創新創業人才培育及提供學術資源服務等四大任務。科政中心自 2005 年改制以來，持續支援科技部草擬我國科技發展策略藍圖與科技白皮書，亦負責協助辦理全科會等政策幕僚的工作，同時也致力完備政策知識平台、產業資料庫及人才與指標的連結，以政策研究及創新服務雙軌並進，全方位協助政府科技部會加速推動國家科技發展與研發成果創新，提升國家總體競爭力。

With an academic foundation and an expertise in empirical research, the Science & Technology Policy Research and Information Center (STPI) has a vision to become a national science and technology policy think tank, providing complete and rapid responses to issues and grasping global technology development trends with timely, professional, and objective analyses and advice. STPI's missions include supporting the government on S&T policy planning, facilitating the evaluation and management of national S&T programs, cultivating innovative and entrepreneurship talents and providing integrated information services. Since its restructuring in 2005, STPI has continued to support the Ministry of Science and Technology (MOST) in drafting blueprints and white papers for Taiwan's scientific and technological advancement. It is also responsible for assisting in staffing for state policy events such as the National Science and Technology Conference, and also commits to linking these policies' knowledge platforms together with industry databases, talents, and indicators. Through dual-track policy research and innovative services, these tasks will assist MOST in accelerating the national development of science and technology and the innovation of R&D achievements, enhancing the country's overall competitiveness.

NLAC 國家實驗動物中心

動物中心座落於臺北、新竹、臺南等生醫研究聚落，以符合國際標準的飼育環境及試驗場域，依在地研究需求提供跨域資源平台。在科學應用與動物福祉雙軌並進的基礎上，供應多元及跨物種的實驗動物資源。整合試驗技術及動物操作，針對轉譯醫學、藥品功效、手術驗證、高階醫材等研究範疇，客製化動物試驗場域服務，依疾病類別提供一站式的解決方案，輔助生醫產品開發，加速生技醫療產業鏈結與發展。

With bases dedicated to biomedical research in Taipei, Hsinchu and Tainan, the National Laboratory Animal Center (NLAC) has set up high standard experimental animal care and research facilities. The NLAC provides an interdisciplinary research platform concerning scientific application and animal welfare. The NLAC not only offers laboratory animal resources, but also experimental technology, animal operations, and scientific research design to cope with translational medicine, drug efficacy, medical devise and surgical validation. The center also provides one-stop solutions to drug and biomedical products test to accelerate the development and partnerships of biotech and medical industries.

NCREE 國家地震工程研究中心

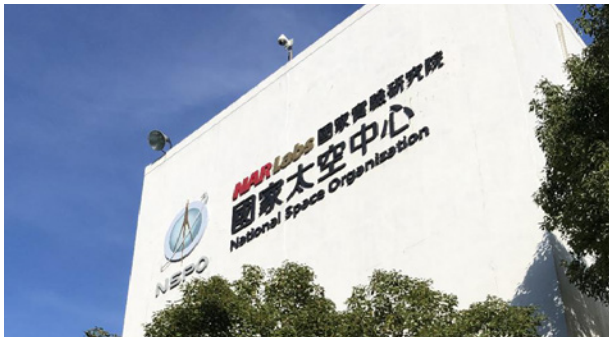
國震中心配合震前準備、震時應變、震後復建之需要，發展「結構耐震實驗及數值模擬」、「結構耐震設計及評估補強」、「地震災損評估」三大核心技術，運用大型實驗設施、實驗技術及地震資料庫之優勢，結合國內產官學研，強化國際合作。近年不論是在震前推動耐震設計規範修訂、耐震評估與補強、隔減震技術、境況模擬技術；或是強化臨震應變的地震早期預警、安全監測技術；以及發展加速震後復建的緊急救災、緊急評估技術，均有具體成果並落實應用，未來期能逐步將臺灣打造成為耐震永續家園。

In meeting the needs for pre-earthquake preparation, earthquake strain emergency response, and post-earthquake reconstruction, the National Center for Research on Earthquake Engineering (NCREE) focuses on developing three core technologies: “Structural Seismic Testing and Numerical Simulation", "Structural Seismic Design, Evaluations and Reinforcement Retrofitting", and "Earthquake Damage Assessments Loss Estimation".By employing large-scale testing facilities, coupled with advantages in experimental technology and seismic databases, the NCREE connects Taiwan’s industry, government, and academic research, and strengthens international cooperation. In recent years, all disaster relief and emergency assessment technologies have produced concrete results and applications, whether it be in promoting the revision of earthquake-resistant design codes, earthquake-resistant evaluations and reinforcement, seismic isolation and mitigation technology, and condition simulation technology; or in strengthening early warning and structure safety monitoring systems for impending earthquake strain; or in the development of emergency post-earthquake reconstruction. In the future, Taiwan will gradually be built into a sustainable, earthquake-resistant homeland.

NSPO 國家太空中心

太空中心是我國唯一負責太空科技政策執行及太空科技研發的機構，太空中心已成功執行五項衛星計畫，並完備衛星整合測試、多枚衛星操控及衛星影像處理能力。2019 年行政院正式通過第三期國家太空計畫，在這期間太空中心將發展更高解析度的光學遙測衛星、合成孔徑雷達衛星，並挑戰外太空探索任務，以期達到帶動國內太空產業，邁入國際市場；同時深耕太空教育，培養太空科技人才的目標。

The National Space Organization (NSPO) is the only institution in Taiwan that is responsible for the implementation, research and development of space technology, having successfully undertaken five satellite programs and the completion of satellite integration and tests, multiple satellite operations and control, and satellite image processing capabilities. In 2019, Taiwan’s Executive Yuan officially signed the third phase of the National Space Program. During this period, and in order to facilitate the entry of the domestic space industry into the international market, NSPO is developing higher-resolution optical remote sensing satellites, synthetic aperture radar satellites, and challenging outer space exploration missions. At the same time, it continues to deepen its goals of space education and cultivating talents within the industry.



TORI 台灣海洋科技研究中心

海洋中心致力於成為國家海洋科學探測之後盾，透過自行研發與購建核心設施及技術，蒐集臺灣周邊海域資料，並因應海洋學界與政府政策規劃所需提供探測服務。同時推動在地海洋產業加值與建構跨國研究之平台，積極以研發替代採購，進而加速達成精準探測之最終目標。

The Taiwan Ocean Research Institute (TORI) is committed to becoming the backbone for Taiwan's marine scientific exploration. Through its own research and development and acquisition of core facilities and technologies, TORI collects data from the waters surrounding Taiwan and provides exploration services in response to the needs the oceanographic field and government policy planning. It also simultaneously promotes adding value to the local marine industry and the establishment of a platforms for transnational research, while actively replacing purchase procurements with research and development to accelerate the institute's ultimate goal of accurately surveying the oceans.

TIRI 台灣儀器科技研究中心

儀科中心建構跨領域整合的儀器科技研發服務平台，針對學術界各領域進行前瞻研究與實驗之需求，開發所需之客製特殊儀器設備，以深耕基礎研究。同時，以成為「臺灣關鍵儀器研發重鎮」為目標，聚焦於「前瞻光學」、「先進真空」與「智慧生醫」關鍵技術開發，積極研發「臺灣第一」、「國際領先」的下世代半導體製程與設備、尖端國防與太空酬載系統及防疫相關儀器，為未來孕育符合數位時代社會與產業需求的高階跨領域研發人才，提升科研資源運用效能。

The Taiwan Instrument Research Institute (TIRI) constructs a cross-field integrated R&D service platform for instrument technology, developing customized instruments and equipment that fulfill academia's needs for various prospective research and experimentations in order to deepen foundational research. With the goal of being the R&D powerhouse for Taiwan's key instrument manufacturing, TIRI focuses on the development of "advanced optics", "advanced vacuum technology", and "smart biomedicine". Also, it is actively devoted to undertaking research in innovative "Taiwan No. 1" & "international leading" next-generation semiconductor manufacturing processes and equipment, as well as cutting-edge defense, space payload systems, and anti-epidemic related instruments. Moreover, TIRI cultivates future high-end cross-field talents capable of meeting the digital society demands, and improves the efficiency of scientific research resource management.

TSRI 台灣半導體研究中心

半導體中心接軌國際技術發展趨勢，引入業界下世代實戰人力需求，推動下世代電晶體技術、新穎記憶體技術、高功率元件技術、三維積體電路技術及矽光子技術等從元件、電路到系統一條龍的整合服務平台，並提供晶片設計製造環境及半導體應用驗證場域，協助 60 多所大學院校、550 位教授從事半導體相關研究工作，並藉此培育碩博士級高階研究人力，建立臺灣獨有的半導體資源生態環境，以帶動我國半導體產業的多元發展。

Adjusting to developments in the international technology, the Taiwan Semiconductor Research Institute (TSRI) introduces the next-generation practical manpower needed in the industry, and promotes the next-generation transistor technology, novel memory technology, high-power device technology, three-dimensional integrated circuit technology and silicon photonics technology. Besides the one-stop integrated service platform, devices, circuits, systems, TSRI also provides the manufacturing environment for chip design and semiconductor application verification. By assisting more than 60 universities and 550 professors' research groups to engage in semiconductor-related research work, TSRI cultivates talent for high-level research among graduated students, and establishes Taiwan's unique semiconductor resource environment to promote the diversification of Taiwan's semiconductor industry.

NCHC 國家高速網路與計算中心

國網中心以高速計算、100G 學研網路及國家級 AI 研發與雲端服務設施資源等核心能量，提供大規模共用、共享的高速運算環境，為臺灣科技能量奠基，服務產官學研發展人工智慧應用。任務願景包含持續提升設施服務（IaaS）與雲端平台（PaaS）之核心技術，快速打造產學研所需之雲端資源與研發環境，並介接整合跨域之資源合作，以推升我國產學研於運算、資料與智能應用之創新發展。

The National Computing High-performance Center (NCHC) provides a high-speed computing environment of large-scale sharing, with core capabilities such as high-speed computing, a 100G academic research network, national AI research and development and cloud service facilities and resources. This lays the foundation for Taiwan's technological capabilities, serving industry, government, and academia in the research and development of AI applications. The NCHC's mission includes the continuous improvement of its core technologies, such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS). It also strives for the rapid creation of cloud resources and R&D environments required for production, education and research, and the integration of cross-domain resource cooperation. Such endeavors promote innovative developments in Taiwanese academic research regarding computing, data and smart software.

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