國立科學工藝博物館
NATIONAL SCIENCE AND TECHNOLOGY MUSEUM

2021

NATIONAL SCIENCE AND TECHNOLOGY MUSEUM

Annual Report

2021

NATIONAL SCIENCE AND
TECHNOLOGY MUSEUM

Annual Report

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Letter from the Director-General

Taiwan has gone through the COVID-19 crisis in 2021. On May 19, 2021, given community spread and as local cases continued to rise, the Central Epidemic Command Center announced to impose Level 3 restrictions nationwide, which brought much stress and anxiety in life. The COVID-19 pandemic has had a significant impact on many industries, and our museum was also forced to suspend exhibitions starting from May 18, 2021, but gradually resumed services and activities since July 28, 2021 thanks to the slowdown of the pandemic.

The National Museum of Science and Technology (NSTM) was temporarily closed due to nationwide Level 3 epidemic alert, but set up five digital collection websites for diversified online learning resources, enabling the public to keep learning while working hard to prevent the spread of the COVID-19 pandemic. In addition, NSTM's science and education activities and camps based on STEAM (Science, Technology, Engineering, Art, and Mathematics) also switched to online teaching in response to the COVID-19 pandemic prevention measures, providing the "2021 Fun Home Science Kit", "Theme-Based Children's Science Education Self-Learning Box", and

innovative cultural and creative DIY material packages, enabling the public to easily study science at home.

During the period of suspension, NSTM not only implemented COVID-19 prevention measures, but also actively set up a vaccination station at the exhibition in cooperation with the Kaohsiung City Government from June 15 to August 28, 2021, making vaccines easily accessible in a safe and convenient location. In addition, NSTM has launched the "COVID-19 Vaccine Miniature Exhibition – Instructions for Vaccination Administration", so that the public can learn about relevant principles, the administering process, the method, and the precautions. With the slowdown of the COVID-19 pandemic, some exhibitions were reopened in September 2021. In addition to regular and timely cleaning and disinfection, NSTM also refilled hand sanitizers and disinfectant spray on a timely basis, with pandemic prevention measures including the real-name registration system, wearing face masks, body temperature monitoring, and social distancing, so that visitors can enjoy their visits and acquire new knowledge.

Although the COVID-19 pandemic has affected operations of the NSTM, all staff still actively combined resources in their respective positions to build force in implementing NSTM's operational plan, with the aim to develop more effective exhibits and achieve museum education. In 2021, NSTM received four printing machines that were originally exhibited in New Zealand Printing Museum from Taiwan's only type foundry – Ri Xing Type Foundry. This is the first time that NSTM has accepted artifacts that were donated from foreign museums. Up until now, the four printing machines have never been seen in Taiwan, and thus NSTM has a rich variety of artifacts which can be used for research, exhibition and promotion of popular science education in the future.

In addition, NSTM also launched diversified and fun exhibition themes and experience activities in 2021, which cover land, sea and airspace, as well as dynamic and static events. For example, the "Insect Kingdom Exhibition" and "Hot Snow Adventure Paradise" are very popular among children, and enable parents and children to travel through tunnels to explore an unknown world of insects, as well as to experience the thrill of snow tubing, and ski basins, while satisfying the dream of building a snowman even in the sub-tropical climate zone. NSTM co-organized the "Underwater Archaeology – Underwater Cultural Heritage Multi-media Interactive Exhibition" with the Bureau of Cultural Heritage, Ministry of Culture, which covers 360-degree photography, virtual reality (VR), and

augmented reality (AR) games, in order for more people to learn about the importance and value of underwater cultural heritage. In addition, in order to welcome the advent of the space generation, NSTM launched the new "Space Exploration", which uses immersive multimedia projection, mosaic technology and spherical projection to create a sense of immersion in the image of outer space and landing on Mars, and drive the students' enthusiasm and motivation on space technology.

As NSTM adheres to creating a friendly and safe visiting environment, it not only performs regular repair and maintenance for its infrastructure, but also joined the MOE's Service Improvement Plan in 2021, which covers seven constructions and equipment upgrading, including "Exhibition Building Exterior Steel Structure Beautification Project", "Roof Skylight and Floor Expansion Joints of the Exhibition Building Landscape Project", "Upgrading of Central Control System", "Building an International level Auditorium", "Adding Elevators with Aesthetic Designs", "Upgrading Special Exhibition Halls", and "Upgrading the 3D Theater", in order to optimize the exhibition space and visiting environment.

In 2021, the COVID-91 pandemic still engulfed the nations of the world, and Taiwan has also faced challenges during the COVID-19 pandemic. Fortunately, the Taiwanese people redoubled their efforts on pandemic prevention to get through this tough period. We hope that the COVID-19 pandemic will ease with the increase in vaccination coverage, and that all industries can recover and develop new business opportunities in 2022. NSTM continues to adopt a friendly, professional and innovative service quality policy, with the vision of building a sustainable "Green Museum" by integrating science into daily life and implementing "experience science and obtain scientific experience" on lifelong learning to achieve the goal of "training for science enthusiasts", coupled with the service attitude of "Smile, Enthusiasm, Initiative, Patience, and Accountability" to transform NSTM into a museum that people will want to visit and revisit.

Director-General

Shiunn-Shyang Chen

Annual Performance and Accolades

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Annual Achievements

Exert the function of life learning and social education in conjunction with the national education policy

2021 Taiwan Science Festival

With "Science to Serve the Society" as the theme, the Ministry of Education (MOE) and the Ministry of Science and Technology (MOST) co-organized the 2nd Taiwan Science Festival with Taiwan's five major science museums in 2021, which was supported by 20 popular science centers to enable the public to experience science.

Based on the theme of "Circular Economy", NSMT planned to conduct 41 innovative scientific activities, including the "Action! The Fight for the Earth" popular science puppet show, "Circular Paper Science for Kids", "Toy Doctor", "Circular Lifestyle Festival", "Circle Journey", and "Popular Science Market". The 9-day Taiwan Science Festival was attended by a total of 175,885 participants.

Adhere to the concept of lifelong learning by improving the learning services for all age groups

In order to work towards the target of "training for science enthusiasts", NSTM has launched myriads of science education activities, where the experiential learning approach is adopted to let the public enjoy the hands-on experience and establish the concept of incorporating science into everyday life. The aim is to promote the educational concept of "taking initiative, engaging the public, and seeking the common good", and develop parent-child popular science reading, tourism, arts and humanities adult courses, and applied science learning activities for the elderly.

Various science education activities were held inside and outside NSTM in 2021

876 activities

151,566 participants

Due to the impact of the COVID-19 pandemic in 2021, activities such as winter camps, weekend courses, field trips, and science competitions were all suspended or switched to online courses in accordance with government policies.

Fulfill NSTM's responsibility of social education and implement learning by sharing

We actively obtained social resources to launch the "NSTM Lanterns of Love", aiming at groups with special needs including citizens from Taiwan's offshore islands, remote areas, aborigines, and new immigrants, subsidizing the economically disadvantaged students to visit the NSTM free of charge, and demonstrate or lend mobile teaching kits at schools in remote areas to provide students with learning opportunities. The program generated a total donation of NT$3,575,729 in 2021. The museum education like this gives an opportunity to root science and gratitude among the disadvantaged school children from remote villages.

2021 "NSTM Lanterns of Love" served

171 schools

5,284 participants

Implement COVID-19 pandemic prevention to improve online learning services

Self-health management to implement COVID-19 prevention measures

In response to the nationwide epidemic alert announced by the Central Epidemic Command Center (CECC), NSTM conducted measures such as flexible working schedules, remote work, and work from home. In addition, we implemented related epidemic prevention measures including the appointment scheduling system, single-entry and single-exit pathways, people flow management, and cleaning and disinfection in accordance with the Ministry of Education's "Guidelines for COVID-19 Prevention in Social Education Organizations", so that people can enjoy their visit to the museum.

Keep groups of personnel apart

Cooperate with the central and local governments to set up vaccination stations

NSTM actively set up a vaccination station at the lobby in cooperation with Kaohsiung City Government. Meanwhile, for the public to understand more about the vaccinations and healthcare knowledge, the "COVID-19 Vaccine Miniature Exhibition – Instructions for Vaccination Administration" curated by the NSTM was held beside the vaccination station. The exhibition was held from June 15 to August 28, 2021, a 21-day event to assist 17,875 Kaohsiung citizens to administer the COVID-19 vaccine.

Vaccination site located at the NSTM lobby

Development of NSTM COVID-19 Prevention Online Teaching Course

Due to the impact of COVID-19 pandemic from May to August 2021, scientific and educational activities and summer camps were switched to online courses in accordance with the COVID-19 prevention policies. NSTM co-organized the "Technology is So Fun – Maker and Technology Education Carnival" science education achievement exhibition with National Kaohsiung Normal University (NKNU) from June 16 to 18, 2021, which invited a total of 100 science-technology centers to participate in the event. The live broadcast of the open ceremony attracted a total of 8,207 viewers.

2021 Fun Home Science Kit Activity

NSTM developed 11 simple scientific hands-on teaching materials and 14 teaching aids in cooperation with private scientific institutions, introducing the scientific principles through online teaching, and enabling primary school students to learn how to operate and assemble teaching kits via hands-on experience. This activity was participated in by a total of 1,400 people, which generated income of NT$1.3 million.

Stay home to help prevent the spread of COVID-19 pandemic, and access to NSTM's collections from home

NSTM has set up five digital collection websites, including "Digital Telecom Museum", "Online Ancient Lock Museum", "The Industrial Heritage in Taiwan", "NSTM Collections – Digital Value-Added Website of Technological Artifacts", and "Artifacts of Standards, Metrology and Inspection" to enable continuous learning even at home, which attracted a total of 3,415,147 views in 2021.

Ancient Chinese Locks Museum

NSTM Collections – Digital Value-Added Website of Technological Artifacts

Digital Telecom Museum

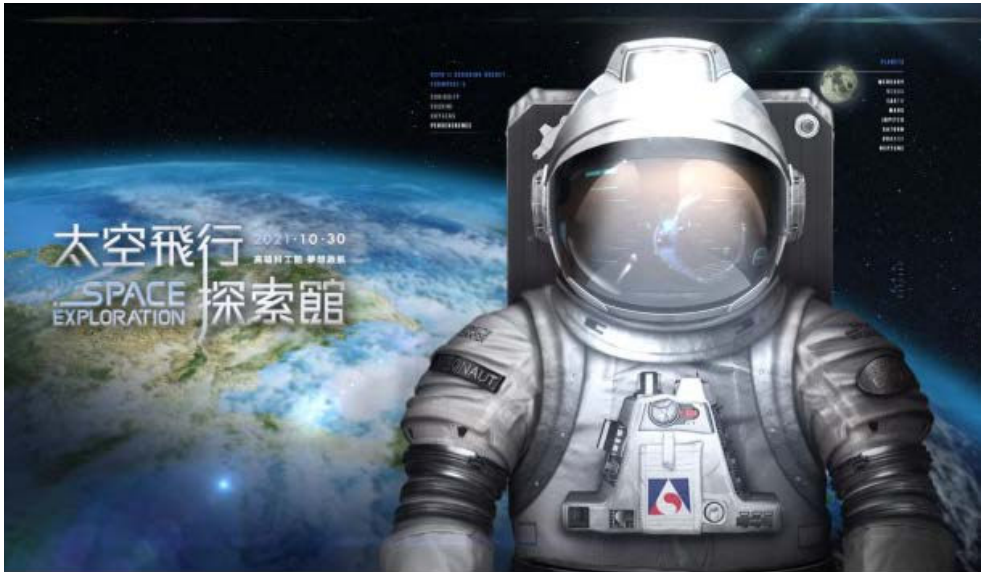
The Industrial Heritage in Taiwan

The Road to Construction of Fairness and Safety: Artifacts of Standards, Metrology and Inspection

Linked resources and multiple curated exhibitions to provide better services

Launch of the new "Space Exploration"

The exhibition covers images and videos from NASA and the National Space Organization, presenting the recent progress in space technology in Taiwan and showing professionalism in cooperation with domestic universities and colleges including National Central University, National Chiao Tung University and National Cheng Kung University.



Relocation of special exhibitions curated by NSTM to expand the benefits of exhibition

In order to deepen and strengthen science education and enable the public to increase their scientific knowledge, the special exhibitions curated by NSTM were relocated to public and private venues in Keelung, Pingtung, Taichung, Miaoli, Hualien, Chiayi, Taipei, Taitung, Tainan, Nantou, Taoyuan, Yilan and Matsu, and even Macao Science Center, which have been recognized by the public and cooperative partners and achieved successful popular science education.

Relocation of "Underwater Archaeology – Underwater Cultural Heritage Multi-media Interactive Exhibition" to Lanyang Museum

Relocation of **13** special exhibitions in 2021

served **294,176** participants

Expand the budget scale to generate more services and value

Proactive measures to raise revenue and cut expenditure

In 2021, NSTM raised revenue by NT$184,556,592 and cut expenditures by NT$44,609,773, totaling NT$229,166,365.

Raise revenue and cut expenditure

Total amount NT$ **229,166,365**

Development of potential cultural and creative products based on NSTM's collections to increase revenue

NSTM integrated its cultural artifacts and the main story themes with each exhibition hall, designed a total of 11 cultural and creative products, and jointly developed 30 cultural and creative products with collaborative exhibitions. In sum, a total of 41 products have been developed to provide multiple selections for visitors in 2021.

NSTM has set up a "Cultural and Creative Online Store", providing a cloud platform for sales and display to meet the needs of shopping without time and space limitation.

2021 Cultural & creative products total revenue generated

NT$ **3,899,023**

In pursuit of perfection for better services and raise more annual revenue

Enhance service quality to serve more people

By combining social/civil resources, we are actively developing potential visitors and disadvantaged groups, and providing a diversity of guided tour services and activities to improved service quality. There were a total of Person 1,329,033 visitors in 2021.

The total number of visitors in 2021

1,329,033

Management of social media and improvement of customer relationships

Actively adopted diverse marketing channels to cultivate target customers and attract potential visitors. Since October 2009, NSTM has established a Facebook fan page to communicate information to internet fans via social media. As of 2021, NSTM's Facebook fan page had 109,611 members, the largest number of fans within museums subordinate to the MOE. In addition, its Google Maps reviews received excellent scores of 4.4 stars (out of 5.0).

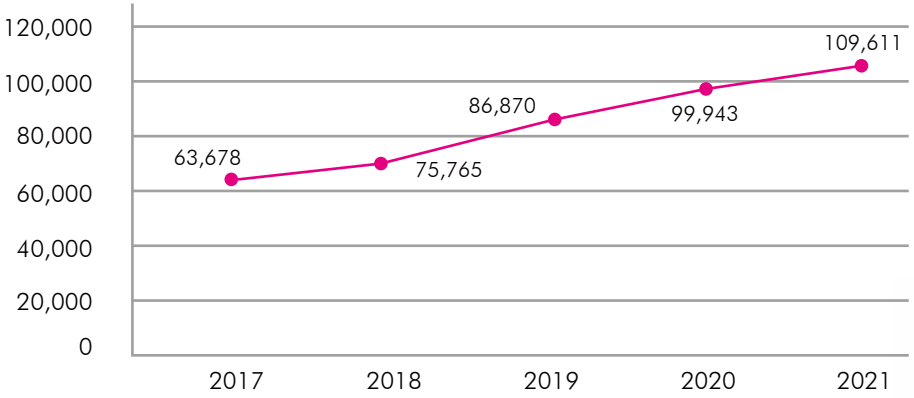


Figure 1 Total number of fans on Facebook in the last 5 years

Utilize social manpower resources to improve services

NSTM strives to manage and utilize volunteers and student volunteers more effectively in facilitating the day to day operation of the museum and offer visitors more comprehensive services. In 2021, a total of 1,194 volunteers were on duty for 120,727 man hours; 351 student volunteers accumulated 1,612 man hours of service.

Due to the impact of COVID-19 pandemic, the volunteer programs were temporarily suspended between May 16 and July 12, 2021 during nationwide Level 3 alert for the disease, but resumed work according to the ease of COVID restrictions. Hence, the combined service time rendered by social human resources was 122,339 man hours in 2021, equivalent to that of 62 full-time staff at NSTM.

Social human resources obtained were equivalent to

62

full time staffs

Active Resource Widening and Implementation of Conservation Measures

With NSTM's business management strategies, coupled with increased revenue and reduced expenditures, raised income from venue rental and creative products development, we realized additional revenue for NSTM funds. Self-raised income was NT$181,850,075 and the self-raised ratio was 50.23% in 2021.

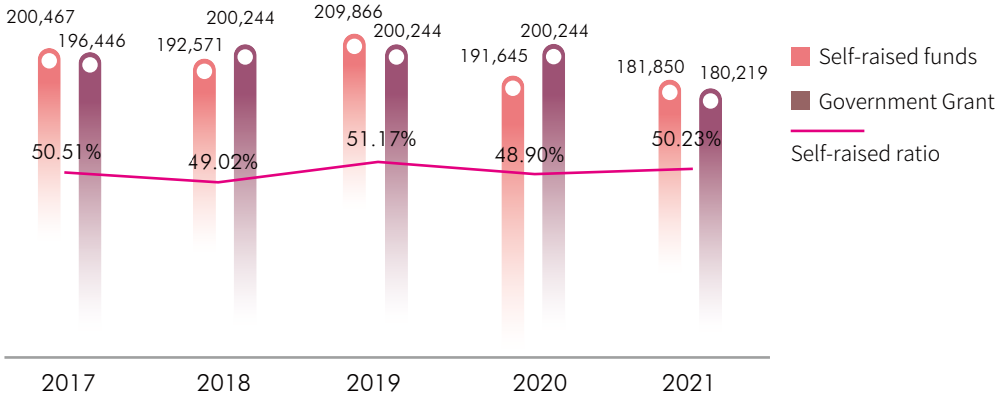


Figure 2 Self-raised income in the last 5 years

2021 self-raised funds was

NT$ **181,850,075**

Honors and Awards

1 Obtained the 2021 MOEA Energy Efficiency Benchmarking Contest Gold Award

MOEA Energy Efficiency Benchmarking Contest Gold Award

2 NSTM's *Technology Museum Review* ranked 1st in the "Imminent Journal Communication Award" and 5th in the "Long Term Journal Communication Award" of the "Academic Impact Awards" given by the National Central Library.

NSTM's *Technology Museum Review* was ranked 1st in the Imminent Journal Communication Award.

3 Ranked 1st in the MOE's Open Government Data Operations Evaluation Group 2 for two consecutive years

Ranked 1st in 2020 and 2021

4 Received the "High Quality Public Toilet Certificate" issued by the Environmental Protection Bureau Kaohsiung City Government

高雄市政府環境保護局

公廁特優場所認證

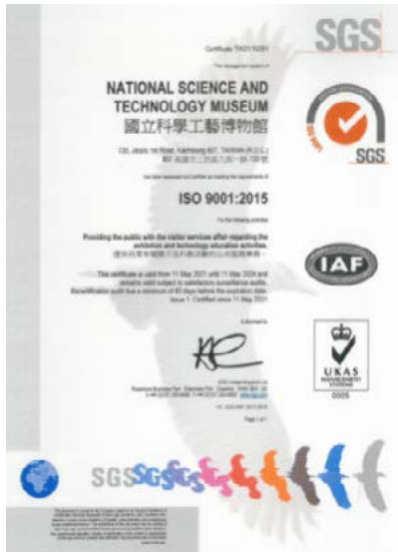
單　　位：國立科學工藝博物館
認證編號：EPA-106-0150
認證期限：110 年 7 月 01 日至
113 年 6 月 30 日止

局長張瑞琿

中華民國 110 年 10 月 14 日

High Quality Public Toilet Certificate

5 Continue to obtain qualification in 4 international certificates: "ISO 9001:2015 Quality Management System" for better on-site services, "ISO 50001:2018 Energy Management System" for better energy saving, and "ISO 27001:2013 Information Security Management System" and "BS 10012:2017 Personal Information Management System" for information security.



Obtained "ISO 9001:2015 Quality Management System Certification" for better on-site services

6 Industrial History of Taiwan: "Towards AIoT" won the 62nd Award of Excellence from Communications Arts (2021)

Towards AIoT Interactive Wall

7 Received the "Environmental Protection and Outdoor Recreation Certificate Silver Rank" from the Environmental Protection Agency of the Executive Yuan

Environmental Protection and Outdoor Recreation Certificate (Silver Rank)

8 Received a certificate of appreciation of "Excellent Performance" from the Environmental Protection Bureau of Kaohsiung City Government thanks to the zeal of promoting environmental protection

Certificate of appreciation of "Excellent Performance" from the Environmental Protection Bureau of Kaohsiung City Government

History

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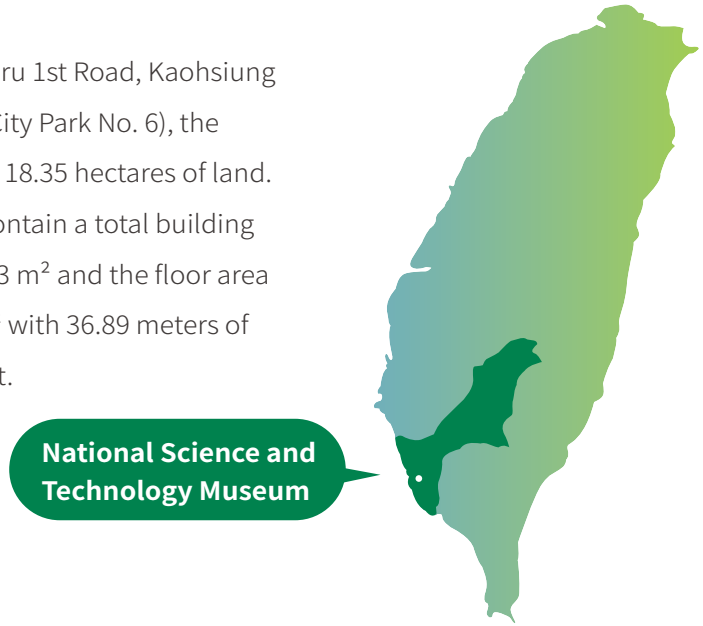
The National Science and Technology Museum (NSTM) was one of the central cultural facilities constructed in the "Project of County/City Cultural Center Construction" in The Twelve Construction Projects announced by the Executive Yuan in 1979. As the first museum of applied science in Taiwan as well as the first national institute of public education in Southern Taiwan, the focus of the museum is to collect and study scientific and technological objects, hold exhibitions related to science and technology and promote education as well as provide the public with a place for leisure and life long learning.

Located on Jiouru 1st Road, Kaohsiung City (originally City Park No. 6), the museum covers 18.35 hectares of land. The buildings contain a total building area of 20,682.83 m^2 and the floor area is 113,570.66 m^2 with 36.89 meters of structural height.



Brief Description of the Preparatory Process

❶ July 1986	The Planning Council for NSTM was established.
❷ November 1988	The Executive Yuan approved the construction plan.
❸ October 2, 1989	Construction of the museum commenced.
❹ January 1, 1997	The museum was officially established with the approval of the Executive Yuan and the Ministry of Education.
❺ July 26, 1997	The south complex was opened.
❻ September 21, 1997	The museum park was opened.
❼ November 9, 1997	The museum was opened to the public.

North Building

The building covers 15,007.55m^2. It contains the administration center, permanent exhibition galleries, special exhibition galleries, 3D Theater, Open Storage, True Dream Land, NSTM Green Shop and Green Living Exploratorium.

South Complex

The building covers 5,412.61m^2. It contains the Popular Science Library, Popular Science Café, auditorium, lecture rooms, meeting rooms and Collections Storage. The LOHAS Energy Conservation House was set up in 2009 and sits on an architectural dimension of 262.67 m^2.

Development Missions

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1 Establish comprehensive collections policies in order to collect, purchase and maintain relics of technology.

2 Increase channels for utilizing museum collections and digitize relics of technology.

3 Implement exhibit update mechanism to phase out old exhibition themes and revitalize the museum exhibits.

4 Plan science education activities and teaching aids in conjunction with education policies and school resources.

5 Strengthen public service functions, capitalize on media and community resources to formulate diverse marketing strategies and increase NSTM's visitor numbers.

6 Improve NSTM's public safety by creating an outstanding environment and enhancing service quality.

7 Automate administrative tasks and promote an online lifelong learning channel.

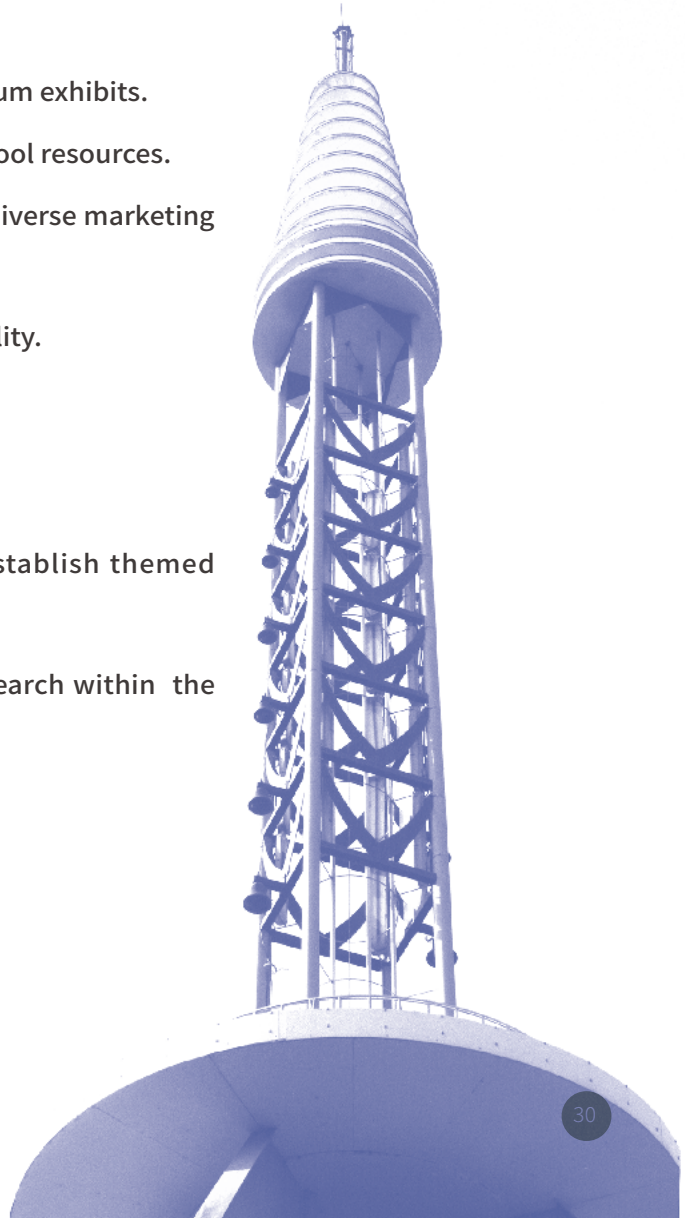
8 Reinforce NSTM's digital services and elevate work efficiency.

9 Create a digital library and provide different information through the online database; establish themed libraries on the Museum's research topics.

10 Improve inter-museum exchanges and host academic seminars to improve the standard of research within the Museum.

11 Set up a Museum Mall that combines technology, recreation and education.

12 Boost museum attendance and build a world-class museum.



Organization Structure

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Organization

Pursuant to the temporary regulations and staffing structnre of National Science and Technology Museum as promulgated by the Ministry of Education with the Letter Year (1996)Tsan- Zi 85504426 on December 30, 1996, the National Science and Technology Museum has one director-general and one deputy director-general. Under them, the Museum operates through the Exhibition Division , Technology Education Division, Public Services Division, Secretariat, Personnel Office and Accounting & Statistics Office. Further in the light of the need for development of the Museum, the Information (MIS) Task Force was established on July 16, 1998 and Collection Research Task Force was established on February 1, 2001.

Subsequently later on, pursuant to the amendment to the temporary regulations as promulgated by the Ministry of Education with the Letter TaiTsan- Zi - 0920113739A dated August 5, 2003, the Collections and Research Division was additionally established on September 1, 2003 and the establishment was approved by the Examination Yuan with the Letter Kao-Tai-Er-I-Zi 09200079281 dated September 22, 2003.

Besides, the Organizational Act of the National Science and Technology Museum was duly enacted under Order of the President of the Republic of China, i.e., Hua Tsung-I+ Zi 10100022841 dated February 3, 2012 and was put into enforcement starting from January 1, 2013 under Order YuanShou-Yen-Tsung- Zi 1012260345 of the Executive Yuan (the Cabinet) dated March 8, 2012. Pursuant to the Organizational Act of the National Science and Technology Museum, the Accounting Office was reorganized into the Accounting and Statistics office.

In light of NSTM's development needs, task forces have been formed to promote certain services:

1. The Maintenance Team was established on January 1, 2013. In December 2015, the performance of NSTM's "Maintenance Team" was reviewed; furthermore, in conjunction with the personnel number evaluation, the Maintenance Team was dissolved on January 1, 2016, in order to restore the normal manpower of various departments.

2. In 2015, in response to NSTM's long-term needs in cultural artifact restoration and inspection, and to collect technological cultural artifact in a more systematic manner, science analysis and restoration technical equipment was purchased, and the Technology Cultural Artifact Inspection Center was formed under the Collections and Research Division on April 7.

3. A Cross-departmental Cultural and Creative Team was formed on March 26, 2014, in response to the cultural and creative development needs of NSTM, and appointed dedicated staff to form the CCT on March 1, 2019, in turn opening a new chapter in NSTM's cultural and creative development and marketing.

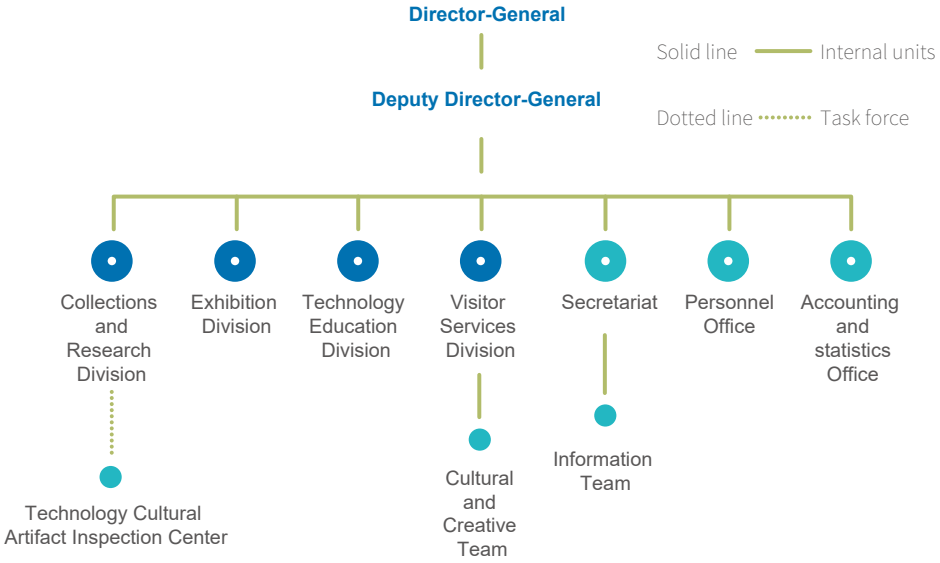


Figure 3 NSTM's Organizational Structure

Staffing

Statutory Staff

In accordance with the law, the total number of staff was 84. The museum was allowed to employ 28 professionals, 47 civil servants, 26 Senior Contract Employees, 20 Junior Contract Employees, 7 Technical Workers and 5 Support Workers, with a total of 133 statutory staff. The statutory staff analysis is showed as Figure 4.

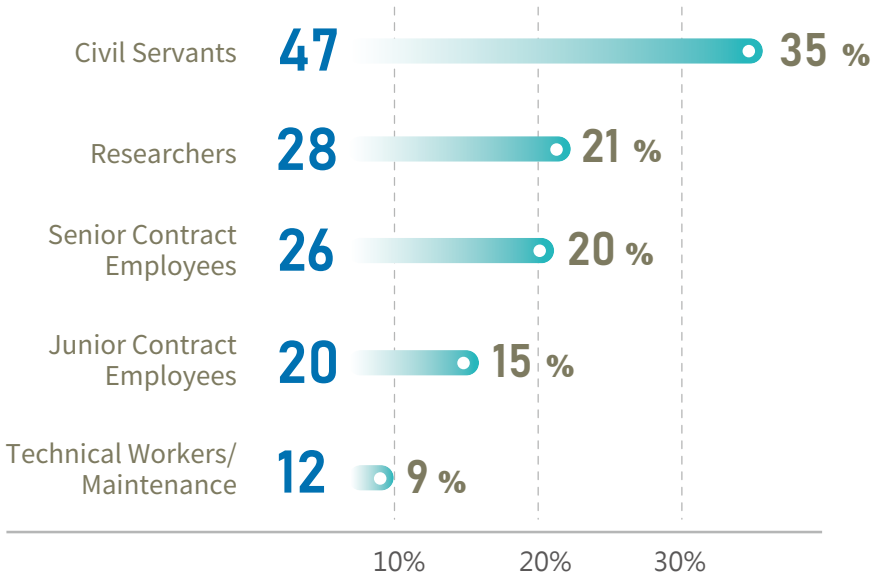


Figure 4 Statutory Staff

Current Staff

Our current staff (excluding volunteers and commissioned service companies) has a total of 124 people. (58 Males, 66 Females). The female ratio is 53%, while the male ratio is 47%. There were 9 managers (including director-general and deputy directorgeneral: 5 males, 4 females). The ratio of female managers is 44%, while the male ratio is 56%. There were 115 non-managers(53 males, 62 females). The ratio of female non-managers is 54%, while the male ratio is 46%. The managers and non-managers gender analgsis is as Table 1.

Table 1 NSTM Managers and Non-Managers Gender Analysis

	Existing Number	Males	Male Ratio	Females	Female Ratio
Managers	9	5	56%	4	44%
Non-Managers	115	53	46%	62	54%
Total	**124**	**58**	**47%**	**66**	**53%**

Additionally, there were 27 Researchers (12 males, 15 females), 43 Civil Servants (25 males, 18 females), 43 Senior Contract Employees and Junior Contract Employees (13 males, 30 females), 11 Technical Workers and Maintenance Workers (8 males, 3 females). The personnel gender analysis is as Table 2.

Table 2 NSTM Personnel Gender Analysis

	Existing Number	Males	Male Ratio	Females	Female Ratio
Researchers	27	12	44%	15	56%
Civil Servants	43	25	58%	18	42%
Senior/Junior Contract employees	43	13	30%	30	70%
Technical/ Maintenance Worker	11	8	73%	3	27%
Total	**124**	**58**	**47%**	**66**	**53%**

Educational Statistics

We currently have a total of 124 employees, out of which, there are 20 with PhDs, 56 with master's degrees, 48 college graduates or below. Our personnel educational statistics analysis is as Figure 5.

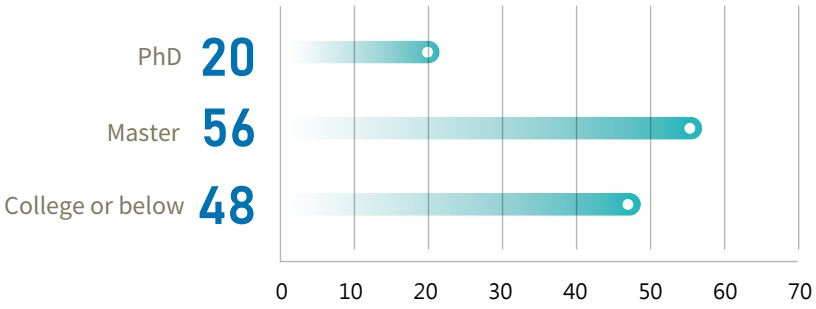


Figure 5 Personnel Educational Statistics

Researcher Backgrounds

Researchers educational statistics

We currently have 27 researchers, out of which, there are 15 with PhDs, and 12 with master's degrees. Our researchers' educational statistics analysis is as Figure 6.

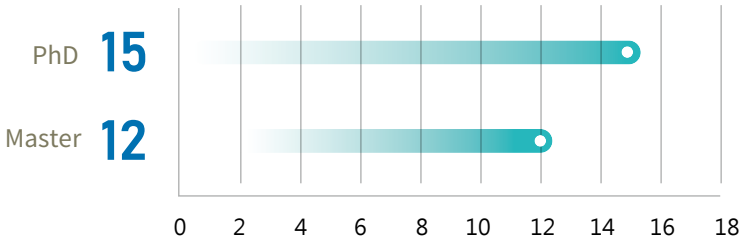


Figure 6 Researchers Educational Statistics

Researchers academic background statistics

We currently have 27 specialized personnel, out of which, 14 are affiliated with Science and Technology, 3 are affiliated with Education and 10 are affiliated with Humanities and Social Sciences. Our researchers' academic background statistics analysis is as Figure 7.

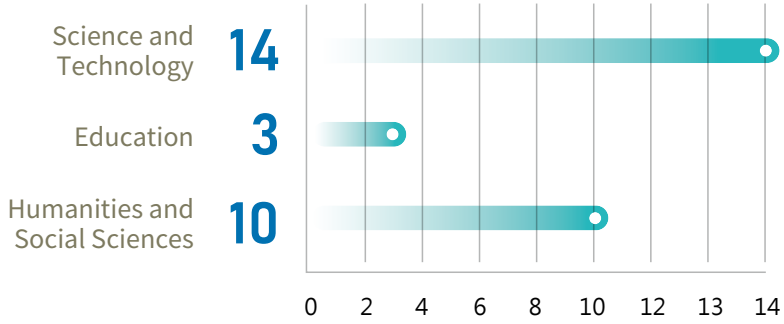


Figure 7 Researchers Academic Background Statistics

Collections and Research

2021 NATIONAL SCIENCE AND TECHNOLOGY MUSEUM ANNUAL REPORT

Under the principle of sustainability, we have actively promoted core businesses such as collection, preservation, maintenance and research. We have applied the operating spirit of "Science Experience and Experience Science" to increase the utilization rate of our collections, and provide the public with multiple services and resources.

Meanwhile, with professional inspection and maintenance, we have been actively creating cooperative opportunities with private institutions, and shaping our museum into a professional platform for research, preservation and maintenance of Taiwan's Industrial/ Technological Cultural Asset with multiple professional and customized services.

The 2021 annual operations on object studies and promotion, collection management and applications, artifacts maintenance and inspections, Open Storage, academic exchanges, research outcomes and publication statistics are as follows:

Object Studies and Promotion

In 2021, the NSTM continued the interpretation, research and promotion of our collections and industry objects, including the following themes and fields: measurement artifacts; printing industry; lock study; weaving industry; Taipower collections; telecom collections; disaster prevention-related artifacts; and broadcasting industry. The findings of the study were used in academic papers and educational promotions.

In terms of metrology, we took digital 3D photos of 15 artifacts, digitally scanned 1,021 pages of artifacts, 3 copies of Weights and Measures Movable Teaching Kits, organized the "May 20 World Metrology Day" Weights and Measures Movable Teaching Kits promotion activities, cooperated with Kaohsiung City's Nature and Life Sciences and Technology Team to conduct 2 teacher seminars and 2 campus activities, and developed 1 set of Online Weights and Measure Challenge Activity for people to instantaneously participate in the activity by scanning the QRcode with their smartphones, unrestricted in time and place.

In addition, during the Taiwan Science Festival, NSTM organized the Save the Earth – Augmented Reality Game Based on Museum Collections, and planned the Online Weights and Measure Challenge Activity which covers a series of weights and measure games based on the knowledge of aboriginals.

Online Weights and Measure Challenge Activity game image

The public experienced Save the Earth Game

For printing antiques, the "Unplugged Media" teaching kits and "Color Theory - Silkscreen Printing" challenge activity was developed to comply with the Taiwan Science Festival, providing the experience of Taiwan's early technique and culture of movable type printing and experience silkscreen printing through the process of checking the word index, typesetting and printing. In addition, we compared our artifacts Olivetti 82 Typewriter and Lego IDEAS Retro-Inspired Typewriter to recreate the way of typing in the past.

The public experienced the Lego Typewriter

The public experienced the "Color Theory - Silkscreen Printing" challenge activity

Hopkinson and Cope Demy Albion printing machine

For cultural artifacts related to printing, Mr. Chang Chieh-Kuan, the owner of Taiwan's last type foundry - Ri Xing Type Foundry, donated a total of 4 printing machines and cultural artifacts from the New Zealand Printing Museum, including 2 sets of English casting machines (Intertype C4, Linotype 78), 1 set of printing machine (Hopkinson and Cope Demy Albion) and 1 set of folding machines (Cundall Folder) to NSTM on August 3, 2021. Currently, these 4 sets of printing machines were never collected in Taiwan. Among them, two of the machines are English casting machines (Intertype C4, Linotype 78) used in the 1960s, known as the 8th Wonder of the World in the historical development of printing technology. The casting machine is a machine used for "line casting". The name of the machine comes from the fact that it produces an entire line of metal type at once, hence a line-o'-type, a significant improvement over the previous industry standard. This is the first time that NSTM has accepted artifacts that were donated from foreign museums.

Hopkinson and Cope Demy Albion printing machine

Through the locks and antique machinery research project "Design and Promotion of the Teaching Plans and Teaching Aids of Ancient Barbed-springs Locks", NSTM studied the historical development of ancient barbed-springs locks, analyzed the designs, and performed lock restoration. Meanwhile, NSTM developed 2 lock DIY teaching kits including the Owl Treasure Box and Cabin Money Box and published 2 journal papers.

In addition, it also used the research results of NSTM's ancient locks and ancient Chinese crossbows, coupled with the Taiwan Science Festival and indigenous scientific and environmental knowledge to design related software and hardware for "Warrior Legend – ARNOS", covering four activity challenges.

" Warrior Legend - ARNOS "challenge

Owl Treasure Box

Cabin Money Box

Along with the effective "2021 Telecom and Museum Cooperation Plan", NSTM digitized 7,140 pages of the ancient references, finished photo shooting for the 54 objects exhibited in the Telecom Hall, revised 118 items of literature, inventoried 655 items of literature in temporary custody, and uploaded 46 oral history interviews. At the same time, the NSTM reviewed, expanded and rectified the website of the Digital Telecom Museum, established the "Telecom@Taiwan Online" VR guiding website and held 3 online promotion activities.

Web image on the "Telecom@Taiwan Online" virtual exhibition

Telecom Artifact Digital Photography

Disaster prevention science and technology artifacts are facing upwards. In order to establish a science and technology cultural artifacts collection mechanism in Taiwan, NSTM obtained disaster prevention collection from relevant disaster management agencies including the Central Weather Bureau of the Ministry of Transportation and Communications and the Water Resources Planning Institute of the Water Resources Agency, Ministry of Economic Affairs after the launch of the National Science and Technology Disaster Reduction Project in Taiwan.

NSTM signed the "MOU for Meteorological Artifacts Collection and Exhibition" with the Central Meteorological Bureau of the Ministry of Transportation and Communications. Based on the MOU , the Taiwan Earthquake Research Center donated 11 mechanical seismographs in 2021, which recorded many major earthquakes in Taiwan.

NSTM invited experts from the Central Weather Bureau to guide the assembly of 3 sets of seismographs, including Omori-horizontal, Wiechert vertical and Wiechert horizontal to learn about the operating mechanisms and various components. Subsequently, 4 seismograph artifacts were inspected and conserved thoroughly, including the Omori strong motion seismograph (V:2), Omori-horizontal, and Wiechert vertical and horizontal seismographs.

Transport of mechanical seismograph

Transport of mechanical seismograph
Invite experts to provide guidance for assembly and repair seismographs

We have collected artifacts related to the Water Resources Agency, MOEA Water Administration, and received 13 water resources planning instruments donated by the Water Resources Planning Institute, which were NSTM's first batch of collection related to water conservancy and disaster prevention. The "Water Conservancy Artifacts Collection Record" was used to record the delivery process of artifacts into NSTM, followed by conservation and inspection. Meanwhile, the large-scale triaxial compression for Zengwen Reservoir was the only disaster prevention infrastructure in the past. After completing the "Interview of Large Scale Triaxial Compression Cultural Relics" video, we also organized the "Water Knowledge - Water Conservation and Disaster Prevention Artifacts Exhibition". During the exhibition, NSTM's science education activities combine the Water Conservation Month Project to promote the concepts of water saving and disaster prevention and thereby enhance public awareness on disaster preparedness.

Open ceremony of the "Water Knowledge - Water Conservation and Disaster Prevention Artifacts Exhibition" in the Open Storage

Large scale triaxial compression for the construction of Zengwen Reservoir

For soil and water conservation and disaster prevention, the Soil and Water Conservation Bureau (SWCB) of the Council of Agriculture, Executive Yuan completed interviews with 7 seniors and experts of soil and water conservation. NSTM investigated in the collection of water and soil conservation and disaster prevention from SWCB since it was established as the Mountain Agricultural Resources Development Bureau, and organized the "Precautions and Monitoring - Soil and Water Conservation Measures and Landslide Disaster Prevention" Artifacts exhibition, and the Slope Protection - Environmental Monitoring Station educational promotion activities, providing group tour guide services to promote the concept of soil and water conservation and landslide disaster prevention.

Interviewing senior experts on soil and water conservation

"Precautions and Monitoring - Soil and Water Conservation Measures and Landslide Disaster Prevention" artifacts exhibition

For the broadcasting industry, 51 broadcasting products such as cameras, TVs, tapes, and CDs were added to the collection, and researches related to scientific principles and visitor experience were conducted for the camera and Pinhole Camera Kits experience activities, of which 1 was published.

Meanwhile, the film equipment collections were exhibited in the "Cine Equipment Exhibition" to show the technical products in Taiwan's professional, educational and home movies industry from the 1950s to the 1990s, broadcasting the national anthem video before movies in the 1980s so that visitors can view images of the political propaganda, major constructions and social life patterns in Taiwan 30 years ago.

Carbon arc film projectors used in movie theaters in the 1950s

In addition, for the collection, preservation and maintenance of cultural relics and cultural properties of the Taiwanese film industry, NSTM has signed the MOU with the Tainan National University of the Arts to promote activities related to social science, culture, education.

In cooperation with the Taiwan Science Festival popular science fairs, the Multi-Media Center of National Tainan University of the Arts drove the "Home Movie Car" truck to NSTM for the first time, promoting film collections with the cultural artifacts of NSTM and Multi-Media Center, which thereby arouse greater awareness on video records and save visitors' life memories.

Preservation of "Home Movie Car" truck tour propaganda video and cultural resources

In addition, NSTM advocates its expertise in collection and conservation to collaborate with Hemei Township Office (HTO), Changhua County and Keelung Branch of Service, Taiwan Power Company (TPC).

The accomplishment of cooperation with HTO duplicated one historical handed loom which stored in Hemei Library and provided Hemei High School students' teaching materials to explore their hometown.

NSTM also obtained the bidding project "Archives' Freezing Process and its Digital Work" commissioned by TPC Keelung Sales Office to assist Keelung Office to establish its own archival storage, with more than 25,000 documents during the period between 1950s and 1960s, as well as technical documents of electricity supply diagrams for extraction equipment in Keelung mining Areas of northern Taiwan.

Handed loom operated by visitor

Archival storage in Keelung sales office, Taiwan Power Company

Collection Management and Applications

Since NSTM was opened in 1997, we have adjusted various collection management systems over the years, resulting in the comprehensive system of today. In 2021, 124 items from 47 batches of artifacts were added to the collection, and 1 technology artifact "Crossed Molecular Beam Apparatus" will be submitted to NSTM as the National Treasure.

Given that NSTM systematically collects artifacts that has won the National Invention and Creation Award, with cultural artifacts that went through standard inspection and received donated TVs in Taiwan. There were 122 artifacts added to the collections in 2021, while the annual accumulated collection has reached 53,496 items. In addition, 13 artifacts were in temporary custody by Chunghwa Telecom. Table 3 illustrates the collection statistics over the last 5 years.

"Crossed Molecular Beam Apparatus" submitted application as the National Treasure

Collected artifacts in 2021

Table 3 Collection statistics over the last 5 years

Item / Year	Total	Collected	Purchased	Donated	Transferred	Others	Annual Accumulated Number	Temporary Custody
2017	405	30	0	329	46	0	41,798	0
2018	2,337	3	2,002	306	26	8,415	52,550	0
2019	412	31	195	166	20	0	52,962	2
2020	412	3	0	409	0	0	53,374	0
2021	122	19	0	64	39	0	53,496	13

In order to increase the visibility and utilization rate of our collections in 2021, 1,103 exhibits and telecom artifacts under NSTM's temporary custody were displayed in the permanent exhibition hall (including public space exhibitions), 8 exhibits were loaned to other museums, 1,559 exhibits were displayed in the Open Storage and 338 exhibits were used in the Open Storage's monthly promotional activities, which achieved outstanding performance. Table 4: Illustrates the utilization statistics of technology artifacts over the past 5 years.

Table 4 The utilization statistics of technology artifacts over the past 5 years.

Item / Year	Total	Research	Teaching	Exhibition*	Others**
2017	4,101	2,020	0	1,747	340
2018	10,019	6,080	0	1,954	1,985
2019	5,293	150	0	2,753	2,390
2020	10,785	138	0	3,084	7,563
2021	4,870	102	0	3,008	1,760

*Internal/external exhibitions, including Open Storage exhibits and telecom exhibits under NSTM's temporary custody.

**Including digitization, maintenance, inspection, picture loaning, cultural and creative application.

Artifacts Conservation and Inspection

NSTM has been devoted to the systematic collection of technological antiques, artifacts conservation and analysis, provision of professional advice on the preservation of cultural artifacts and training of preservation specialists. We have been playing an essential role in South Taiwan's technological cultural asset conservation.

Assisting the Sihu Cantian Temple in Yunlin County on microscopic inspection of the Japanese Shrine

Printing and data interpretation of rune plates

Conduct various internal operations such as artifact inspections, packaging, transport, display and exhibition space adjustment to comply with the museum's special exhibition activities and supported 1 domestic loan exhibition and 2 self-exhibitions and a total of 128 artifacts were cataloged.

NSTM has launched the Artifact Condition analysis service since 2015. In 2021, portable X-ray detectors, XRF handheld analyzers and non-destructive instruments were used to support external units on artifact analyses for conservation and prevention. In addition, we also take external commission for restoration and research projects, including strategic alliance with Feng Chia University, and assisting in artifact inspections of temples in Yunlin and Chiayi and arranging a number of materials analysts to assist in on-site inspection.

Meanwhile, there are restoration demonstrations in our Open Storage from Tuesday to Friday and we have a live show of the restoration process on the TV at the entrance of Open Storage so that visitors can see how our collections are conserved and prevented from the monitor outside the Open Storage.

Besides 31 inspections, we conducted 10 charged analysis and conservation services as well as 6 artifact conservation workshops in 2021. This not only showed our specialty in the preservation of technological artifacts, but also generated additional revenue for the museum and promoted the knowledge and technique of the preservation of historic artifacts.

Assist CPC Corporation for investigation and maintenance at the Blueprint Cultural and Creative Park

X-ray fluorescence (XRF) analyzer for detecting the paint ingredients of the faces of god statues

Open Storage

Open Storage was completed in 2009 and incorporated into NSTM's experience facilities in July 2010 and officially opened to the public. Unlike storage in conventional museums that are normally closed to the public, NSTM's Open Storage uses the new display mode of "Visible Artifacts" which combines functions on collection, research, display and education. A wide range of experiential activities were also conducted to enhance people's understanding of the scientific principles behind the artifacts and their applications.

In terms of the special tour guide team, we have appointed considerate and professional oral guide services for the visually impaired. In 2021, QR Code oral videos have been added to the Open Storage, which covers prototype submeters, balances, letterpress and full-size IDF wood models and we started to provide relevant services since May 2021.

Visually impaired visitors at the Open Storage

NSTM was closed from May 16 to July 12, 2021 due to the impact of COVID-19 pandemic. From July 13 to October 24, 2021, the exhibition hall tickets were priced at NT$50, whereas the Open Storage is free of charge, but temporarily closed since October 25, 2021 in conjunction with the "Renovation of Open Storage Upper Storage Rack and Exhibition Space". In 2021, NSTM held 6 collection exhibitions and 12 collection promotion activities, with a total of 40,442 visitors. Table 5 shows the service performance of Open Storage over the past 5 years.

Table 5 Service performance of Open Storage over the past 5 years

Year	Number of visitors	Income generated
2017	14,786	122,930
2018	10,886	72,370
2019	12,746	128,780
2020	9,100	110,590
2021	40,442	24,665

Academic Exchanges

On October 27-29, NSTM and 8 organizations including the Graduate Institute of Conservation of Cultural Relics and Museology of Tainan National University of the Arts, NCKU Museum, the Department of Theater Arts of National Sun Yat-sen University, the Asia-Pacific Heritage Preservation and Restoration Start-Up Technology Research Center of Cheng Shiu University, Chinese Association of Museum and its Conservation Committee, and the Department of Communication Arts & Graduate Institute of Creative Arts Industries of Wenzao Ursuline University of Languages jointly held the "2021 International Conference on Professional Development in Museums". The conference invited 3 foreign and 7 native speakers to give lectures, providing a professional seminar platform and published 60 papers to enable participants to further exchange information and acquire new knowledge.

Research Outcomes and Publication Statistics

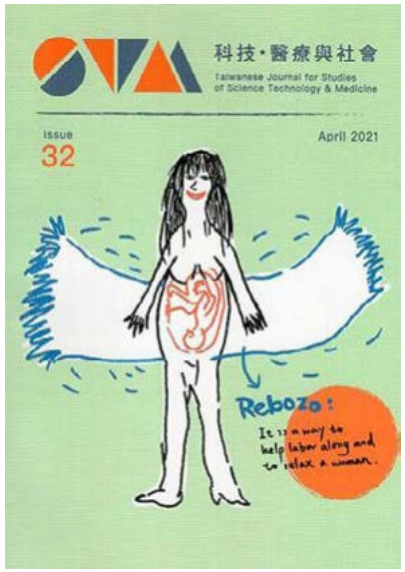
For the research findings in 2021, a total of 35 journal papers, 45 conference papers, 2 books and 6 other publications were published. NSTM also participated in 16 research projects. The devotion and effort of the NSTM personnel proved to be beneficial to museology-related fields. Table 6 illustrates the research findings and publications over the past 5 years.

Table 6 Research findings and publications over the last 5 years

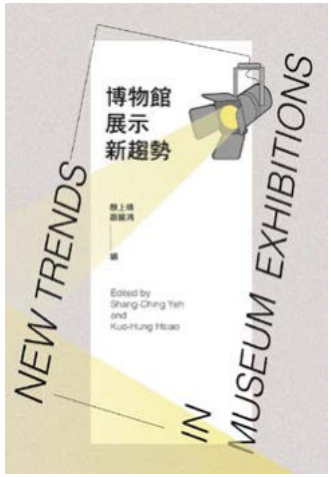
Item / Year	Journal Papers	Conference Papers	Research Projects		Invited to Academic Lectures	Publications					Symposiums siums	Lectures tures
			NSTM Personnel as Hosts	NSTM Personnel as Participants		Books	CDs	Text Messages	Folded Leaflets	Journals		
2017	43	47	21	6	24	6	0	0	2	2	4	45
2018	36	42	30	5	5	1	0	0	4	2	11	6
2019	33	40	22	7	19	5	0	1	7	2	2	21
2020	33	35	10	6	2	5	0	1	3	2	1	17
2021	35	45	11	5	5	2	0	1	3	2	2	18

Since the initial publication in March 2001, the *Taiwanese Journal for Studies of Science, Technology and Medicine*, issued by the NSTM and published by the Taiwan Science, Technology and Society (STS) Association, has been a major journal in the field of science and technology. In addition, NSTM's *Technology Museum Review* have won the "Imminent Journal Communication Award" and "Long Term Journal Communication Award" of the "Academic Impact Awards" given by the National Central Library in 2021.

NSTM's *Technology Museum Review* have won the "Long Term Journal Communication Award" (left) and "Imminent Journal Communication Award" (right)



NSTM's *Technology Museum Review* (left) and the *Taiwanese Journal for Studies of Science, Technology and Medicine* (right)



Books published in 2021

In addition, the *New Trends in Museum Exhibitions* was published in cooperation with external units, which contains special papers for co-organized conferences in 2020 with the aim to expand exhibition knowledge, which can be applied to museums in Taiwan.

Exhibitions

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NSTM introduced a total of 58 exhibitions, fully renovated 1 permanent exhibition hall, partially renovated 4 permanent exhibition halls, as well as conducted 6 special exhibitions (including miniature exhibitions) curated by NSTM and 15 exhibitions in the Art Exhibition Area. We also introduced 18 activities in permanent exhibition halls, as well as 4 activities in exhibition halls in conjunction with festivals. A total of 453 activities were launched in 2021, with 18 teaching aids and DIY packages. By constantly maintaining the exhibits and expanding the intelligent inspection system, we have achieved a normal exhibit functioning rate of over 98.97%. Refer to Table 7 for the number of exhibitions organized and permanent exhibition hall renovations over the past 5 years.

Table 7 Number of exhibitions organized and permanent exhibition hall renovations over the past 5 years

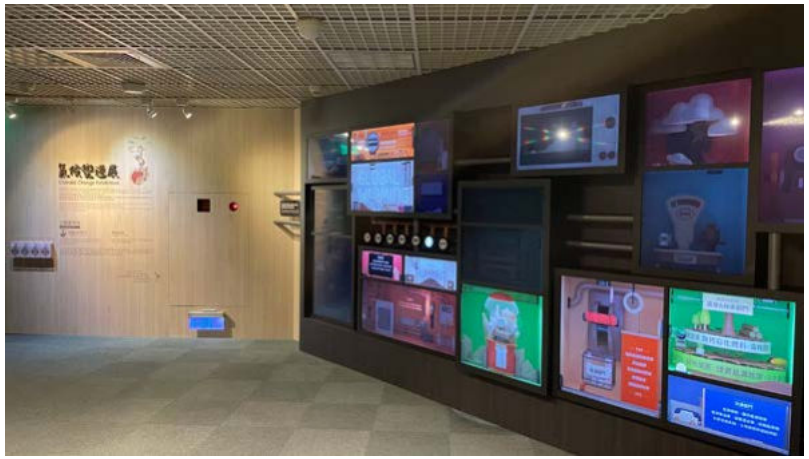
Item	2017	2018	2019	2020	2021
New Permanent Exhibition	1	1	0	0	1
Exhibit Renewal	10	10	9	7	4
Special exhibitions curated by NSTM (including miniature exhibitions)	8	2	5	6	6
Art exhibition area	8	17	11	22	15
Collaboration (charged) exhibitions	13	4	4	4	3
Touring exhibitions	9	14	11	11	23
Others	4	2	4	0	6
Total	53	50	44	50	58

Permanent Exhibition Hall Renovation

1. Partial renewal of the "Climate Change" Exhibition Hall

The renewal was made mainly focused on the topics of "UN Sustainability Goals," "Global Warming Responses Strategies" and "The Circular Economy". Through simple wording and interactive displays enabled more people to understand the governmental policies, industrial development and global issues. After analyzing the potential causes and countermeasures of global warming, we know there is close relationship between the circular economy and our daily lives. And to explore more about the industry, government and academic institutions engaged in the R&D of professional technology behind the circular economy can help us to slove some problems of the planet.

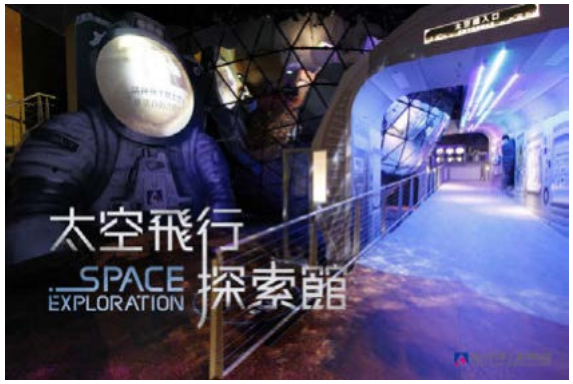
Circular Economy and innovative technology



Global Warming

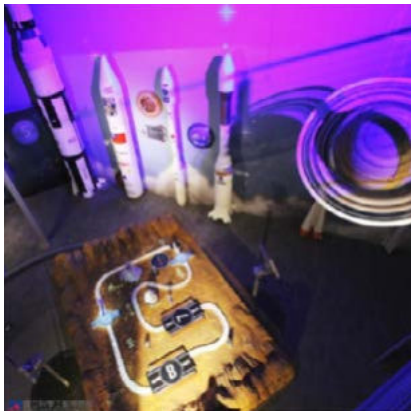
2. Space Exploration

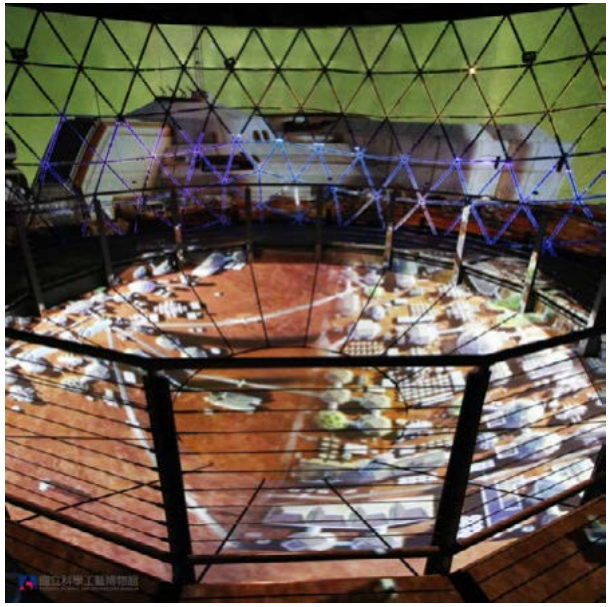
After accompanying students for more than 20 years, "Air Navigation & Aerospace" exhibition hall was closed in 2021. In the advent of the space age, the NSTM officially introduced "Space Exploration" to the public on November 6, 2021. It combines the "Space Dream" and "Martian World" story line to introduce "Colonization of Mars", "Life in Space", "Advanced Space Technology Mission", "Evolution of Aircrafts and Aeronautics Principles" and "Space Development in Taiwan". With large projection screens and mosaic technology to simulate the Martian environment, the immersive spherical projection theater to introduce the exhibition components, virtual and real features integrated in light sculptures to demonstrate the evolution of aircrafts, the augmented reality (AR) interactive experience to learn advanced space exploration, space-themed 4D dynamic cinema inspires the space dreams, and multimedia electronically controlled thin film technology to show the R&D of space technology in Taiwan, it hopes to drive the students' enthusiasm and motivation on space technology in the new generation.



Entrance of Space Exploration

F-104 Starfighter and virtual reality light sculpture


Advanced space mission experience


360 ° spherical projection theater

3. Renewal Exhibits of Motors and Prime Movers in the "Power and Machines" exhibition hall

NSTM extended the issues and applications related to Taiwan's industrial development, including AI and IoT and combined the prime mover and generators and motors of the "Power and Machines" to demonstrate the historical development of related technologies and applications. Besides, educational activities with new science knowledge of motors were conducted for the visitors to understand the evolution of motor technology and cultivate their abilities of logical thinking. In addition, exhibits including the steam and diesel engines at the prime mover exhibition were also renewed.

Renewal of the motor exhibits

Renewal to the steam engine exhibits

4. 5G AR Guide for "Telecom@Taiwan" Exhibition Hall

In 2021, an exclusive exhibition area was set up to introduce the latest 5G technology. 5G technology features large-capacity transmission, low latency, and massive IoT, which brings the possibilities of technological improvement, such as unmanned vehicles, AR (augmented reality), VR (virtual reality) and drone applications. VR and AR are commonly seen in museum exhibitions, by immediate massive transmission of visual images and data, visitors are allowed to have more in-depth interaction with the exhibits. Thanks for the help from Chunghwa Telecom for establishing a 5G base station in "Telecom @Taiwan" exhibition hall, so visitors can use the 5G AR guide equipment to know different telecommunications artifacts through interactive challenge games with fun.

5G exhibition

5G AR guide

5. Nobel Prize Area

The Nobel Prize has been awarded since 1901. It has become the world's most prestigious award and symbol of the superior performance of human intelligence, with significant contributions to fundamental sciences and medical research. The Nobel Prize winners are announced in early October each year. As such, NSTM has set up the Nobel Prize Area at the west corridor on the first-floor area to exhibit the latest annual Nobel Prize winners for physics, chemistry, physiology or medicine, literature, peace and economics, introduced the winners' achievements, allowed visitors to find out about the 2021 Nobel Prize laureates.

Various laureates of the 2021 Nobel Prize

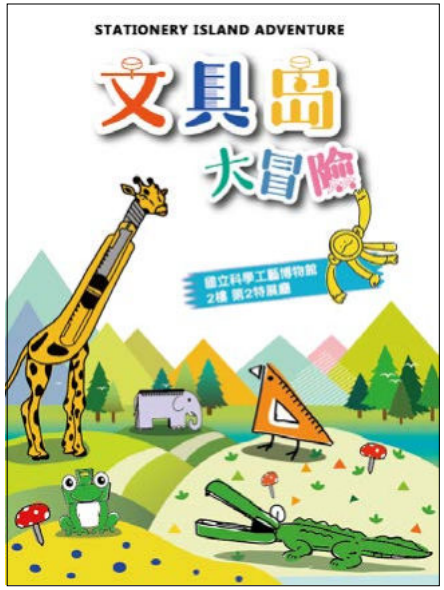
Special Exhibitions Curated by NSTM

1. Stationery Island Adventure

With the theme of "stationery, cultural creativity, and design", the stationery island rich in knowledge and fun was created to link the history, science and creativity of stationery. Stationery with historical significance and stories were exhibited and many cute animals on the island were transformed from stationery such as scissors, erasers, utility knives, etc. There were also various settings such as "tunnel", "forest", "tribe", "swamp", "grasslands", etc., for the visitors to have hands-on activities and take beautiful pictures.

When entered the exhibition, the visitors received an adventure lamp, an exhibition map, and hands-on materials, visitors can follow the instructions on the map and complete various hands-on activities and tasks in this specially designed exhibition hall and learn about stories behind the invention of stationery, its scientific principles and the scenarios for actual application. Enormous stationery installation arts were also available to take photos as mementos. There were precious stationery collections of many well-known stationery collectors, artists, and influencers, as well as the printed classic collections of the NSTM that attracted you. Souvenir shop was set up in the exhibition hall to sell limited edition stationery and carefully selected goods. We welcome everyone to take on this stationery adventure!

This special exhibition was originally scheduled to be held from June 26 to November 28, 2021, but postponed to August 11 to September 1, 2021 due to the impact of COVID-19 pandemic. Subsequently, it was temporarily closed due to renovation of the exhibition hall and was opened again from January 15 2022 until March 13, 2022.



Stationery Island Adventure

2. Glory of TANG PRIZE Laureate and Diploma Exhibition

NSTM once again cooperated with the Tang Prize Foundation. From February 4, 2021 to February 5, 2023, the "Glory of TANG PRIZE Laureate and Diploma Exhibition" was opened at the east corridor on 1F, with simple and understandable introduction, multimedia (audio and video), scenario experience, and letter writing activities, enabled the public to understand contributions and achievements of the winners of the 4th Tang Prize.

This exhibition was mainly divided into five areas: Entrance Image, Introduction to Tang Prize, Winners of the 4th Tang Prize, Tang Prize Designs and Stories of the Winners. The "Introduction to Tang Prize" recorded the spirit, historical development and award categories of Tang Prize, as well as the introduction previous Tang Prize Laureates. In addition, it also provided a supplementary information to compare between Nobel Prize and Tang Prize. The "Winners of the 4th Tang Prize" used award scenario simulations to leads visitors to understand the winners' contributions and achievements, incorporating the winners' views on the COVID-19 pandemic and words of encouragement for the youth.

Glory of TANG PRIZE Laureate and Diploma Exhibition

3. Underwater Archaeology: Underwater Cultural Heritage Multi-media Interactive Exhibition

This exhibition was jointly organized by the NSTM and the Bureau of Cultural Heritage, Ministry of Culture, and was first relocated to Southern Taiwan with the theme of underwater archaeology, creating scenarios by the use of advanced multimedia technologies including underwater artifacts 360 degree photography, virtual reality (VR) and augmented reality (AR) games, which demonstrated the scenes for underwater archaeology. The exhibition was divided into six themes: "Underwater Time Capsule", "Explore Taiwan", "Underwater Archaeological Sites", "Technologies for Underwater Archaeology", "Uncovering Shipwreck Secrets", and "Promoting Sustainability". This exhibition demonstrated the historical shipwrecks in Taiwan and the achievements of underwater archaeology in recent years, so that more people can learn about the importance and value of underwater cultural heritage and established a consensus in preserving and protecting Taiwan's unique maritime history and culture. This exhibition was opened from February 5, 2021 to May 9, 2021 at NSTM's 1st exhibition hall (on 2F), attended by a total of 33,186 visitors.

Underwater Archaeology: Underwater Cultural Heritage Multi-media Interactive Exhibition

4. Revitalizing Public Space: NSTM Collection Exhibition

NSTM has collected more than 50,000 items, some are exhibited in the permanent exhibition halls, such as "Industrial History of Taiwan", "Power and Machines", "Adventures in Health Land", "Telecom@Taiwan" and "Textile and Clothing" and rest of them are stored in the storage rooms. In order to increase their visibility and revitalize the public spaces, NSTM collections are designed and displayed as a special exhibition in the corridors for the public to know their beauty and diversity.

Collection treasure display

5. Small-scale Exhibition for Current Events

Since science is everywhere in everyday life, the rapid changes in society, and the advancement in science and technology bring about additional grand events anytime and anywhere. Thus, the cost-effective and rapidly curated miniature exhibitions have become the best solution for NSTM to respond to current events. In 2021, there were 2 miniature exhibitions.

(1). COVID-19 Vaccine Miniature Exhibition

Due to the spread of COVID-19, NSTM supported the vaccinations by opening the main lobby on the 1F as a vaccination station. In order to let the public understand more about the vaccinations, NSTM organized the "COVID-19 Vaccine Miniature Exhibition: Instructions for Vaccination Administration" at the corridor on 2F, which was held from July 12 to August 31, 2021. People who come to visit NSTM or administer the COVID-19 vaccine can learn about relevant principles, the administering process, the method and the precautions. In addition, NSTM also provided QR code for relevant information for visitors to scan and understand the differences between various COVID-19 vaccines and to clarify the false information. The public can have onsite experience of watching people get vaccinated on the 1F while viewing the COVID-19 Vaccine Miniature Exhibition on the 2F.

Small-scale Exhibition for COVID-19 Vaccine

(2). Wolbachia: The Biological Prevention Strategy

NSTM co-organized a special exhibition "Wolbachia: The Biological Prevention Strategy" with the National Mosquito-Borne Disease Control Research Center of the National Health Research Institutes to introduce a new biological prevention technology for dengue fever. It used pictures and texts for the public to easily understand the strategy and used scientific questionnaires or guides to keep track of their opinions for the prevention strategy. This exhibition was not only held at the NSTM, but also at the Wujia Community Activity Center (April 7, 2021) in conjunction with the health promotion courses organized by the Disease Control Office of the Department of Health, Kaohsiung City Government and the lobby of the Department of Health, Kaohsiung City Government (from April 16 to May 19, 2021).

Wolbachia: The Biological Prevention Strategy

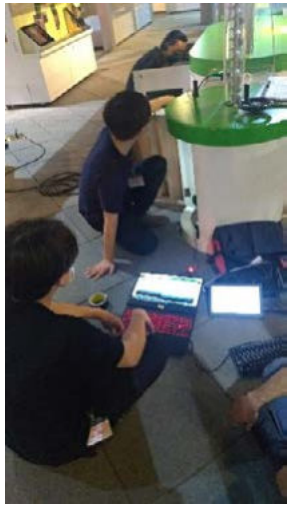
Intelligent Maintenance and Management: Cooperation and Experience Inheritance

In addition to positively maintaining normal operations for each exhibition, the maintenance team members continuously enhance their abilities through cooperation and experience inheritance. By using their professional skills, the maintenance colleagues develop souvenirs and conduct courses with featured exhibits. Besides, the functions of the smart inspection system are constantly improved. In 2021, in response to the increasing external cooperation opportunities, at least 23 relocations were conducted by maintenance colleagues. It not only saved costs, but also efficiently managed the schedule and improved their professional skills. In addition, the maintenance staff completed computer dust removal during the epidemic from May to June 2021 and a total of 77 computers were cleaned.

1. Improvement of the intelligent inspection system

In 2021, intelligent inspection system was upgraded using the fund of "Intelligent Inspections and Environmental Safety Upgrade Sub-Project 3: Smart Inspection System for the Exhibition Hall". NSTM performed evaluation for the exhibits monitoring software detection and installation, and completed the installation of report controllers at the Power and Machines Exhibition Hall: Multiple Designs of Motorcycles and the Open Sesame Science Exploration Center: Normal Distribution. In addition, there were automatic software reports from the Linux operating system for 4 exhibitions including: the Speed Reducer, Ball Screw Spline, and End Effector exhibits in the Power and Machines Exhibition Hall and the Window of Medical Technology at the Adventures in Health Land Exhibition Hall.

Computer cleaning



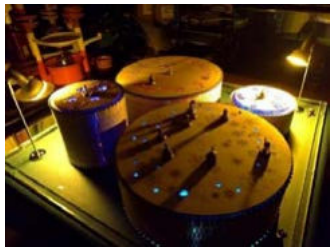
Expansion of the intelligent inspection system

Expansion of the intelligent inspection system

2. Self-curated exhibits

Oximeter: 660 nm (red) and 940 nm (infrared) light sources illuminate oxygenated and deoxygenated hemoglobin and subsequently, the light detector received the reflected lights. The result is calculated by programs and then relevant blood oxygen level is revealed.

Dance of the Four Seasons: With music to present a happy folk atmosphere, it used large and small gears rotate forwards and backwards and the different adsorption and repulsive of magnetic forces which allowed rotating objects to perform different actions.



Dance of the Four Seasons

Glowing tree: Based on the electromechanical energy conversion principles, this exhibit was mostly made of recycled resources and materials in the museum.

Glowing tree

3. Establish the management system for recycling exhibit resources

Recycling exhibition panels and various types of lamps were reused for exhibits to achieve the goal of asset optimization. A total of 13 special exhibitions used recycled items including: Hot Snow Paradise, The Probability in Life Exhibition, Awakening Technology and Preparedness for Disaster Reduction Keelung Touring Exhibition, Technological and Vocational Paradise Exhibition, Automaton Pingtung Touring Exhibition, The Recycling Mission Special Exhibition, KidsFest of 5 ASEAN Countries, Stationery Island Adventure Exhibition, Glory of TANG PRIZE Laureate and Diploma Exhibition, Forest and Modernization Exhibition, Blanket of Love Exhibition, Insect Exhibition, Disease Prevention Combat Camp Chiayi Touring Exhibition. This management system will continuously be used for special exhibitions and the art exhibition areas.

Forest and Modernization: Narration of Science by Aerial Telemetry

Collaboration Exhibitions

1. Insect Exhibition

From December 25, 2020 to March 1, 2021, the Insect Exhibition organized by TicketMart International Technology Co., Ltd. was held at the 2nd special exhibition hall on 2F with a total of 22,623 visitors. This exhibition covered five sectors: Insect Tunnel, Battle Prairie, King's Temple, Scarab Luminous City and Insect Academy, so that parents and children can travel through the Insect Tunnel to explore the world of unknown insects. A large cage-shaped observation room was set up for the Insect Exhibition, so that visitors can enjoy an extraordinary experience within it.

Insect Exhibition

2. Hot Snow Paradise

NSTM co-organized the Hot Snow Paradise exhibition with CooLED Co., Ltd. since January 18, 2020 at the Star of the Universe plaza on B1F, which is currently the most attractive special exhibition for visitors. Due to the spread of COVID-19 pandemic from mid-May 2021, NSTM was temporarily closed in accordance with MOE's pandemic prevention regulations, and returned to normal operations since September 4, 2021, with strengthened on-site cleaning and disinfection operations, so that visitors can enjoy the exhibition with peace of mind. In 2021, a total of 25,275 people attended the exhibition.

Crowds at snow playing area

3. XR Traversal Experience Exhibition

XR Traversal Experience Exhibition was co-organized by the NSTM and True Sense Technology Co., Ltd. at the east terrace of Power and Machines Exhibition Hall on the 2F, which is from August 4, 2020 to August 31, 2022. This exhibition includes XR Evolution, which describes the past, present and future of XR technology via pictorial illustrations and explanations; AR interactive experience allows visitors to view different virtual objects at the same place by moving a special magnifying glass; and 360-Degree VR Traversal Experience involves the first 360-degree VR experience platform, with 11 scenarios to be selected by visitors. This exhibition created stunning visual content by digital media for more visitor engagement, with a total of 7,600 visitors in 2021.

School outings at the exhibition area in cooperation with the NSTM Lantern of Love

Visitors experiencing the 360-degree VR rotation chair

4. Attract different visitors through art exhibition area and collaboration exhibitions

The Art Exhibition Areas located at B1F corridor, the west corridor on the first floor and in the Art Café on the second floor are for NSTM to conduct exhibitions or for different artists to submit applications for their own exhibitions. The artworks exhibit include drawings, Chinese calligraphies, photo collections, sculptures, seal carvings, pottery, crafts and other multi-media materials.

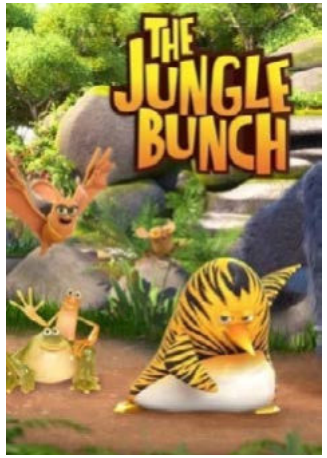
NSTM held a total of 15 exhibitions in 2021: Anadou Exhibition, Forest and Modernization: Narration of Science by Aerial Telemetry, Hsieh, Hsin-Chang Drawing Exhibition, Chen, Yueh-Mei Oil Painting Art Exhibition, Dinosaur Adventure Island: Children's Painting Exhibition by TWCECA, 2020-2021 Caring for the Environment Design Competition by the Environmental Protection Administration of the Executive Yuan, TGM: Mokume Art Work Exhibition, 2020 Touring Exhibition of Award-winning Long-Term Care 2.0 Home Assistance Drawing Contest, 2021 Member Joint Exhibition of Kaohsiung Fine Arts Association, Listen to the World: Members and Artists Joint Exhibition, Ethics Educational Calligraphy and Painting Exhibition, Spirit and Earth: 2022 Ho Hui-Bai Art Exhibition, Appreciation of Arts and Artifacts, Charming Persimmon of Authentic Taiwanese Flavor: Xinpu Persimmon Dyeing, and Arts Achievement Exhibition of Kaohsiung Elementary Schools.

Painting and Calligraphy exhibited on the first floor

Charming Persimmon of Authentic Taiwanese Flavor: Xinpu Persimmon Dyeing

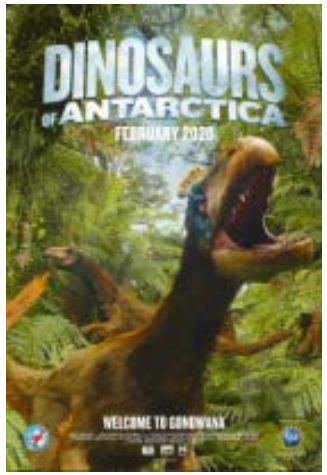
3D Theater

The film evaluation team consists of NSTM science and marketing colleagues and volunteers selected four quality 3D films for the public. Due to the COVID-19 pandemic, the films cannot be released on time, therefore, NSTM tried to negotiate with the film releaser to extend the non-commercial film copyright license. As a result, "Oceans 3D" and "Dinosaurs of Antarctica" were agreed to be extended to August 31, 2021. In addition, the 3D Theater was temporarily closed due to the renovation from September 1 to the end of 2021, thus, the other two 3D movies "The Jungle Bunch" and "Antarctica" were postponed to be released till January 2022.

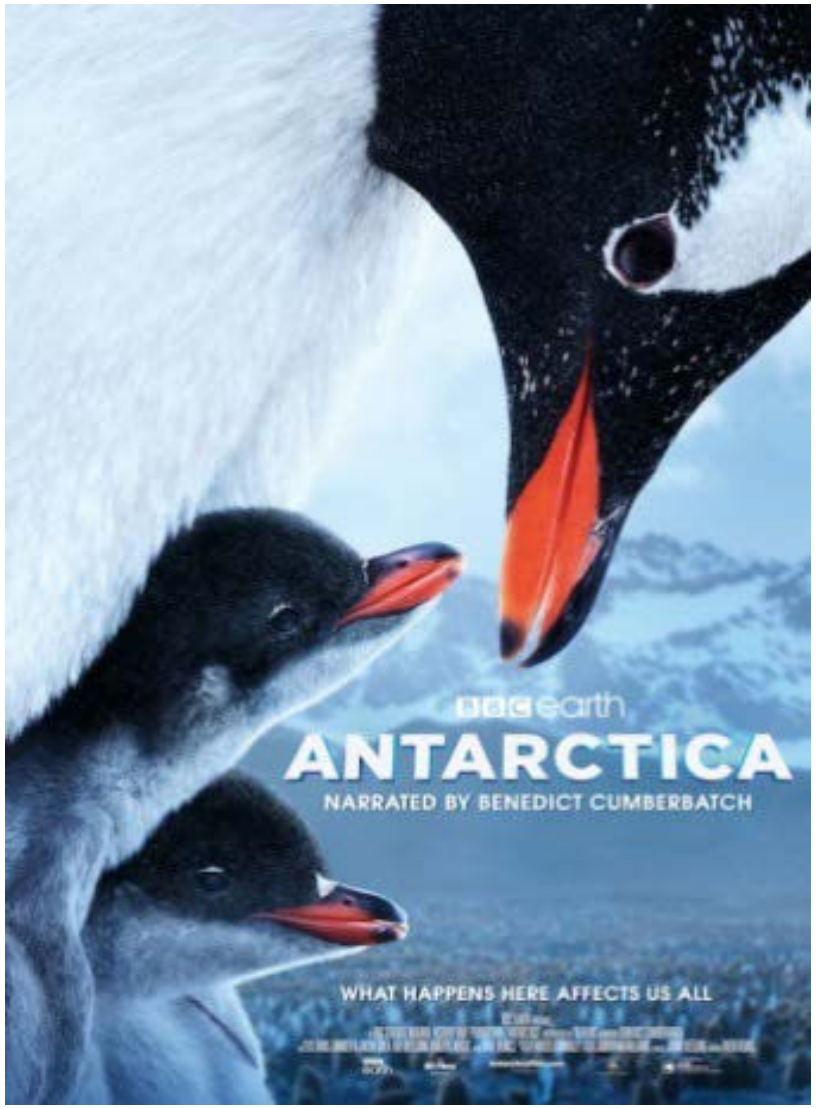


The Jungle Bunch

Ocean 3D



Dinosaurs of Antarctica



Antarctica

Performance of Services Outside the Museum

Apart from curated exhibitions in the museum, NSTM also aims to organize touring exhibitions outside the museum to achieve efficient use of resources and maximum benefits, focusing on promoting science education exhibits, and working towards the aim of "Cultivating Popular Science Talents".

Open ceremony at the National Museum of Marine Biology and Aquarium

In 2021, NSTM conducted 12 curated exhibitions or permanent exhibits, including "Eureka! The Fun Science Zone Exhibition", "Awakening Technology and Preparedness for Disaster Reduction Exhibition", "Automaton Exhibition", "Soil and Water Conservation for Disaster Prevention", "Disease Prevention Combat Camp: Dengue Fever, COVID-19 Pandemic and Influenza Exhibition", "Resilient Campus: Disease Prevention and Control", "The Probability in Life", "Campus Compound Disaster Prevention Touring Exhibition", "Wolbachia Project: Special Exhibition of Biological Prevention Strategy" and "KidsFest of 5 ASEAN Countries", which were relocated to 23 locations by NSTM personnel.

In 2021, we have gradually established a classified database for NSTM's special exhibitions to improve the relocation mechanism and established a 4-year touring exhibition mechanism to improve efficiency and attract more visitors from different target groups. The touring exhibitions were also held in the outlying islands and remote areas so that local citizens can also have the opportunity to learn.

1. Soil and Water Conservation for Disaster Prevention

To comply with soil and water conservation, this special touring exhibition was relocated since May 1, 2016 from NSTM to over 17 museums in Taipei, Taichung, Tainan, Taitung and the offshore islands, with a total of 1,195,427 participants. The touring exhibitions in 2021 were as followed: from October 26, 2020 to March 29, 2021 at the Hakka Culture Development Center; from April 20 to August 31 at the National Museum of Marine Biology and Aquarium (originally scheduled at April 20 to August 31, 2021, but was temporarily closed from May 17 to August 31, 2021 due to the COVID-19 pandemic); from September 12 to February 28, 2022 at the Penghu Living Museum (temporarily closed from September 13 to October 12, 2021 due to internal constructions and the exhibition period was adjusted to September 12, 2021 and from October 13, 2021 to February 28, 2022). There was a total of 179,133 visitors in 2021.

Penghu Living Museum

2. Technology and Preparedness for Disaster Reduction

"Technology and Preparedness for Disaster Reduction" was organized based on the educational goal of disaster prevention with the curatorial concept of learning science and technology for disaster reduction as well as actions for disaster prevention. With the plan of "Promotion of Disaster Prevention Campus Regional Culture and Disaster Prevention Technology Teaching Aids" of the Ministry of Education, this touring exhibition is continuously organized to display in different places for the public. The recent one was held at the National Museum of Marine Science and Technology in Keelung from December 17, 2021 to April 10, 2022.

Preparation for the Exhibition

Technology and Preparedness for Disaster Reduction

3. Explore IoT Exhibition

From November 19, 2021 to May 22, 2022, the Explore IoT Exhibition was held at Macao Science Center despite limitations caused by the COVID-19 pandemic. This special exhibition used multiple and interesting exhibition methods to introduce the new technological development and knowledge related to the ICT industry, enabled the public to understand the ICT applications and impact of IoT on everyday life. There was a total of 8,173 visitors in 2021.

Explore IoT Exhibition at Macao Science Center

4. Nanometer: The Invisible Scale

This special exhibition was held with the support of the Nanotechnology Human Resource Development Program to make nanotechnology more comprehensible and acceptable to visitors and elevate the literacy of nanotechnology to facilitate its promotion as a popular technology. Visitors can easily experience the magic and fun of nanotechnology through a variety of interactive exhibits as well as vivid metaphors and examples. Kaohsiung Liou-Guei Senior High School has negotiated to borrow three of the best exhibits in this special exhibition at the beginning of 2021, and signed for relocation of the special exhibition on May 10, 2021. Due to the impact of COVID-19 pandemic, this special exhibition was postponed, and was held from November 18 to December 18, 2021, with a total of 1,094visitors.

The signing ceremony held at NSTM on May 10, 2021

5. Disease Prevention Combat Camp: Dengue Fever, Influenza and COVID-19 Pandemic Exhibition

Visitors can learn about Dengue Fever, Influenza and COVID-19 Pandemic while enjoying their experience in playing interactive games and scoring points. This exhibition was relocated at Tzu chi Foundation of Hualien City from January 20 to April 25, 2021, with a total of 4,617 visitors and relocated at the Chiayi City Gymnasium from May 8 to 15, 2021 (the original schedule was June 2, 2021, but was postponed due to the spread of COVID-19 pandemic), with a total of 260 visitors. Subsequently, this exhibition was relocated at Tzu chi Foundation of Taichung City from October 7, 2021 to March 13, 2022, with 1,831 visitors in 2021.

Tzu chi Foundation of Hualien City

Chiayi City Gymnasium

6. Automaton Exhibition

The automaton exhibition invited lecturers Tang Yi-Hsiu and Yin Chi-Chun, the local automaton designer, to jointly exhibit their works, which allowed visitors to learn about the application of automaton in daily life by introduction of relevant knowledge, pictures, film analyses and practical experience. This special exhibition was held at Pingtung Martial Arts Hall from October 23, 2020 to January 24, 2021, with a total of 15,536 participants.

Students interact with the exhibits

Automaton Exhibition at Pingtung Martial Arts Hall

7. The Probability in Life

To expand the benefits from this special exhibition curated by the NSTM, we plan to promote the relocation of the exhibition in the next four years, starting from Tzu Chi - Tainan Branch in cooperation with the Buddhist Tzu Chi Foundation from February 15 to August 31, 2022. NSTM was responsible for the installation and dismantling of the exhibition, guided tours and education and training, while Tzu Chi Tainan Branch was responsible for relevant operations, management and promotional activities of the exhibition.

8. KidsFest of 5 ASEAN Countries

This exhibition introduced children's favorite "toy and games", "desserts and snacks", "nursery rhymes" and "traditional clothing", and childhood cultures of 5 countries: Vietnam, Indonesia, Thailand, Malaysia and Cambodia. It shared interesting childhood memories of new residents with new generations and peers. This special exhibition was relocated at Tzu Chi Foundation, Bade Taoyuan from January 15 to May 9, 2021, with a total of 3,559 visitors and relocated at Tzu Chi Nantou Liaison Office from September 26 to December 31, 2021, with a total of 1,085 visitors.

Opening ceremony at Tzu Chi Foundation, Bade Taoyuan

Opening ceremony of Tzu Chi Nantou Liaison Office

9. "Understanding Water and Soil" Special Touring Exhibition

"Understanding Water and Soil" special touring exhibition was relocated to Tainan Children's Science Museum from September 9, 2020 to February 21, 2021, with a total of 17,180 visitors, of which 12,250 visitors attended the exhibition in 2021.

Visitors at "Understanding Water and Soil" exhibition

"Understanding Water and Soil" Special Touring Exhibition

10. Eureka! The Fun Science Zone

This special exhibition featured interactive exhibits and personal experience based on basic science, and was divided into exhibition areas including electrical science, optics, mechanics, physiology and medicine according to its nature, with the goal of winning the Nobel Prize which symbolized the highest honor in science to encourage students to perseve in science, in the hope that visitors can easily understand and accept it, so that science will no longer be considered difficult. In addition, in order to narrow the distance between science and the public, representative scientists of each exhibition area were presented in animation so that visitors can explore in a laboratory space inside exhibition areas.

Tainan Astronomical Education Area Poster

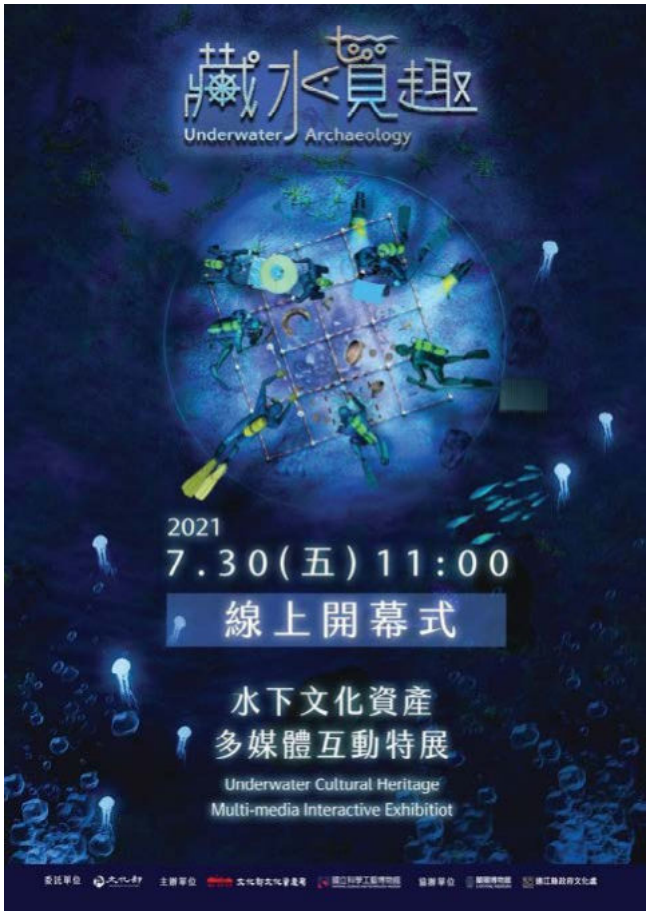
In 2021, this special exhibition was relocated to Howard Beach Resort Kenting from April 20, 2020 to February 21, 2021 and relocated to Tainan Astronomical Education Area from March 13, 2021 to May 2022. As of the end of 2021, there were a total of 10,405visitors.

11. Underwater Archaeology: Underwater Cultural Heritage Multi-media Interactive Exhibition

This special exhibition is commissioned by the Ministry of Culture for the preservation and education of underwater cultural heritage. Based on the exhibition materials provided by the Bureau of Cultural Heritage, Ministry of Culture, NSTM transformed the storage, maintenance and research achievements of underwater cultural heritage into digital games and interactive experience devices by use of advanced multimedia technology and interactive display methods, including the 360-degree photography, virtual reality (VR) and augmented reality (AR) games, transcending the limits of time and space and demonstrating the achievements of underwater archaeology in Taiwan and historical shipwrecks in a simple but profound way, in order for more people to learn about the importance and value of underwater cultural heritage.

This special exhibition was first held at the NSTM, and was then relocated to Matsu Folklore Culture Museum of Lianjiang County, followed by Lanyang Museum in Yilan County. As of 2021, the exhibition attracted up to 60,079 visitors and 2,560 school groups, deepening education as visitors actively participated in the exhibition.

Exhibited at Lanyang Museum in Yilan County



Exhibited at Matsu Folklore Culture Museum

12. Wolbachia: A Biological Control Method for Dengue Fever

This special exhibition introduced the new technology "Wolbachia: A Biological Control Method for Dengue Fever," which enabled visitors to act as scientists and guided visitors to understand the role of Wolbachia and shared their thoughts after observing the habit of mosquito specimens through the scientific dialogue or filled out a questionnaire for the exhibition. The questions collected will be answered by experts from the National Mosquito-Borne Diseases Control Research Center under the National Health Research Institutes (NHRI). In cooperation with the Disease Control Office of the Department of Health, Kaohsiung City Government, this special exhibition was relocated to Wujia Community Activity Center, Fengshan District, Kaohsiung City on April 7, 2021, and relocated to the Department of Health, Kaohsiung City Government from April 16 to May 19, 2021.

Wujia Community Activity Center, Fengshan District, Kaohsiung City

Department of Health, Kaohsiung City Government

13. "Campus Compound Disaster Prevention" Touring Exhibition

In 2021, with the support of MOE's "Promotion of Disaster Prevention Campus Regional Culture and Disaster Prevention Technology Teaching Aids", NSTM organized the "Campus Compound Disaster Prevention" Touring Exhibition by combining NSTM's existing disaster prevention technology display platform and large-scale teaching aids, with the aim of promoting disaster prevention education for the public. The touring exhibition was first held at Xin-Yi Elementary School in Chenggong Township, Taitung County, and was then relocated to Taipei Municipal Zhongshan Junior High and Taichung Municipal Shalu Junior High School, with a total of 3,150 participants.

Open ceremony of Taichung Municipal Shalu Junior High School

Guided tour of Xin-Yi Elementary School in Chenggong Township, Taitung County

Exhibition at Taipei Municipal Zhongshan Junior High School

Exhibition at Taichung Municipal Shalu Junior High School

14. Teaching aids promotion

To optimize benefits for exhibition halls, NSTM has created two sets of teaching aids related to disease prevention and landslide disaster prevention to be provided for elementary and junior high school teachers, with the aim of promoting exhibition and education outside the museum and firmly rooting NSTM's environmental education in elementary and junior high schools.

(1). Mobile teaching aids for soil and water conservation: Decoding game I and II

In 2021, the teaching aids were loaned to 79 schools, to benefit 5,101 people, of which 28 schools were in remote townships which benefited 359 people. The elementary, junior high and senior high schools in Taiwan were allowed to loan teaching aids by official application to the education bureaus in Taiwan every semester. In particular, it has strengthened publicity for schools in remote areas and Cool Soil and Water Conservation, focused more on promoting education in schools of remote areas and debris-flow potential areas.

Nanwang Elementary School, Taitung

Zhangqiao Elementary School, Hualien

Fengyuan Elementary School, Taitung

Chung-Wen Elementary School, Chiayi

(2). Dengue Fever Prevention Mobile Learning Kit: Exterminator Squad was free to loan to the elementary and junior high schools

The learning kit were delivered to schools throughout Taiwan to promote the awareness in remote townships to deepen the students' awareness of mosquito-borne diseases using interesting teaching aids. In 2021, the teaching aids were loaned to 81 schools, to benefit 2,772 people, of which 20 schools were in remote townships which benefited 461 people.

Dengue Fever Prevention Mobile Learning Kit: Exterminator Squad Promotion

Dengue Fever Prevention Mobile Learning Kit: Exterminator Squad Promotion

(3). "Go Go! Soil and Water Conservation for Disaster Prevention" and disaster prevention teaching aids

The promotion activities were in the "Soil and Water Conservation Disaster Prevention Education" and "Large-Scale Collapse Education" exhibition areas, with one session in the morning and one session in the afternoon on holidays, while group visits were accepted on weekdays. In 2021, a total of 172 educational promotion activities were held and participated by 1,557 people.

"Large-Scale Collapse Education" Demonstration

"The Stories of Soil and Water" Demonstration

(4). Mission of Detective Calcuim

This board game "Mission of Detective Calcuim: A Modern Board Game" is similar to Monopoly which based on the Industrial Technology Research Institute's innovative technology "Calcium Looping Processes for Carbon Capture". We hope this board game can enable visitors to learn about the use of carbon dioxide and the calcium looping process for capturing carbon dioxide. In 2021, 80 people attended the promotion activities.

Visitors experiencing the Board Game of Mission of Detective Calcuim

(5). Development of "Underwater Archaeology: Underwater Cultural Heritage Multi-media Interactive Exhibition" teaching aids

NSTM developed L-shaped folder, paper tape, measuring rod design pencil, diving cylinder shape USB, and waterproof phone pouch as souvenirs for educational and promotion activities, so as to deepen the underwater knowledge and concepts of primary and junior high school students. In addition, to expand the benefits of special exhibitions, NSTM developed the "Underwater Archaeology Class" teaching aids (board game) for students to learn with fun.

Development of Underwater Archaeology Class teaching aids (board game)

souvenirs for educational promotion activities

(6). Promotion of "Turning Bicycle" teaching aids

The "Turning Bicycle" teaching aids covers simulation for cycling safety concepts including inner wheel difference warning, hand gestures for left/ right turn, and keeping a safe distance. The teaching aids enable students to experience riding a bicycle and learn road safety knowledge by simulation, which deepen their learning while having fun.

Teaching aid experience

Social Resources Integration Achievements

To fulfill social education responsibilities, NSTM's colleagues continue to actively obtain social resources from the public and private sectors, and negotiate with cooperative partners, including government institutions, academia, enterprises and R&D units to improve NSTM's exhibition quality and services. In 2021, NSTM's Director-General, Deputy Director-General, directors and colleagues have dedicated efforts to obtain resources from the MOE's Smart Museum Project, while NSTM co-organized professional experience activities and themed exhibitions related to vocational education together with National Kaohsiung University of Science and Technology and National Pingtung University of Science and Technology, subsidized by the Department of Technological and Vocational Education of the MOE. In addition, the special exhibitions curated by NSTM were subsidized by the Bureau of Cultural Heritage of the Ministry of Culture and Tang Prize Foundation, while NSTM continues to deepen soil and water conservation education and disaster prevention with the support from the Soil and Water Conservation Bureau, Council of Agriculture, Executive Yuan and has been actively cooperating with private companies to organize various exhibitions and activities.

1. Exhibitions and Activities of Taiwan Science Festival

In 2021, the Taiwan Science Festival focused on climate change, and planed to launch the "Circle Journey" educational exhibition in cooperation with TPC, Formosa Plastics Corporation and the Industrial Technology Research Institute, so as to demonstrate its achievements in the "circular economy" and enable the public to understand the use of resources in the endless cycle of nature.

The Circle Journey Exhibition

Board Games: Learn About Waste Resources

2. Agronomy Wonderland・Intelligent Agricultural Machinery:Introduction to Technical and Vocational Education

Visitors can use postcards for obstacle challenges and experience the virtual reality of drone applications in agricultural technology, followed by photos of playing the role of tech farmers. In addition, visitors can also experience related agriculture and agricultural machinery during the exhibition. In 2021, there were 70,877 visitors at this special exhibition, and 44 education and promotion activities were held, with a total of 54,997 participants.

Technical and Vocational Education Special Exhibition

Self-propelled car Assembling

3. Technological and Vocational Paradise

In order to improve the visibility of vocational education, the NSTM co-organized themed exhibitions and professional experience activities with the National Kaohsiung University of Science and Technology. In 2021, NSTM assisted in the organization of exhibitions related to vocational education, including summer camps, maker courses, Lanterns of Love activities and family activities, with a total of 878 participants. Since May 16, 2021, the exhibition was closed due to COVID-19 pandemic. As a result, there were a total of 17,058 visitors in 2021.

Technological and Vocational Paradise

4. Animation of Antimicrobial Resistance Commissioned by the National Health Research Institutes

NSTM was commissioned by the National Institute of Infectious Diseases and Vaccinology of the National Health Research Institutes to produce the animation of antimicrobial resistance to promote relevant knowledge, including the appropriate use of antibiotics, and that the misuse of antibiotics may lead to the promotion of resistant bacteria. It is divided into two stages. In the first stage, the animation introduces antimicrobial resistance, and in the second stage, a browser game is provided, so that viewers can play the game after watching the animation and learn about drug resistance and the right way of medication to understand the difficulties of drug development.

Animation of Antimicrobial Resistance

5. "Come and Look! A Cool Adventure of Reality and Imagination Mobile Museum" from National Museum of History

"Come and Look! A Cool Adventure of Reality and Imagination Mobile Museum" was held at the NSTM from August 18th to September 9th, 2021 to be attended by visitors of all ages. This exhibition was held in a 40-foot container truck. The exhibits mainly focused on the national treasures and artifacts from the National Museum of History, including the "Tomb-guardian chimena, Bronze", the "Green Glazed Pottery Cow" and the "Tri-color horse," combined with interactive machines, 3D printing technology, AR magic mirror and interaction designs, which inspired visitors' unlimited imagination by virtual reality exploration, which was in conjunction with NSTM's long-term efforts in promoting science and technology. Through the "Spirital and Real Animals" interactive card game, visitors can learn about spiritual animals such as the phoenix and unicorn from the artifacts and common phrases, as well as the Taiwan endangered species such as

the Formosan Leopard cat and Formosan Sika Deer. In order to provide better interactive experience, NSTM jointly organized the "Beast Seeks Friends" special educational activity with the National Museum of History on September 5, 2021 (Sunday), which covered limited-time missions, beast coloring and reading activities, etc., with a total of 400 participants.

Visitors at the "Come and Look! A Cool Adventure of Reality and Imagination" Exhibition

Come and Look! A Cool Adventure of Reality and Imagination Mobile Museum

"Beast Seeks Friends" Educational Activity

6. The "9th Disaster Prevention Campus: Disaster Preparedness Conference" of the Ministry of Education

"The 8th and 9th Disaster Prevention Campus: Disaster Preparedness Conference" was held online, combining two years of achievements due to the impact of COVID-19 pandemic. NSTM was a co-organizer and had supported the Ministry of Education in setting up an exclusive workshop to be exhibited from September 10 to October 10, 2021. Please visit the website: https://disaster.moe.edu.tw/VR/. The exhibition attracted 1.27 million viewers and the website is still open to the public as free online education materials until 2022.

Disaster Prevention Online Exhibition

Development of Special Exhibition Activities and Teaching Materials

1. Permanent Exhibits Activities

We encourage curators to combine maker spirit and external resources to plan and execute activities related to exhibits in the permanent exhibition hall, in order to enrich visitors' experience at the NSTM, and integrate new knowledge, methods and technologies in each permanent exhibition halls. In 2021, we introduced 18 activities, which were mostly from other resources, such as applied projects or co-organized events, in order to launch the event while saving money. In addition, NSTM has conducted corresponding activities in 4 exhibition halls in conjunction with special festivals.

The Story of Taiwan Agriculture:Taiwan Butterfly Orchid Card

Parent-Child Workshop: Crystal Epoxy UV Ballpoint Pen

FUN City: Inner Wheel Difference

The Story of Taiwan Agriculture:Taiwan Butterfly Orchid Card

2. Souvenirs, Teaching Aids and Teaching Materials of the Exhibition Halls

The influence of the permanent exhibition halls may be expanded through the development of souvenirs and teaching aids. The achievements in 2021 included: "Go Go! Soil and Water Conservation for Disaster Prevention", "Mission of Detective Calcium" (board game), "Underwater Archaeology Class" (board game), L-shaped folder, paper tape, measuring rod design pencil, diving cylinder shape USB, and waterproof phone pouch of the Underwater Archaeology: Underwater Cultural Heritage Multi-media Interactive Exhibition.

The teaching aids include: Smart Home Automation from Intelligent Water Management, Prevention of the Spread of COVID-19 Pandemic, Herd Immunity, Large-Scale Collapse Education Video, 7 videos of Soil and Water Conservation : Uninterruptible Power Supply, Soil and Water Conservation for Disaster Prevention: Online Learning digital teaching aids, children's bicycle and traffic safety teaching aids and teaching aids incorporating indigenous culture into disaster prevention.

Aboriginal culture teaching aids

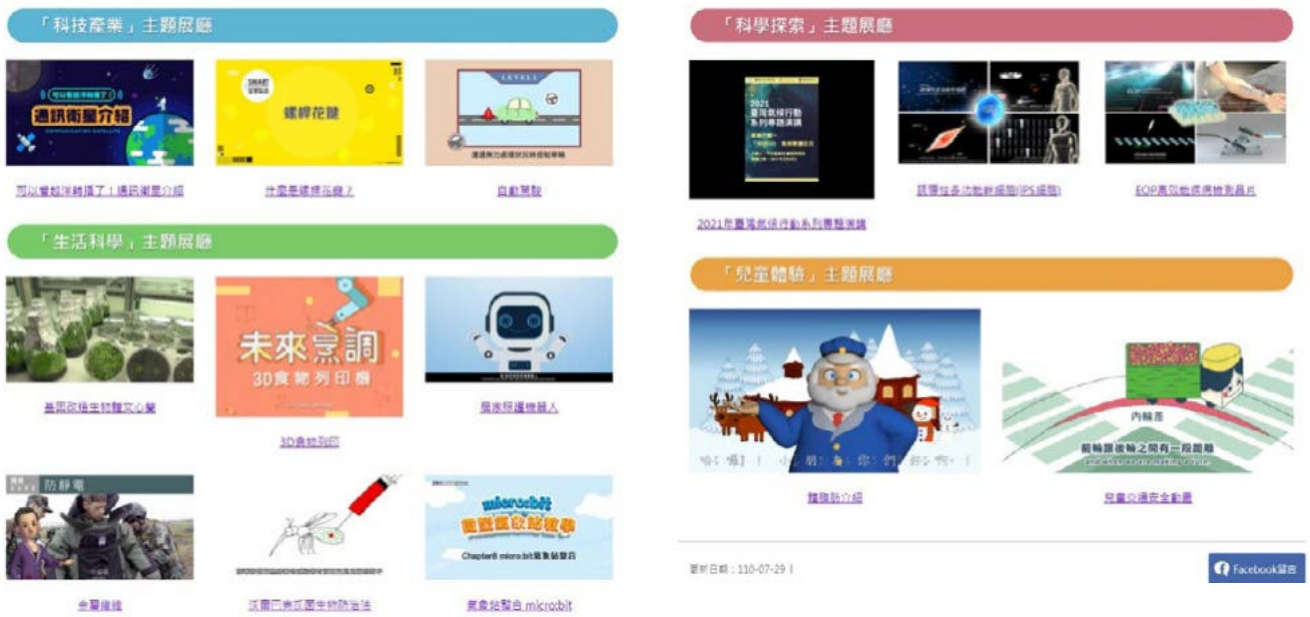
Souvenirs of Underwater Archaeology:Underwater Cultural Heritage Multi-media Interactive Exhibition

FUN City: Bicycle Teaching Aids

"Go Go! Soil and Water Conservation for Disaster Prevention" activities to understand landslides

3. Establishment of a digital learning area

During NSTM's closing period in response to the COVID-19 pandemic in 2021, we actively reviewed the existing films, animations and e-books in each exhibition and selected more than 60 items for online digital learning, which were exposed on Facebook and YouTube in order to turn "challenges" into "opportunities" under the COVID-19 pandemic. NSTM switched to online activities to attract viewers and its video data have become the main learning resource from the exhibitions. In the past, the visitors may not have time to watch these videos, but now is the best opportunity, just like the concept of Long Tail Effect, which allowed various products that initially received little attention to become the main focus in the exhibition. The inventory and promotion of online learning resources enables viewers to explore new knowledge of science and technology during the COVID-19 pandemic.



The official website classifies learning resources based on different topics

Service Improvement Plan

With the changes in the time and space and emergence of cutting-edge technology, the social and educational institutions are facing challenges in their current position and business models, and coupled with changes in the population and reduction in birthrates, the social and educational institutions are required to adjust target customers. In 2021, with the support of the MOE's Service Improvement Plan, NSTM replaced its software and hardware facilities, various exhibits and operating devices to provide high-quality, comprehensive, aesthetic and safe environment for visitors.

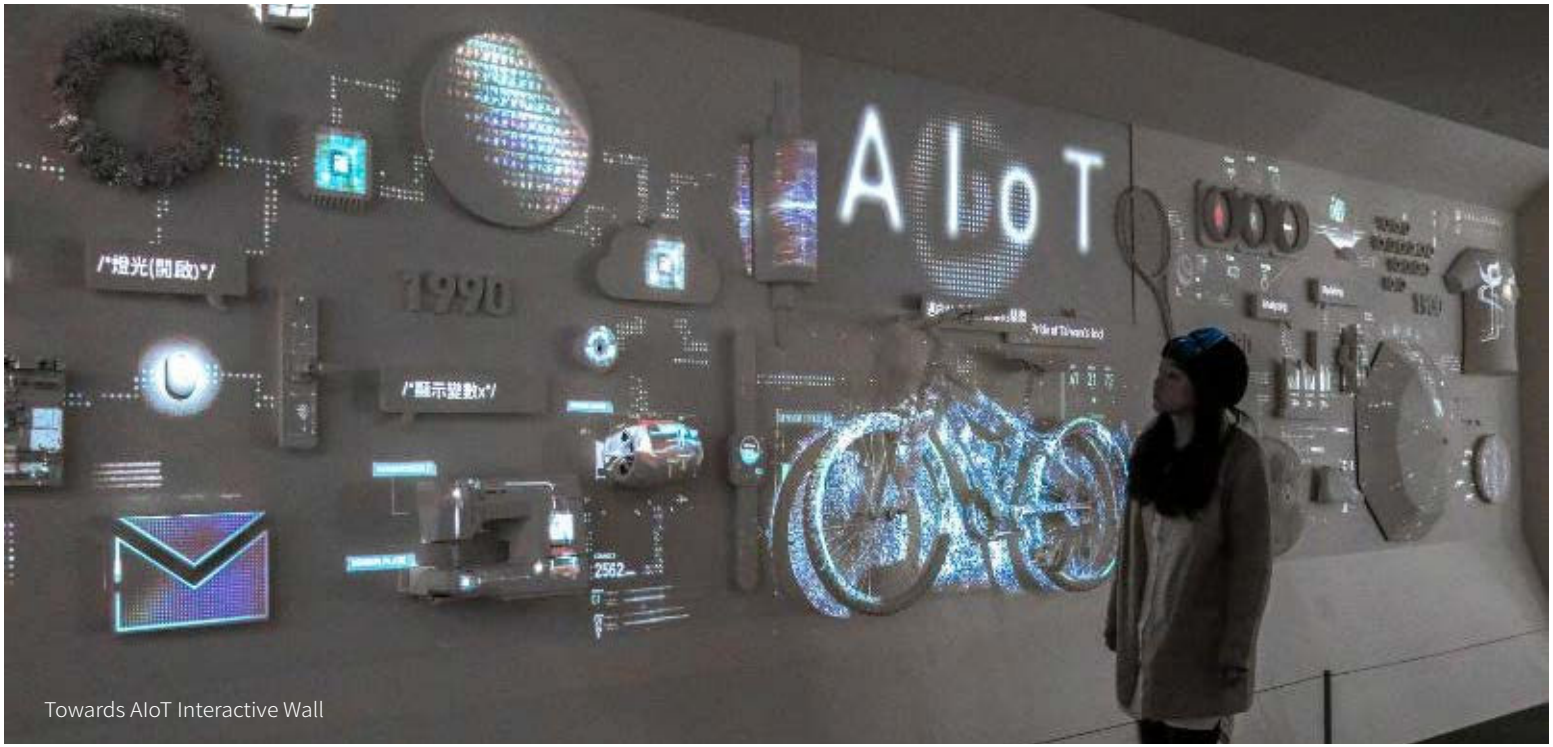
In order to create a comfortable space and friendly environment with innovative services, NSTM's first plan is to expand its exhibition space by building a storage space to store exhibits. The second plan is to renovate the 3D Theater and set a new stage based on the structure of the original theater, with 300 renewed seats at the audience area. In addition, the floor carpet and VIP lounge were renovated, with reconditioning and expansion of peripheral equipment and functions to increase the utilization and flexibility of the exhibition space in case of group camping trips in the future. Meanwhile, this could also make visitors more comfortable at the 3D Theater, help develop diversified activities and the use of venues, attract new customer groups with multiple functions of the 3D Theater to increase the overall number of visitors, and expand the service functions for art and cultural activities to improve NSTM's positioning on science and technology education.

Renovation of the 1st special exhibition hall has been completed

Renovation 3D theater to increase its utilization and flexibility

Awards and Achievements: Towards AIoT

Towards AIoT held at the entrance of the Industrial History of Taiwan had won the 2021 (62nd term) U.S. Communication Arts Design Competition. Among the 3,570 works that applied for the competition, 130 works were finally selected as winners (acceptance rate of 3.64%), of which only 4 works were environmental graphics and "Towards AIoT" was one of the winners.



Towards AIoT Interactive Wall

Technology Education

2021 NATIONAL SCIENCE AND TECHNOLOGY MUSEUM ANNUAL REPORT

In order to promote popular science education with the aim of "Science Experience and Experience Science", NSTM has hosted a multitude of science-themed educational events, and has organized winter and summer camps, weekend science courses, the NSTM Cultural Design Workshop for adults and the elderly, as well as developed interactive experience activities to enhance the fun of learning popular science.

In 2021, due to the impact of the COVID-19 pandemic, activities such as summer camps, weekend courses and field trips all be suspended or switched to online courses in accordance with government policies. The activities started to resume in November. In 2021, a total of 876 sessions were handled, which served 151,566 people.

Meanwhile, the diverse learning model was adopted to promote popular science, where the Hand Launch Glider Flying Competition, Robotic Competition, Clean Energy Innovation Contest and Project on Creative Maker Education Competition and Exhibition were held for junior high school to college students, in order to train students on the ability for designing, thinking and solving problems.

Table 8 Table of technology education activities from 2017 to 2021

Type / Year	Total		Lectures		Symposiums		Study activity		On-site activity		External service		Others	
	Sessions	Participants	Sessions	Participants	Sessions	Participants	Sessions	Participants	Sessions	Participants	Sessions	Participants	Sessions	Participants
2017	1,746	328,123	27	4,961	6	308	727	27,370	754	183,507	149	105,858	34	6,119
2018	1,538	291,203	50	6,304	1	150	673	28,582	628	122,193	98	131,955	88	2019
2019	1,460	295,495	36	5,435	3	200	724	32,430	608	228,990	79	27,980	10	460
2020	1,260	147,755	17	3,015	0	0	535	18,582	563	100,171	116	20,253	29	5,734
2021	876	151,566	19	3,646	0	0	409	15,255	397	126,819	38	3,376	13	2,470

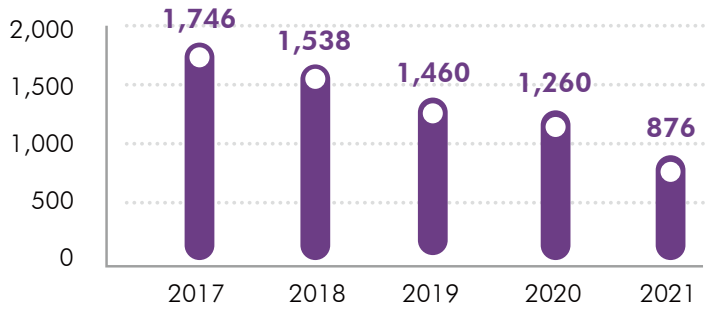


Figure 8 Number of activities in the past 5 years

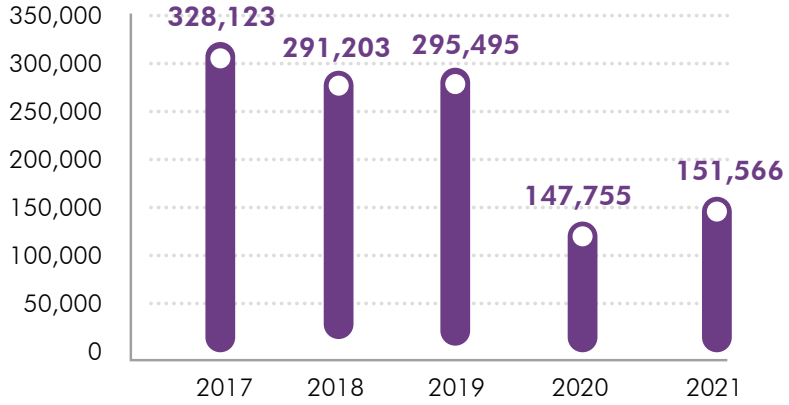


Figure 9 Number of participants in the past 5 years

Projects and Plans

1. Science Activities

(1). MOE subsidizes "Clean Energy Creative Contest"

Corresponding the Energy Technology Education Promotion Plan of the Ministry of Education, NSTM and MOE's Office of Talent Cultivation for the Integration and Application of Clean Energy Systems co-organized the Clean Energy Creative Contest. Due to the impact of the COVID-19 pandemic, the training sessions were transferred to online and real time video broadcasting, with a total of 1,228 views and participated in by 2,292 persons, grouped into 508 teams. With the hope that contestants incorporate environmental sustainability into their artwork, the NSTM held the competition in 2021. The University/College contest teams include localized practice, green transportation and microfilm, while senior high school contestants include practice and microfilm. Also, junior high school contestants were included. Among them, the Localized Practice Division of vocational schools encourages students to think about their locality such as residency and studies, while integrating features such as the local ecological environment, regional industry and technological development and emphasizing the local competitiveness of artworks. The Green Transportation Division plans to integrate energy technology with transportation systems which can be applied to the development of equipment, systems and facilities of transportation by land, by sea, or by air. In addition, the Microfilm Division participated in video and audio creation and screenwriting competitions. The team's creativity stir up resonance of the public in cherishing resources and environmental protection. 42 winning teams were selected during the final competition on October 30 to 31, 2021, and awards were presented to 204 students.

Gold Award for Energy Microfilm Contest

(2). Commissioned by MOE to organize Project on Creative Technology Education Contest and Exhibition

In order to increase students' interest in technology education, the K-12 Education Administration, MOE, organized the "Creative Technology Education Contest" and "Technology is So Fun –Technology Education Carnival", which were co-organized by NSTM and NKNU. The 3rd term competition was divided into the elementary school and junior high school category, the contest features major themes including the "Living Technology", "IT Applications" and "Mechatronics". On April 17 and 18, a total of 54 teams were selected from 241 teams that participated in the contest. The online technology fair was held on June 16 to 18, 2021, which covers live broadcasting of the achievement exhibition opening ceremony, with a video carousel for 100 videos in 100 maker education and technology centers, and the Technology Class – Online Hands-On Course. The live broadcasting of the opening ceremony ended in late December 2021, with a total of 8,222 views.

Technology Education Contest – Review

(3). The 11th "Hand Launch Glider Flying Contest"

NSTM held the 11th "Hand Launch Glider Flying Contest" during December 18–19, which received positive feedback from the students since the 1st competition and attracted more than 400 junior high and high school students in Taiwan every year. The event is classified into two categories of "Straight Flight" and "Endurance Flight," while taking into consideration the creativity and scientific principles of flight in order to train students on the ability for designing, thinking and solving problems. The event adopted the approach of building and competing on the same day with overall procedures including the functional design, materials selection and method of artworks. The teams must complete the artworks within a specified time. It is hoped that the event can enhance the interests of students on aerospace science in order to achieve the purpose of promoting the education of aerospace science.

(4). 2021 3rd Robotics Creative Contest

On May 22, 2021, NSTM co-organized the 2021 3rd Robotics Creative Contest with IOP Robotic Technology Co., Ltd. Due to the impact of the COVID-19 pandemic, the contest switched to online contest on October 2, 2021, which attracted high school/vocational high school, junior high and elementary school students in Taiwan to participate in the contest. The contest has a variety of orbital arrangements, coupled with the computer integrated mathematics contest, which help contestants to develop logical thinking, programming design, robotic control, teamwork, communication and problem-solving skills. The contest was participated by 672 people, with a total of 173 teams.

Robotics Creative Contest Team Leader and Coach Meeting

(5). 2020–2021 FIRST Robotics Competition

NSTM co-organized the 2020–2021 Taiwan Robot Tryouts with ESUN ROBOT ASSOCIATION from April 9 to 11, 2021, covering 3 challenges FLL Explore, FLL Challenge and FTC. Due to the impact of the COVID-19 pandemic, the competition was conducted in accordance with the regulations related to pandemic prevention, which include real-name registration, keeping a safety distance, disinfection and wearing masks. The competition was participated in by 1,250 people, with a total of 148 teams.

FLL Challenge

(6). 2021 Taiwan Science Exploration Fair – To Do, To Understand

Under the permission of the Ministry of Education, NSTM co-organized this activity with the National Museum of Natural Science, National Museum of Marine Biology and Aquarium, National Museum of Marine Science and Technology and National Taiwan Science Education Center, which is implemented by the National Center for High-performance Computing. The Fair invites participants to explore the principles of natural sciences, and express the scientific concepts by use of drawings, reports and short films, with the hope of creating a lively and diverse learning atmosphere and inspire the participants' creativities and oral abilities. The competition attracted more and more teams to participate. In 2021, there were a total of 1,025 teams, which are classified into elementary school, junior high school, high school, teachers and marine science. Due to the impact of the COVID-19 pandemic, the final contest switched to online "Videofinal", followed by Excellent Works Sharing which invited experts, scholars and 5 winning teams to NSTM to share their works. People can learn from the outstanding works, and to inspire participants and raising young students' interest in science.

To Do, To Understand Outstanding Works Share Exhibition

2. Government Grant

(1). 2020–2022 Science Education Resource Promotion Program commissioned by the K-12 Education Administration of the MOE

We continued to promote science education commissioned by the K-12 Education Administration with our museum resources, so as to achieve the following three goals: developing and integrating teaching resources, providing students with innovative and convenient learning resources and enhancing the empowerment and cooperation between teachers. In 2021, NSTM held 3 teacher workshops plus 16 online teacher workshops for a total of 587 participants and offered teaching resource packages for 400 classes. Additionally, 24 scientific activities were held in 12 days with a total of 3,990 participants, and 1 hands-on activity of creative popular science plus 1 volunteer training activity were held for 150 people in remote areas. A total of 30 schools applied for our teaching resource packages.

Teacher workshops

(2). 2021 Education and Cultivation of Southeast Asian Herbs and Science Activities for new residents sponsored by the Ministry of Education

In order to encourage children to learn about Southeast Asian countries, respect and understand ethnic diversity in Taiwan, as well as to train lecturers that are new residents as seed teachers on culture, the MOE subsidized on-site activities such as the new residents' science and cultural creativity training courses, cultural and creative activities, and handmade vanilla science workshops, which establish a world view on the respect for diversity among parents and children and develop multicultural literacy, with a total of 63 sessions and 2,687 participants.

Southeast Asian Herbs Mint Donut Shaped Soap DIY Activity for Kids sponsored by the Ministry of Education

(3). MOST subsidized the 2021 "Museum-Based Innovative Biomedicine Transformation Program: Biomedicine Innovation Popular Science Promotion Program (3/3) "

This program develops innovative popular science books and teaching kits which enables junior high school students and the public to acquire more knowledge on cutting-edge technology and research by combining biomedicine exhibition, digital media and popular science activities. In 2021, this program transformed the research of "Nanowire Biochip Testing" into popular science teaching materials, teaching kits and promotion activities by researcher Hui-Min Chen from Taiwan Semiconductor Research Institute (TSRI) of National Applied Research Laboratories. NSTM held 36 sessions with a total of 2,030 participants.

Transformation of Cutting-Edge Technology and Online Promotion Achievement Exhibition

(4). MOST subsidized 2021 Popular Science Promotion Program of Smart Technology

The Ministry of Science and Technology subsidize the development of a knowledge sharing platform for "Smart Technology Education" transmitting new knowledge related to smart technology and popular science, and develop diversified popular science activities and study courses for the public's understanding, interest and appreciation for smart technology. A total of 83 activities were held, participated in by 1,382 people.

Smart technology education and knowledge sharing platform

(5). MOST subsidized 2021 "Her Story – The Girl who Pursued Science"

This popular science activity is themed on female scientists, introducing the achievements and histories of female scientists in 7 different science fields, with a total of 31 sessions, participated in by 3,088 people. In addition, more than 61 female scientists will be introduced in NSTM, with the hope that women's efforts on scientific research will receive social support, as well as to promote parent–child popular science reading.

Children observed and recorded stick insects in "Women in Biological Science" course.

(6). MOST 2021 popular science activity: On the Waterside – Water Science Exploration

NSTM continues to conduct domestic and international science trips in conjunction with the three major agricultural water conservancy constructions in Taiwan that were built from the Japanese Colonial Period and are currently still in use. The three major water conservancy projects including Erfengzhen in Pingtung which uses underground barrage to extract groundwater, the Wushantou Reservoir and Jianan Irrigation Waterways in Tainan and Bailengzhen in Taichung which extract water from Dajia River based on the U-type Syphon Principle. The science tour planning covers humanity, emotional and cognitive aspects. Subsidized by the Ministry of Science and Technology, NSTM held a total of 12 popular science tours, attended by 431 participants.

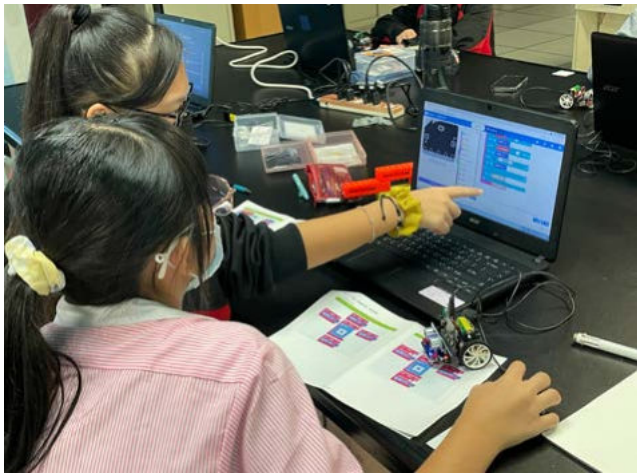
Visit the Display Model of Er-Feng Irrigation System

Scientific hands-on activity guides related to the scientific principles used in the construction of Bailengzhen

3. Social Resources/Caring About the Disadvantaged

(1). Lam Research Sponsored 2021 Robotic Experience and Museum Exploration Promotion Program

In fulfilling their corporate social responsibility, Lam Research fully sponsored NSTM's summer camps, museum exploration and smart technology experience activities organized for the benefit of school children in remote townships and the disadvantaged students, providing school children from remote townships and disadvantaged students with the opportunity to learn about robots and smart technology. A total of 6 activities were held, participated in by 189 people.



Micro : Bit Chip Integrated Programming Course

Programming activities for junior high school students of remote townships

(2). Kinghong Foundation sponsored the "2021 Multicultural and Ethnic Education – Southeast Asian Herbal Science" Program

The Foundation subsidized the students who are the second-generation of new residents in remote areas on multicultural, ethnic and science education. It also sponsors NSTM's activities, allowing students to cultivate multicultural knowledge and experience and explore the herb culture of the new residents' native country by visiting NSTM exhibitions, watching 3D movies, as well as Southeast Asian herbal science, cultural and creative activities, with a total of 55 sessions which were participated in by 2,600 people.

Kinghong Foundation Southeast Asian Herbs Cambodian Pikachu Shaped Lemongrass Fragrant Soap

4. Environmental Education

(1). The Industrial Technology Research Institute (ITRI) Commissioned NSTM to Organize the 2021 LOHAS Energy Conservation HousePromotion and Volunteer Education and Training Project

Using NSTM's environmentally certified halls in conjunction with the Bureau of Energy, MOEA's Energy-Saving and Carbon-Reduction movement, as well as a demonstration of LOHAS Energy Conservation House exhibit, and lecture activities, we have introduced tips for saving energy to the visitors. NSTM held Energy-Saving Partners – Volunteer Alliance Seminars, Saving Energy with A-guang – Winter and Summer Camps, Energy Saving and Environmental Education Courses and Saving Energy – LOHAS Energy Conservation House Itinerant Exhibition in Remote Townships, Energy Conservation Popular Science and LOHAS Energy Conservation Challenge Activities. NSTM held 30 events with a total of 1,500 participants.

Energy conservation and environmental education activities

(2). Co-organized the Water Saving with LOHAS Promotion Project with the Water Resources Agency, MOEA.

In order to expand water resources education and services, achieve balanced allocation of educational resources and narrow the environmental education gap between urban and rural areas, NSTM organized the "2021 LOHAS Energy Saving Initiative – Love Water Festival" together with the Water Resources Agency, MOE and Southern Taiwan Joint Services Center of the Executive Yuan. This water saving promotional activity was not only held in the NSTM during World Water Day and Earth Day, but also held in Penghu County for the first time in 2021 together with the Penghu International Fireworks Festival. It provides interactive experience activities to promote popular science resources to outlying islands, so as to let the public understand the technology to save water in daily life and save water to help the earth, This promotional activity was participated in by a total of 8,490 people in 11 days.

Penghu County "Water Saving" activity

(3). 2021 " Marine Education Touring Exhibition" plan

To promote marine education, NSTM cooperated with the Ocean Affairs Council Council, to develop 3 interactive teaching aids, and conduct the Marine Education exhibition in conjunction with and conduct the Marine Education exhibition in conjunction with the Taiwan Science Festival and Clean Energy Innovation achievement exhibition. Marine energy education is transformed into interesting activities and it is hoped that the lively, interactive teaching aid experience in the form of edutainment will be able to increase the public's understanding of ocean energy. The exhibition was held for 10 days, with a total of 23,314 participants.

Ocean Energy Discovery Tour

(4). 2021 Environmental Learning Center and School Trip Promotion Plan – NSTM Tour subsidized by the MOE

The activity provides priority application for 7 primary schools and junior high schools in remote areas. The plans include Green Discovery – LOHAS Energy Conservation House Tour and Experience and Discover the Environmental Issues exhibition hall. With hands-on courses such as Nature Feast – Frogs in Taiwan, Water Vanguards, Energy Saving and Carbon Emission Reduction, and Green Magic – The Flowerpot Clock, we lead students to a better understanding of Taiwan tree frogs and other issues related to ecology, water resource usage, energy saving and carbon reduction, and environmental sustainability. Due to the impact of the COVID-19 pandemic in 2021, the promotion plan was mainly implemented in October–December as COVID-19 pandemic started to slow down. 10 activities were held, which served 330 teachers and students in total.

The staff of the NSTM Tour assisted and taught students to make the Frog Castanet

(5). 2021 Environmental Education Project-Love Water and Love the Earth subsidized by the Environmental Protection Administration of the Executive Yuan

Adhering to the Sustainable Development Goals (SDGs), NSTM focuses on creating a "friendly environment" in 2021, combining drama and interactive technology for "Action! The Fight for the Earth" popular science drama, which is based on marine waste recycling and classification and" emission reduction, plastic reduction and climate change" issues. In addition, the Water Saving promotional activity consists of 10 sets of large-scale teaching kits, with popular science touring exhibitions held in Penghu, Chiayi and Kaohsiung. In March 2021, NSTM held 13 Water Saving promotional activities, which served a total of 3,075 people. In April 2021, the museum organized 2 popular science dramas in conjunction with the Penghu International Fireworks Festival, with a total of 600 participants, while 10 Water Saving promotional activities were conducted to serve 4,990 people in total.

Due to the impact of the COVID-19 pandemic, the event in Chiayi County was canceled in May 2021, and switched to 2 popular science dramas in conjunction with 2021 2nd Taiwan Science Festival, which were attended by 2,169 participants in total.

Popular Science drama

Popular Science Lectures

MOST's "19th Reading Science Master on Sunday" with popular science lectures in cooperation with the National Cheng Kung University

In 2021, 17 lectures of "Reading Science Master on Sunday" were held International Lecture Hall in NSTM, with a total of 3,552 participants. Meanwhile, 4 sessions were switched to online and real-time video broadcasting due to the impact of the COVID-19 pandemic. The themes of lectures in 2021 include biotechnology, smart healthcare, aerospace science and technology, and animal science, attracting students and people who are interested in the lectures, to elevate public scientific literacy.

"Reading Science Master on Sunday" popular science lectures

Technology Education Activity

1. 2021 Weekend Science Feast

In order to cultivate basic scientific knowledge and discipline of students, NSTM has integrated applied science resources to develop weekend science courses in March-June and September-December, including programs and robotics, toy science, children's science games, biological economy, physics and chemistry, astronomy and living science. In 2021, a total of 89 activities were held to serve 1,541 people

2021 Weekend Science Feast

2. 2021 Summer and Winter Camp

In order to enrich the lives of students during summer and winter vacations, NSTM promoted a diversity of science education courses to improve the scientific knowledge and discipline of our national students via a variety of science experiences. These activities include software applications, programs and robotics, aesthetic works, life sciences, astronomy, toy science, physics, chemistry and mathematics, children's creative arts, creative building blocks, food science, power machines and other courses for students to enjoy the experience of learning science. Due to the impact of the COVID-19 pandemic in 2021, the summer camps were temporarily suspended or switched to online video broadcasting, and a total of 81 activities were held to serve 1,965 people.

2021 Summer and Winter Camp

3. School Outreach Booking

In order to enhance the basic scientific knowledge of students, NSTM combines the experience activities and exhibition hall resources, with plans on the NSTM Fun and Learning hands-on activities for school trip booking. The education activities were classified for elementary grade 1–2, 3–4, 5–6 students, junior high school students, environmental education and the visually and hearing impaired, with multiple themes which provide fair learning opportunities and knowledge sharing. In 2021, a total of 178 activities were held to serve 8,039 people.

School Outreach Program

4. Science Classroom

NSTM organized the "Science Classroom" activities in cooperation with Municipal Jhengsing Junior High School, with the 108 Special Education Syllabus, coupled with customized courses including physics, chemistry and biology, which help people understand relevant knowledge through experiments. NSTM's resources include training for bilingual guided tours, so that participants can explore scientific knowledge and enhance their communication skills. In 2021, a total of 38 activities were held and participated by 1,072 people.

Science Classroom Dynamic Mechanics Course

5. Fantasy: Little Science King – Kindergarten Activities

Designed for the mental development and learning of pre-school children, in order to promote their basic scientific knowledge. In 2021, the Science King activity covers the Thai tuk-tuk car building blocks and Indonesian Drawing and Writing on the Goldenrod Paper activities at NSTM's Fantasy Exhibition Hall, so that kindergarten children can experience science and have fun in building blocks and science activities. A total of 7 sessions have been held, attended by 237 participants.

Science Laureates Kindergarten - Indonesian Goldenrod Paper Message

6. NSTM Cultural Design Workshop

NSTM organized the NSTM Creative Arts School for Elderlies, which provides an entertaining, relaxing and comfortable environment for elderlies to enjoy learning. NSTM invited an erhu teacher to plan and teach a series of erhu courses from beginners to advanced levels. There were a total of 10 classes with high quality learning environment for lifelong learning.

Erhu Study Course

7. Online Science Education

NSTM currently focuses on organizing STEAM scientific experience activities. Due to the impact of the COVID-19 pandemic from May to August 2021, the scientific and educational activities and camps have changed to online teaching, which cover "2021 Fun Home Science Kit" activities to comply with the COVID-19 pandemic prevention policy, introducing scientific principles and enabling students to learn how to operate and assemble teaching kits through simple scientific hands-on activities. The teaching materials also provide a worksheet to teach students the ability of observation and statistical analysis in various experiments by adjusting different variables. There was a total of 1,400 orders on the teaching kits for primary school students, which brought about an income of NT$1.3 million.

2021 Fun Home Science Kit

8. Development of theme-based children's science education self-learning box

In order to promote children's science education, the NSTM has invited professional popular science teachers to develop a series of learning boxes for children, which cover three groups including "4-6 year olds", "Mixed age class", "Infant and young children series". Each learning box not only developed 10 science-themed teaching kits for young children, but also provided video and learning manuals that were filmed for preschool teachers and parents to assist children in learning science at school or at home. The teaching aids and learning boxes are commissioned to be produced and sold by NSTM's cultural and creative store. In addition, a workshop is organized based on the content of the teaching kit, so that preschool teachers can teach by use of the learning box.

"Theme-based children's science education self-learning box for 4-6 year olds" teaching manual

The Popular Science Library

The Popular Science Library is located on 1F of the South Complex. With a space of 1,350 m2, it is divided into the reading area and book storage. Periodicals, videos and popular science reading materials are available in the reading area. There are also 9 major popular science themes, 5 major themes and theme exhibits were held in conjunction with the museum exhibitions in the library. In 2021, NSTM set up the "ireading" area in cooperation with the Education Bureau of Kaohsiung City Government, in order to promote reading for children.

Popular Science Library theme decoration

The Popular Science Library allows technology to firmly take root via readings on popular sciences, which can also broaden the scope of educational learning of the visitors. NSTM currently houses a collection of 48,827 books, while activities and lectures are held to promote the reading of popular science materials among all age groups. For example, for this year's winter vacation, NSTM organized the various camps including the "Satellite Mission Camp", "Color Magic Classroom" and the "Food Science". There were a total of 3 sessions, with 262 participants.

Table 9 Number of people served by the Popular Science Library over the past 5 years

Year	Number of visitors
2017	28,111
2018	30,270
2019	31,182
2020	30,101
2021	14,132

The Popular Science Library was temporarily closed from May 16 to September 6, 2021.

2021 Taiwan Science Festival

In 2021, the Ministry of Education and Ministry of Science and Technology organized the 2nd Taiwan Science Festival to be held in 5 science museums and supported by 20 SciBases, with "Science for Society" as the theme for the public to experience science activities. Based on the theme of "Circular Economy" NSTM planned to conduct 41 innovative scientific activities, including "Action! The Fight for the Earth" science drama, Toy Doctor, Circular Journey, Circular Paper Science. During the 9-day Taiwan Science Festival was attended by a total of 175,885 participants.

Circular Paper Science on-site activities

Visitor Services

2021 NATIONAL SCIENCE AND TECHNOLOGY MUSEUM ANNUAL REPORT

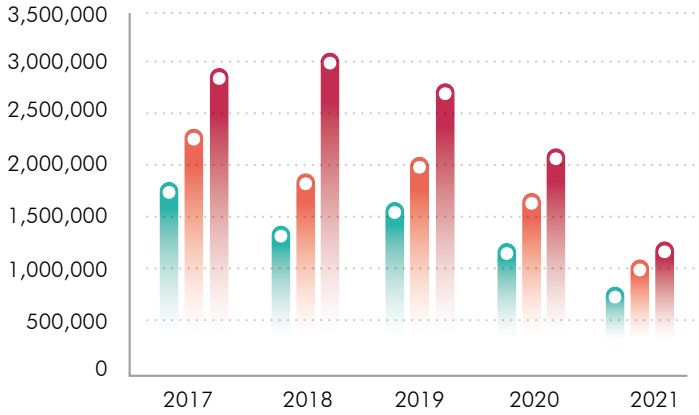
Visitor Services

1. Enhancement of marketing and services to improve the visiting rate

The number of visitors is one of the key performance indicators of the museum, as well as a demonstration of its performance goals. Faced with the changing environment, besides continuing to update and innovate our merchandise, the NSTM also adopted diverse marketing channels and combined social/civil resources, to actively develop potential visitors and disadvantaged groups. In terms of visitor services, to implement fairness and sharing, the NSTM has provided a diversity of guided tour services and activities, improved service quality. Approximately 1,320,860 people are served this year.

Table 10 Number of people served over the past 5 years

Item \ Year / Person		2017	2018	2019	2020	2021
Exhibition Hall	Permanent Exhibition	811,766	770,247	925,338	611,363	370,627
	Paid Special Exhibition	62,654	43,160	39,213	88,493	39,678
3D Theater		127,373	96,771	116,659	62,924	34,329
Independent Special Exhibitions		481,412	82,382	98,018	102,175	33,478
Experience Activity		160,553	190,149	205,779	146,677	247,724
LOHAS Energy Conservation House		3,122	21,278	24,682	13,100	4,204
Popular Science Library		78,239	84,615	85,237	104,807	44,976
Activities in indoor venues		114,700	109,921	113,428	84,626	93,953
Number of visitors		**1,839,819**	**1,398,523**	**1,621,100**	**1,214,165**	**868,969**
Outdoor Plaza		494,611	530,507	437,891	415,131	322,617
Total in Museum		**2,334,430**	**1,929,030**	**2,058,991**	**1,629,296**	**1,191,586**
External services (Taiwan)		572,126	574,375	719,435	548,758	129,274
External Services (Overseas)		59,960	557,737	25,772	249,102	8,173
Total no. of visitors served (Taiwan)		2,906,556	2,503,405	2.778,426	2,178,054	1,320,860
Total		**2,966,516**	**3,061,142**	**2,804,198**	**2,427,156**	**1,329,033**



	2017	2018	2019	2020	2021
Number of Visitors	1,804,534	1,839,819	1,398,523	1,621,100	868,969
Number Inside the Museum	2,280268	2,334,430	1,929,030	2,058,991	1,191,586
Total Number of People Served	3,159,505	2,966,516	3,061,142	2,804,198	1,329,033

Figure10 Number of visitors over the Past 5 Years

2. Obtained annual certification of the ISO9001 quality management system.

The NSTM has undergone three revisions and upgrades for the certification of the ISO9001 quality management system and has continuously adjusted provisions in response to new system requirements. It had also won the SGS ISO9001 Plus Award for quality-orientated management change and innovation. We are the only museum that had won the ISO9001 Plus Award in Taiwan, with our interviews published in Manager Today, in order to increase the NSTM's exposure in public and private enterprises. Over the past years, we have ensured the integrity and consistency of service quality through regular external and internal audits. In 2021, the internal audits were completed by audit members of various departments from March 22 to April 1, 2021, with document review by SGS on April 29, 2021, and formal audits were completed on May 4, 2021, which showed no deficiencies and passed the new annual certification.

Passed the certification of ISO9001 quality management system in 2021

3. Effective shaping of a friendly organizational culture

With the concept of "Receiving Every Visitor as a VIP", the NSTM has conducted mystery audits since 2011. With continuous improvement from 1.0 to 3.0, the implementation has been fruitful in the last two years. For on-site customer satisfaction, the average score was 81.59 and 87.79 in the first and second half of 2020. The score had increased to 92.06 and 93.89 in the first and second half of 2021. Overall, the customer satisfaction had gradually and steadily improved. As for phone etiquette, the NSTM's average score was 90.14 and 91.01 in the first and second half of 2020. The score was increased to 95.9 and 94.8 in the first and second half of 2021. The colleagues dedicated efforts to improve the quality of service by responding to customers patiently or helping customers solve problems with a positive and enthusiastic attitude, which received positive feedback from external consulting firms, indicating that NSTM has achieved effective results in creating a friendly organization.

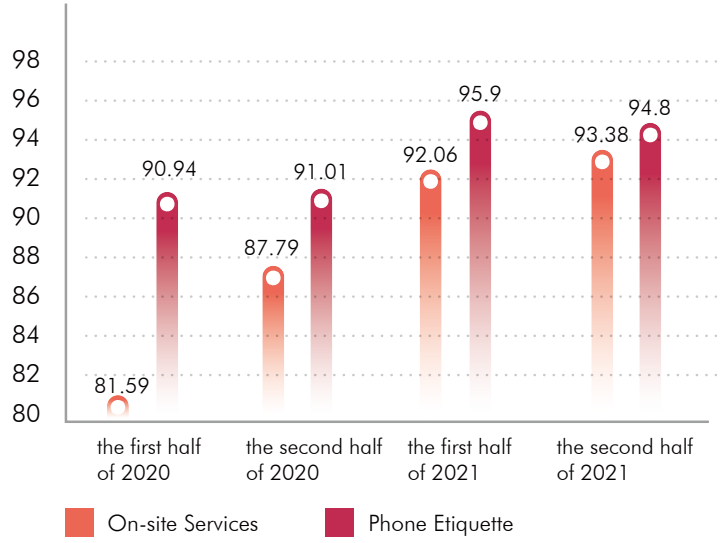


Figure11 The average score of customer satisfaction of on-site service quality and phone etiquette in 2020 and 2021

Public Relations and Marketing

1. Utilize media resources, develop marketing channels

In 2021, over 75 advertising media procurements and promotions were conducted, resulting in media exposure in China Times, United Daily News, Liberty Times, Central News Agency, The Commons Daily, Taiwan Times, Mandarin Daily News, TSSD News, Life Times, Comment News Website, CHN, Fengmin Radio, FM Hit Radio, KISS Radio, Best Radio, myTuner Radio, SuperFM98.5, China Daily News, Happy Radio, Fresh Weekly, Taiwan Railways, LED in collective residential buildings, New-Kaohsiung TV, Phoenix Cable TV and other NSTM-friendly media, etc. In addition, 12 special exhibitions and marketing activities were held in 2021 (which is slightly lower due to the impact of the COVID-19 pandemic).

Joint interview press conference

2. Enhance the "Holiday Marketing" project to be deeply rooted in holiday traveling

Since 2021, we continue to dedicate efforts to the "Holiday Marketing" project and launched the marketing project: "NSTM Smart Technologies: The Turnaround" in winter vacations, which achieved outstanding results on encouraging the public to visit important permanent exhibition and experience new special facilities in the museum. With the slowdown of COVID-19 pandemic in the second half of 2021, the 2nd Taiwan Science Festival and NSTM's 24th Anniversary (Earth) Space Exploration activity have been held together with NSTM's highlights in the 4th quarter. Meanwhile, the Space Exploration Exhibition would be opened simultaneously for marketing, with a preview for the Stationery Island Adventure special exhibition.

Integrated marketing campaigns of "NSTM Smart Technologies: the Turnaround" in the winter vacation

Launched the "NSTM's 24th Anniversary (Earth) Space Exploration" promotion in the 4th quarter of 2021

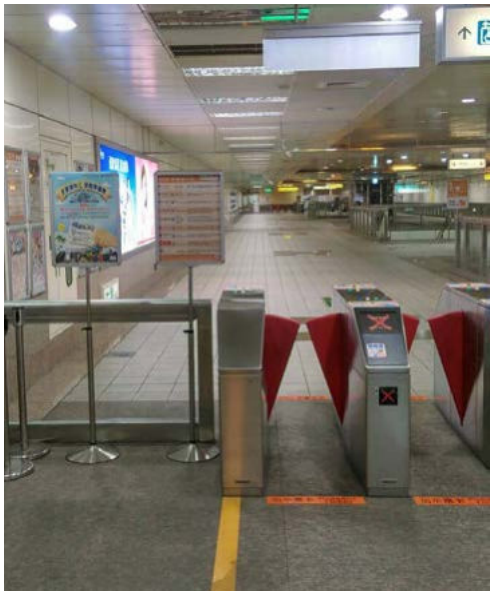
3. Utilize social media to update information

Due to the generalization of social media, the NSTM established a Facebook fan page in October 2009 (website: http://www.facebook.com/ilovenstm). As of 2021, the fan page had 109,611 members, an increase of 9.6% over 2020 (99,943 members). The NSTM continues to communicate information to our Internet fans via NSTM's Facebook fan page, which includes permanent exhibitions, special exhibitions, science education events, selected collections, seminars, relevant images and writings, videos, as well as science, environmental education and science education news. We hope to bring forth applied science and the vision of a green museum in both educational and entertaining manner.

Post-event information via Facebook

4. Special offers to encourage the public to materialize the spirit of Green Museum by using public transportation

Apart from buses and trains, we also launched the special offer of "Visit NSTM by the MRT" for MRT passengers, and expanded our services starting from September 1, 2020 until August 31, 2022. Coupons are not only available at the 4 MRT stations including the Wukuaicuo Station, Houyi Station, Formosa Boulevard Station, Kaohsiung Main Station, but also Sinyi Elementary School Station, Cultural Center Station and Martial Arts Stadium Station, total of 7 MRT stations. We announced the special offers via MRT marquee, the official website and posters, as well as MRT promotion and broadcast channels. Exhibition hall tickets are available for only NT$70 (original price was NT$100) for adults and NT$50 for students (original price was NT$70). As of December 31, 2021, there were only a total of 241 visitors who participated in this event due to the impact of COVID-19 pandemic, which resulted in carbon reduction of 395.16 kg CO_2e. Due to the COVID-19 pandemic in 2021, the various special offers only benefited a total of 681 people, which declined by 59% compared to the 1,659 people in 2020, while carbon reduction of 1,958.26 kg CO_2e fully materialized the spirit of the Green Museum.



Vertical poster at the MRT Station

"Visit NSTM by the MRT" poster

Guided Tour

1. Provide quality guided tours to enrich the visit experience

In correspondence with our exhibitions, we provide the public with a variety of guided tours, which include group tours, active tours, robot shows and selected exhibits tours. This year we provided group guide tours, walking tours, selective exhibits tours of permanent and special exhibitions, including "Technological and Vocational Paradise" and "Agronomy Wonderland, Intelligent Agricultural Machinery, Introduction to Technical and Vocational Education", "Underwater Archaeology – Underwater Cultural Heritage Multi-media Interactive Exhibition" and "Glory of TANG PRIZE Laureate and Diploma Exhibition". Due to the impact of the COVID-19 pandemic, the NSTM was temporarily closed starting from May 18, 2021, and all guided tour services were suspended in compliance with the COVID-19 prevention policies and measures of the Central Epidemic Command Center. Since the slowdown of the COVID-19 pandemic on July 28, 2021, part of the exhibition halls and special exhibitions had reopened to visitors. There would be 3 selective exhibits tours held every day, and related services such as group guided tours would gradually resume. A total of 1,967 guided tour services were rendered to 15,517 visitors, 947 of which were selective exhibits tours.

The guide tours at "Glory of TANG PRIZE Laureate and Diploma Exhibition" were non-stop during the COVID-19 prevention period.

2. Robot Show

We innovatively modified the domestic robot ZENBO to become the 3rd generation Robot. We held robot shows which demonstrate emotional expression, speech ability, and music and dance performances of the 3rd generation robot. During the show, the Q&A session increases visitor involvement, linking to the content of the exhibition hall in order to make a deep impression. From May 19, CECC raises its epidemic warning to Level 3 due to the Covid-19, the robot shows are cancelled. Since the restrictions during disease prevention were loosened by CECC, the robot shows on weekends were resumed from October 9. From November, the robot shows on weekdays were also resumed. In total, 335 robot shows were held for 6,226 visitors in 2021.

Kids actively participate in the interactions –Who Gets the Right Answer?

Create the "Childhood Memories" of the Robot Shows.

3. Guided tours for the visually impaired

The visually impaired lack the most important vision sensors. Describing images verbally for the visually impaired substitutes visual information, and hence this guided tour meets the needs of the visually impaired compared to general guided tours. The NSTM's tour guide for the visually impaired strengthens the training of the volunteer interpreters on their ability to guide the visually impaired, with technologies in accessibility for the disabled, with the aim to provide verbal description of images for the visually impaired regardless of individual or group tours.

In terms of the tour guide team, the NSTM provides the verbal description of the FUN City Exhibition in 2021 to guide the visually impaired children. As of December 31, 2021, we have trained a total of 61 guides for 35 visually impaired visitors to provide them a comfortable environment for recreation, education and technology learning.

In terms of technologies in accessibility for the disabled, on the basis of the verbal description guided tours, the NSTM also provides audio files that verbally describe the special artifacts at the Open Storage, in order to facilitate the visually impaired visitors to understand the key points and value of the exhibits and artifacts by non-visual techniques.

Friendly service – a guided tour for the visually impaired

Friendly service – a guided tour for the visually impaired

Resources Utilization

1. NSTM Lanterns of Love

In order to narrow the wealth gap between the rich and the poor, and implement scientific education, the NSTM continued to promote the "NSTM Lanterns of Love" program for the disadvantaged, accepting donations from philanthropists at NT$10,000 per lantern to provide opportunities for the economically disadvantaged students to broaden their horizons and learn through experiences by visiting the NSTM. The program generated a total donation of NT$3,575,729, served 171 schools, and arranged for 5,284 teachers and students to visit the museum free of charge. The museum education like this gives an opportunity to root science and gratitude among the economically disadvantaged students. It helps spread the power of love from society and gives a chance for the children to bring their role into full play in the future.

Lanterns of Love Program

2. Adequately utilize social resources to aid disadvantaged groups

To help students from remote villages share the resources of the museum, Chunghwa Telecom, the Taiwan Telecommunication Industry Development Association, and the NSTM jointly initiated a program of "Love and Care for Disadvantaged Students from Remote Villages" to help them have a day of vitality and knowledge and make their dreams come true by fully subsidizing their visit to the museum. Two visits were provided in 2021, where 514 teachers and students from 9 schools participated in the event.

Chunghwa Telecom Love and Care for Disadvantaged Students from Remote Villages Event

3. Utilize social manpower resources to improve overall performance

The NSTM is the first applied science museum in Taiwan and the center of science education promotion in South Taiwan. Facing limited manpower, we ask for social human resources for provision of service according to the Volunteer Service Act. The scope of service includes reader services, collection maintenance, collection management, maintenance services, educational activities, exhibition services, Chunghwa Telecom exhibition services, theater services, audience services, volunteer administration, guided tours, nursing, information desk, promotion, group cafeteria, energy-saving house projects, general affairs, and gardening. There was a total of 1,194 volunteers, with an accumulated 120,727 service hours.

Essential social human resources to achieve better performance and services in the museum

In addition, the NSTM helped to establish the "NSTM Volunteer Foundation" in 2012. The source of the fund primarily comes from volunteer donations, and flea market charity events held every Wednesday and Thursday morning and deeply supported by volunteers. The funds were used for volunteer gift money, consolations, as well as charity donations in accordance with the annual balance. The fund balance for 2021 was NT$622,636.

2021 Volunteer Foundation Implementation Status Report

4. Provide service opportunities to encourage students to engage in volunteer services

In encouraging students to commit to volunteer services, the NSTM amended the "Rules of Student Social Services of the National Science and Technology Museum" in 2019, which was formulated in 2012. In 2021, the NSTM has conducted 4 sessions of educational training and 351 students participated in social services with a total service time of 1,612 hours.

5. Conduct community events to build good community relations

The NSTM holds related community activities every year. The activities combine social resources to cater to the needs of the community and maintain good public relationships with local residents. The plan also engages in community development by incorporating community residents as an integral part of the NSTM's support resources, in turn generating excellent interaction with local communities and enhancing NSTM's favorable image. The 2021 activities are as follows:

Table 11 Summary of the number of participants in community events over the past 5 years

	2017	2018	2019	2020	2021
Movie appreciation during the first half	3,125	1,709	1,928	Suspended for the prevention of Coronavirus disease (COVID-19) pandemic	1,811
Movie appreciation during the second half	1,884	2,271	2,336	1,947	Suspended for the prevention of Coronavirus disease (COVID-19) pandemic
Special exhibition visit	990	1,337	747	736	Suspended for the prevention of Coronavirus disease (COVID-19) pandemic
Total	5,999	5,317	5,011	2,683	1,811

(1). Free movie screening for the residents of the neighborhood during the first half of 2021: A 6-day event from February 2 to 7, 2021, with 8 movie screenings each day, totaling 48 movie screenings. The event was participated in by a total of 1,811 people.

(2). Free movie screening for the residents of the neighborhood during the second half of 2021: this event was originally scheduled from August 24 to 29, 2021, but was canceled due to the impact of the COVID-19 pandemic.

(3). Stationery Island Adventure Special Exhibition: the special exhibition was suspended due to the impact of the COVID-19 pandemic.

Issue a certificate of award to the chief of village

Volunteers provided services at the community events

6. Join International Museum Organizations to expand international exchanges

The NSTM has been actively participating in the international organizations of museums, such as the Asia-Pacific Network of Science and Technology Centers (ASPAC) and Federation of International Human Rights Museums – Asia Pacific (FIHRM-AP).

Although the impact of COVID-19 pandemic has forced suspension on social interactions between countries in 2021, the NSTM still actively participates in online communication activities of various international organizations. For example, the ASPAC Webinar: YOUTH Got This! in August 2021, and the ASPAC Annual Meeting in November 2021. In addition, the NSTM also participated in the calls for papers and established the direct dialogue channels with various science centers by participating in the annual conference and various exchange activities, in order to expand its self-curated exhibits, science education activities, cultural and creative products and international exchanges, while keeping in track of the trends and issues of global museums as reference for operations management.

In addition, the NSTM also participated in the 2021 international online exchange conference held by the Federation of International Human Rights Museums – Asia Pacific (FIHRM-AP), while its colleagues from various departments have submitted drafts to participate in the special workshop projects in the World Leisure Congress 2022 in order to gain more visibility in the world.

Promoting Cultural Creativity

1. Cultural and creative products were developed to make life more interesting

The NSTM is the first museum for applied sciences in Taiwan and also the first national science education organization in southern Taiwan. The Museum's mission is to collect and study technological artifacts, host technology-related exhibits, promote technology education as well as provide citizens with a place for leisure and lifelong learning. In recent years, the NSTM actively developed cultural and creative products based on its collections and images and promoted the products of science education and teaching aids that were packaged as cultural and creative products.

Self-designed and self-developed "Robot body massage stick"

In 2021, NSTM's 11 self-designed and self-developed cultural and creative products include "Linkage Material kit (DIY)", "Mold material of aroma stone kit(DIY)", "Coral Restoration L-shaped Folder", "Robot Balance Beam", "Penguin Spinner", "Underwater Archaeology Tool-Benchmark Pencil", "Robot body massage stick", "Robot keychain", "Flat Heald Type Shuttle Loom Material kit (DIY)", "Spaceman Phone Stand/keychain", and "Special designed Face Masks". In addition, there were 30 cultural and creative products jointly developed. In total, there were 41 cultural and creative products were launched in 2021 to provide diversified selections for the public.

The cultural and creative products were jointly developed for the "Stationery Island Adventure Special Exhibition"

Flat Heald Type Shuttle Loom Material kit(DIY)

Table 12 The Sales figures of cultural and creative products over the last 5 years

Year	Sales
2017	1,639,784
2018	2,607,177
2019	2,717,137
2020	2,420,460
2021	3,889,023

2. The Last Exhibition Hall – Optimized "Cultural and Creative Product Store"

In recent years, the NSTM actively developed cultural and creative products based on its collections, as well as the products of science education and the teaching aids combined science demonstrations. The purpose is to promote science education and enhance the image of the museum. The museum can benefit from cultural and creative business. Except for the physical store in the 1F lobby, the museum set up a "Cultural and Creative Online Store" for providing a cloud platform for sales and display to meet the needs of shopping without the constraints of time and space. Also, it provides an innovative service, and a convenient purchase procedure with diversified payments.

Cultural and creative online store

The merchandise store is regarded as the museum's last exhibition hall, focusing on integrating elements of the museum for environmental planning, merchandise display and service personnel. In 2021, The NSTM shop covers "commodity categories", "the route of the shop" and "service personnel" for the planning of the NSTM shop. In addition to the exhibition of cultural and creative products, the overall internal and external environmental planning, store activity and lighting of the store also need to show the NSTM's image, systematically classifying and displaying cultural and creative products. The NSTM assigned service personnel to explain cultural and creative product connotations, increased credit card swiping services, and switched from paper to electronic invoices to achieve paperless processing and environmental protection, which thereby increase the desire for goods purchasing, and develop diversified products to meet customer needs.

The environment and display of the NSTM Shop was reconditioned and optimized in 2021.

3. Integrate the resources of True Dreamland and organized various educational activities

The NSTM's True Dreamland upholds the concept of implementing maker education to improve the ability to develop innovative courses and teaching kits. In 2021, the activities include 6 workshops, 2 achievement exhibitions, and 124 courses. On October 9-10, we hosted the "2021 NSTM Maker Party" which exhibited the NSTM's cultural and creative products and the technology education division for 15 exhibition booths. In addition, the NSTM also organized the Dinosaur Hunter – Warring States Crossbow Shooting experience activities, 2 card weaving courses, 2 survival bracelet courses, and 4 cultural and creative product DIY experience activities. There was a total of 1,000 participants and the total income generated was NT$109,241.

Shuttle Loom Experience Course

Creative plant modeling workshop

2021 NSTM Maker Party: Dinosaur Hunter-Warring States Crossbow Shooting

2021 NSTM Maker Party: on-site Workshops

4. 2021 MAKEX Robotics Competition

The MAKEX Robotics Competition is a robotics competition platform that promotes development and learning of young people, which boosts visitors' passion for creation, sharing and collaboration. The competition encourages the youth to systematically learn multidisciplinary knowledge including science, technology, engineering, art and mathematics via interesting and challenging competitions, applying the knowledge on solving practical problems and promoting technological and educational innovation. After the 2020 MAKEX Robotics Competition World Championship, the NSTM continued to co-organize the 2021 MAKEX Robotics Competition World Championship in Kaohsiung on October 17, 2021, which includes MAKEX Starter (primary school and junior high school), MAKEX Challenge (high school and vocational high school), with 30 teams and 20 teams, respectively, participated by 200 people, including trainees and coaches.

At the competition (Junior High School/ High School Students)

At the competition (Primary School/ Junior High School Students)

5. 2021 Taiwan Science Festival – The Circular Economy

In conjunction with the 2nd Taiwan Science Festival, the NSTM's True Dreamland introduced the circular economy science and technology and attached importance to resource recycling, linking the knowledge culture, and wisdom of the indigenous people of Taiwan.

Professor Chu Wei-Cheng Banana Fabric Weaving Workshop

Kavalan Banana Weave Craft – Traditional Loom Weaving

(1). The indigenous textile culture and banana fabric design

The NSTM self-developed portable shuttle loom which is simple and easy to assemble is combined with the aboriginal culture, textile technology, and banana fabrics. We invited the Lala Ban Banana Weaving Workshop, Shu-Te University Hengshan Co-creation Base and Professor Chu Wei-Cheng to jointly organize 27 weaving activities, with a total of 387 participants.

(2). The Benefits of Recycling in Life – Toy Doctor Workshop

The NSTM invited the Environmental Protection Bureau of Kaohsiung City Government, Su Papa Toy Hospital and G.M. Repair Service Station to participate in the collection of second-hand toys for 5 repair workshops, implementing the circular economy and maker education through toy repair practices, with a total of 111 participants.

Toy Doctor Workshop – Su Papa Toy Hospital

Green Museum

2021 NATIONAL SCIENCE AND TECHNOLOGY MUSEUM ANNUAL REPORT

In 2021, NSTM continued to strive toward the ideal and vision of being a green museum by upholding our sustainable development philosophy and actively promoting the United Nations Sustainable Development Goals according to the announcement of the United Nations and the Taiwan Executive Yuan. Achievements in 2021 include:

1. Improving the care for social and economic conditions of the disadvantaged: NSTM has long been engaged in conducting neighborly community care activities and educational activities for the disadvantaged, such as the relocation of KidsFest of 5 ASEAN Countries Exhibition, with a total of 195,126 participants in 2021.

2. Ensuring food security and promoting sustainable agriculture: We have promoted education on sustainable agriculture in the "Story of Taiwan Agriculture" exhibition, with a total of 14,237 visitors in 2021.

3. Ensuring healthy lives and promoting the wellbeing at all ages: NSTM promoted the"Disease Prevention Combat Camp" exhibition and education and advocacy of healthy diet, and food safety science and educational activities. The disease prevention learning kits have been lent to a total of 81 schools. NSTM cooperated with the Nutrition and Health Science Team of Fooyin University for the advocacy of healthy diet and food safety, with a total of 1,244 visitors.

4. Ensure equal access to comprehensive and high quality education and promote lifelong learning: the NSTM has conducted 4 hours of environmental education and training for colleagues to comply with the responsibility of Social Education Institutions. It also organized 20 education and training courses related to sustainable development to achieve lifelong learning through multiple methods, including the competitions, camps, lectures and teaching aid experience application, with a total of 378 sessions and 15,532 participants.

5. Achieving gender equality and women's rights: the NSTM currently has 123 staff, of which 72 are women, accounting for 55% of the total staff and 57% among the 9 top managers are women.

6. Ensure environmental quality and sustainable management of environmental resources: the NSTM continues to work towards the objective of green building concept, implementing green building improvement constructions to maintain sustainable environmental resources with better indoor shading and cooling and solar photovoltaic power generation. In 2021, NSTM leased rooftop solar energy equipment with capacity of 801.5kwp, and provided total shading area of 3,930m^2。

7. Ensure affordability, stability, reliability and sustainability of modern energy: after six months of equipment maintenance and power generation efficiency evaluation, replacement of de-icing equipment to improve AC performance and replacement of highly efficient lighting equipment, in order to ensure sustainable energy.

8. Promote care and sustainable economic growth, improve labor productivity and ensure employment opportunities: the NSTM has provided opportunities and hired 5 disabled people as staff.

9. Constructing affordable, safe, environmentally friendly, resilient and sustainable transport: in 2021, the NSTM offered promotional activities for public transport to achieve a carbon reduction of 1,958.26kg of CO_2 emissions.

10. Reducing inequality in Taiwan and with other countries: the "2021 NSTM Lanterns of Love" program generated a total donation of NT$3,575,729 for economically disadvantaged students. In addition, NSTM cooperated with foundations, hospitals, Chunghwa Telecom and the private sector to take care of disadvantaged children or children in the remote areas.

11. Establish a caring and sustainable museum: the NSTM took actions on achieving a sustainable museum, such as measuring the amount and analyzing the type of waste and reviewing the recycling rate.

12. Promote the green economy and ensure the model of sustainable consumption and production: the NSTM implements measures to open up new sources to steadily increase revenue by NT$184,556,592 and reduce expenditures by NT$44,609,773. We also reached 100% of the green procurement target.

13. Complete adaptation actions in response to climate change and its impact: the NSTM has permanent exhibition halls including "Climate Change" and performs educational tasks in Social Education Institutions, with a total of 79,987 visitors. A total of 15 water resource teaching aids promotional activities were held.

14. Conservation and sustainable use of ecosystems to ensure biodiversity and environmental degradation: the NSTM continues to improve planting, greening and ecofriendly constructions. In 2021, we planted 100 rose periwinkles, 200 jungle flames as butterfly nectar plants, and added 1,100 shrubs.

15. Promote a peaceful and diverse society to ensure a responsible and service-oriented system: the NSTM provides a single-window service and public inquiry of government information in order to service all residents. It also continues to develop in the new social media community to narrow the distance between the public and the NSTM; with 109,611 Facebook fans, we showed an increase of 9.6% compared with 9,668 fans in 2020.

16. Establish diversified partnership to work together on sustainable development: in 2021, NSTM's 3 diversified partners include companies and schools. Apart from the various resources invested in education, all the units also work together to gain the power of achieving sustainable development.

Establish the Green Pavilion based on the 17 sustainable development goals set by the UN

General Affairs Management

2021 NATIONAL SCIENCE AND TECHNOLOGY MUSEUM ANNUAL REPORT

General Affairs, Electromechanical Operations and Civil Engineering

In 2021, NSTM will continue to improve various administrative services. In addition to actively increasing funds, NSTM also reduced costs on general affairs. It opened up new sources to increase revenue by NT$4,379,560, and reduced expenditures by NT$19,634,529 in total. The archives management department also actively performed document digitization to build a solid base and boost archiving efficiency, in the aim to improve the quality of NSTM's archive applications. In addition, NSTM has long been committed to various energy-saving activities to strive towards the ideal vision of being a green museum and after continuous improvements, it finally won the Energy Efficiency Benchmarking Contest Gold Award. The achievements in 2021 are listed as follows:

1. Actively Increase Income by Widening Resources

In 2021, NSTM actively increased its NT$4,379,560 income by widening resources, including flexible utilization of fixed deposits which generated interests of NT$1,672,655, while NT$1,650,000 rent income was generated from base stations, and NT$463,544 rent income was from renting part of the South Building to National Open University Kaohsiung Learning Center. Furthermore, NT$330,961 was from rebates for installing solar energy equipment by the roof leasing company and NT$262,400 was generated by auctioning scrapped products.

2. Public Procurement to Conserve Public Funds

For procurement contracts and 88 tender award cases over NT$100,000, the accumulated tender budget was NT$357,951,674 and the awarded amount was NT$344,861,167. NT$13,090,507 was conserved in total, with a conservation achievement rate of 3.66%. There were 497 procurement cases between NT$10,000 and NT$100,000 totaling NT$23,440,680; the amount reported was NT$22,704,191, saving a total of NT$736,489, equivalent to 3.14%.

3. Improve the Quality and Efficiency of Archive Management and Applications

To improve the quality of archive management, NSTM continue to scan paper documents into digital files to build up the basis for online archiving, which greatly reduced the time for data archiving compared with traditional operations.

NSTM provides convenient file services by adopting the two-pronged approach including online archiving and paper documents, focusing on single projects for search to carry out systematic file collection. Relevant file copies are selected for each file type and the files are sorted according to the time of occurrence, with its contents summarized with brief descriptions, including the cause of the incidents, key processes, results and impacts, which are then incorporated into a file for future reference. In 2021, NSTM's "Kaohsiung City Government's Appropriation of Land for Non-Departmental Public Bodies Promotion Project Archives Summary" is a case of archive application, which highlight the importance of file scanning to improve NSTM's archive management quality.

4. Emphasis on the Performance of Internal Control

NSTM continued internal control in 2021 and signed the 2020 Internal Control Effectiveness Statement and announced it on our website. Other achievements include the establishment of the 2021 self-evaluation and internal audit plans, execution of self-evaluation and audit and proposition of 5 deficiencies and reform suggestions for continuous improvement.

5. Continuous Improvements to Win the Energy Efficiency Benchmarking Contest Gold Award

(1). Replacement of equipment to enhance energy efficiency

In 2021, NSTM's improvement of electrical equipment covers adding 1 set of ice storage host, 1 air-conditioning water cooler and 10 air-conditioning fans, and replacing 2 air-water coolers. We also conducted review and adjustment of emergency power control panels and power panels in the exhibition hall, with improvements on sewage pumps. Compared to 2020, NSTM saved 26.47% of electricity (2,437,730 kWh) in 2019. The power consumption statistics analysis over the last 10 years are shown in figure 12.

Addition of ice storage host

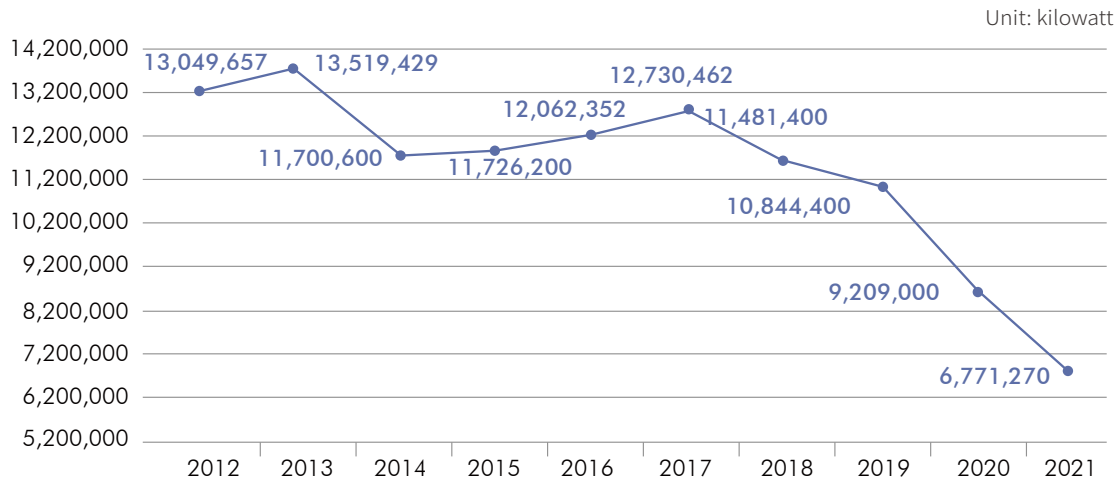


Figure 12 Electricity consumption in the last 10 years

(2). Continuous Development to Achieve Excellent Energy-Saving Performance

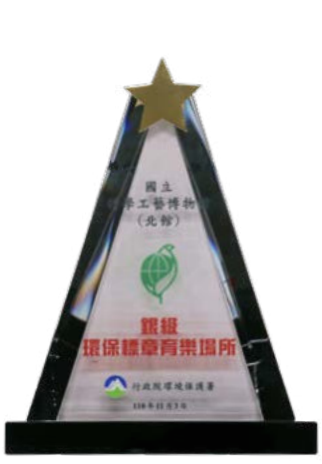
In 2020, NSTM passed the revision of ISO50001:2018 Energy Management System and won the Silver Environmental Protection and Outdoor Recreation Mark. In 2021, NSTM will continue to promote energy management measures to save water and electricity and reduce waste, which not only performed ISO certification renewal, and has also obtained the Energy Conservation Benchmarking Gold Award (Group F) from the Ministry of Economic Affairs and "Excellence Award for Promoting Environmental Protection" from the Kaohsiung City Government.

(3). Leasing and installation of solar energy equipment to share energy efficiency benefits

Solar energy equipment with total capacity of 802KWp was installed on the roofs of NSTM's South Building and North Building, with rebates accounting for 16.5% of electricity sold. This could also solve the heat dissipation problems of the roofs and reduce energy consumption. In addition, since relevant laws and regulations have been lifted, corrugated roof panels were installed to ensure proper water run-off, which also improves water leaks in NSTM. In addition to the rebates, the rebate project also covers co-organized exhibitions and locomotive shed repair.

Excellence Award for Promoting Environmental Protection

Energy Efficiency Benchmarking Gold Award



Environmental Protection and Outdoor Recreation Certificate (Silver Rank)

Solar energy equipment installed on the roof

6. Improve the Efficiency of Public Facilities

(1). Building renovation subsidized by the Ministry of Education

Until now, some of NSTM hardware and software equipment has not met usage requirements. In 2021, the subsidy obtained from the Ministry of Education has been used for the renovation and improvement of NSTM's Lecture Hall in the South Building, adding stylish designed elevators to the circular hall, coupled with the outdoor steel structure beautification project at the North Building and renewal and improvements for family restrooms, roof waterproof and heat insulation improvement construction to improve the safety and practicality of buildings and service quality.

Roof waterproof and thermal insulation improvement project

Exhibition building outdoor steel structure beautification project

(2). Generator overhaul to increase the life and reliability of generators

NSTM's diesel generators provide backup power in case of power outages to ensure public safety (evacuation lighting, escape from a stuck elevator) and disaster preparedness (emergency drainage under heavy rain). Since the opening of NSTM, only routine replacement of lubricants and air filters have been conducted without further maintenance work. In order to ensure that the generator can operate normally in an emergency situation, maintenance work is improved by overhauling to extend the life of the equipment and achieve higher reliability.

Generator overhaul

(3). Comprehensive inspection and maintenance of fire detection system in the exhibition hall

In 2021, when NSTM was temporarily closed due to the impact of the COVID-19 pandemic, we tested the fire detection system in the elevated portion of exhibition halls. The repairable damage or fuse cutouts with no obstructions have all been repaired. Subsequently, NSTM will continue seek funding or improvements to conform to the renovation of exhibitions.

(4). Obtained certification for high quality Public toilets

NSTM's outdoor public toilets have obtained certification for high quality toilets from the Environmental Protection Bureau Kaohsiung City Government, with duration until June 30, 2024.

高雄市政府環境保護局
公廁特優場所認證
單　　位：國立科學工藝博物館
認證編號：EPA-106-0150
認證期限：110 年 7 月 01 日至
113 年 6 月 30 日止
局長張瑞琿
中華民國 110 年 10 月 14 日

Certification for high quality public toilets

(5). Repair and maintenance of office building, outdoor gardening and surrounding facilities

In 2021, NSTM performed waterproofing of roof skylight and floor (areas A and C), expansion joints (areas A and E) and the walls in area D, as well as water leak investigation and repairs. In addition, NSTM completed the installation of watertight doors at the underground parking lot entrance and exit, reporting of building inspections and structural safety monitoring.

Continued repair and maintenance of the surrounding facilities of the premises and outdoor parks, including interior and outdoor public toilets, outdoor grounds, advertising facilities, drainage systems, indoor public area doors, floors, ceilings, notice facilities, compartments and other related maintenance and repair, as well as trimming and replanting of shrubs, replanting jungle flames, maintenance of nursery grounds, and setting up a demonstration area of pet waste disposal to provide public reference and enhance the education function of the park.

Build flood gates

Water leak repair

Replanting jungle flames

Improvement of road surface water flood

Exterior wall renovation

Demonstration area of pet waste disposal

7. Collaboration between private companies and the government to create lifelong learning opportunities

(1). Provide venue as the vaccination site for Kaohsiung City Government

NSTM's lobby was provided as Kaohsiung City Government's vaccination site for 21 days from June 15 to August 28, 2021 and 17,875 Kaohsiung citizens were vaccinated. By providing venues for vaccination, NSTM gained the opportunity to contact and communicate with colleagues in Kaohsiung City Government. During the spread of the COVID-19 pandemic, NSTM also increased its TV media exposure to demonstrate NSTM's vision of lifelong education and developed diverse partnerships, working together to achieve sustainability.

Certificate of Appreciation for Supporting COVID-19 Pandemic Prevention

(2). Smart Pump Collaborative Project

MiTAC Information Technology Corp. and HCP Pump Manufacturer Co., Ltd. are developing a new generation of smart pump applications, and submitted application to Ministry of Economic Affairs Industrial Development Bureau program to assist traditional CITD subsidies, with NSTM's theater square as the venue to ensure efficient drainage in the rainy season to achieve equipment safety.

(3). It takes ten years to nurture a tree but a hundred years to train a man; collaborative teaching of public and private institutions

The Pink Trumpet Tree donation was held on March 9, 2021, with 12 participants including the Chairman of the Kaohsiung Supplementary Education and Quality Assurance Association. The Pink Trumpet Tree was planted next to NSTM's Sun Plaza. This event aims to build a new landmark of NSTM, provide people with a scenic spot to rest and take pictures, which could also achieve effective media marketing to increase the visibility of museums and donors, demonstrate cooperative relationships between NSTM and private education institutions and improve cooperation between public and private educational institutions.

Pink Trumpet Tree Donor Appreciation Event

IT Operations

1. Online Body Temperature Registration System

In order to effectively control the spread of the COVID-19 pandemic, NSTM recorded staff body temperature in the morning and afternoon, with dedicated personnel responsible for review and reporting to the supervisor, as well as notifying the staff that did not measure (record) their body temperature. To simplify work processes and promote paperless operations, NSTM has developed an "Online Body Temperature Registration System" (hereinafter referred to as the System) to record body temperature, supplemented by monthly charts for statistical analysis to make physical health management more simple and more convenient.

This system replaces the traditional body temperature recording with online registration. In addition to quickly reading and keeping in line with the body temperature at each time period, the system can also e-mail the records to the parties concerned, as well as the caregivers and supervisors of relevant units. The system provides daily care for employee health and immediately report any abnormalities to the head, deputy head and HR office.

2. NSTM Online Booking System

On July 8, 2021, the Central Epidemic Command Center's announced that the Level 3 epidemic alert was extended but moderately loosened, social and educational institutions were partially opened for visitors, with single-entry single-exit and the appointment system, as well as restricting the maximum number of people in the museum. In response, NSTM urgently developed the "NSTM Reservation System" within three days to allow visitors to make reservations in advance and quickly enter the venue, while the system can also automatically control the upper limit for the number of visitors.

When swiping the ID card for access, the system provides automatic verification and broadcasts the number of people in Chinese, so that relevant staff can keep track of the situation on site without constantly viewing the computer screen or using the keyboard. There is also a welcome speech in Chinese, English and Japanese.

3. Real-time event search platform

In order for NSTM's staff to better search exhibition-related information, and immediately respond to public inquiries, the IT team planned to set up a platform to summarize NSTM's activities. In addition, considering that relevant activities of each department have been incorporated in the systems for educational activity promotion, venue rental, group reservation and official website special exhibition information, so as to avoid repeated logins and collect data. The IT team has established a 4-in-1 Real-Time Activity Information Search Platform, so that not only the exhibition information (NSTM's SharePoint data), but also the exhibition activity information can be retrieved from the 4 systems, and all of NSTM's activity information can be searched on the same service platform on the search date (or the day before/after).

4. Passed the ISO27001:2013 information safety management system re-examination

After CISO's approval on March 31, 2016, NSTM launched the Information Security Management System (ISMS) and included the ticketing system, official document integration system and online service in the accreditation. SGS Certification and Business Enhancement Division was commissioned to conduct document review and external audit at NSTM and the museum successfully obtained ISO 27001:2013 international accreditation to maintain the validity of the certificate. To maintain the validity of the certificate, the SGS Certification and Business Enhancement Division was commissioned to conduct document review at NSTM. As a result, the document review was successfully passed with no deficiencies.

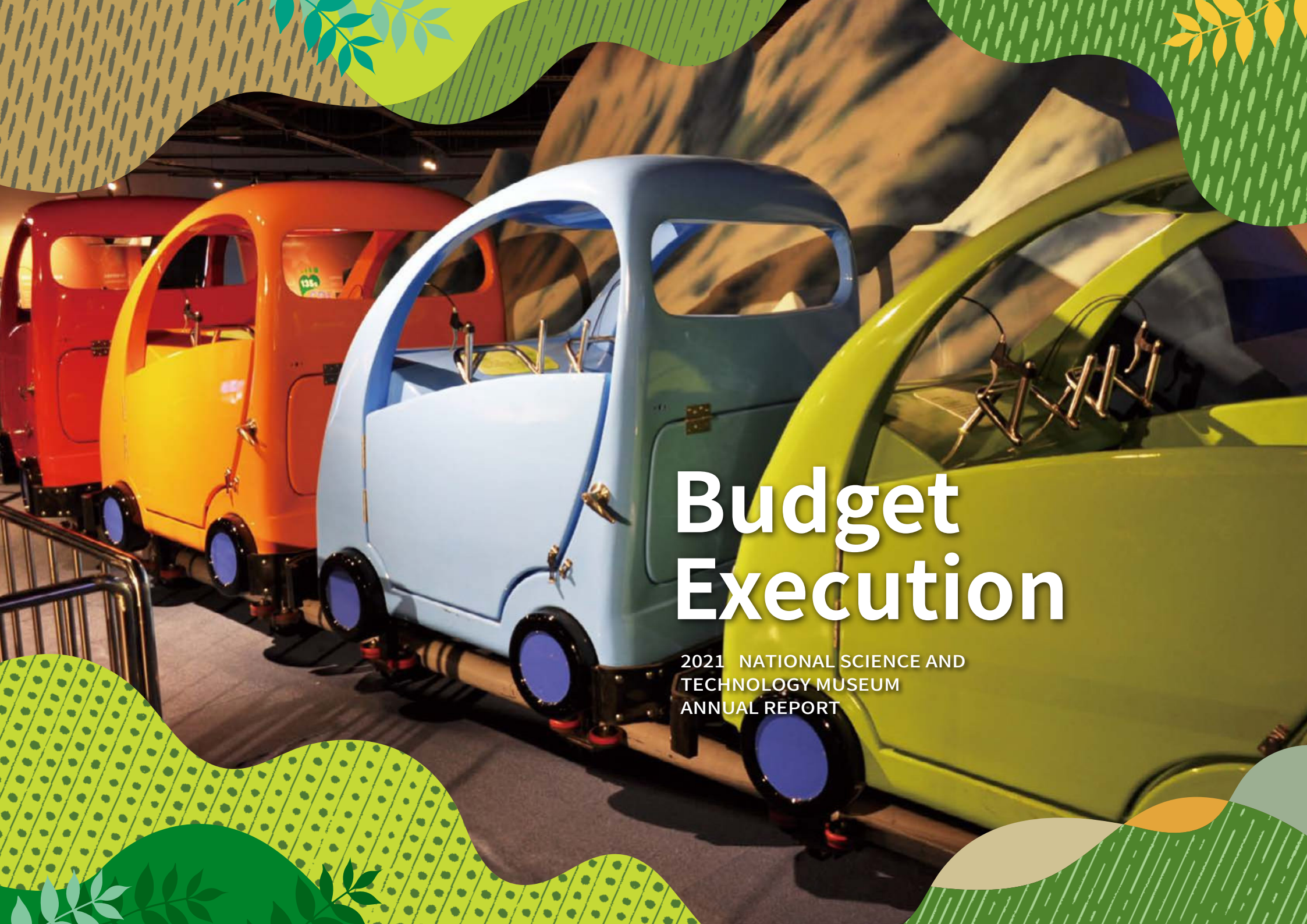
5. Passed the BS10012:2017 personal information management system re-examination

In an effort to ensure NSTM's PIMS complies with international standards, in 2021 we continued to incorporate the re-examination of "Personal Information Management Related to Registration of the Continuing Education Organized by the Technology Education Division and the Membership Card Application to the Visitor Services Division" in the scope of the certification to maintain the validity of the certificate.

6. NSTM was selected as top organization for the MOE's Open Government Data Operational Performance Evaluation

On November 11, 2021, NSTM held the 14th meeting of the MOE's Open Government Data Consulting Team, which ranked first in MOE's Open Government Data Operational Performance Evaluation Group 2 for two consecutive years in 2020 and 2021.

Ranked 1st place for two consecutive years



Budget Execution

2021 NATIONAL SCIENCE AND TECHNOLOGY MUSEUM ANNUAL REPORT

Annual Balance

The total revenue from execution results of NSTM in 2021 was NT$362,069,000. The main source was the social education institution development grant of NT$180,219,000, which occupied 49.77% of the total revenue. Self-raised funds was NT$181,850,000, occupying 50.23% of the total revenue. Out of which, Cooperative Education Income of NT$58,380,000 took the top, occupying 16.12% of the total revenue. The second highest was the income from Other Subsidy Income of NT$57,113,000, occupying 15.78% of the total revenue. The rest in order were: Service Income of NT$24,760,000,occupying 6.84% of the total revenue; Asset-use and Royalties Income of NT$21,949,000, occupying 6.06% of the total revenue; Educational Promotion Income of NT$9,506,000,occupying 2.63% of the total revenue; Miscellaneous Income of NT$3,889,000,occupying 1.08% of the total revenue; donation income of NT$3,851,000, occupying 1.06% of the total revenue; other income of NT$2,402,000,occupying 0.66% of the total revenue.Business Costs and Expenses of NT$472,312,000,occupying 130.45% of the total revenue;Other Business Expenses of NT$97,000,occupying 0.03% of the total revenue.

Our annual shortage amount was NT$110,340,000, this was attributed to the fact that operational funds must be depreciated and amortized. On the income side, the self-raised ratio of NSTM in 2021 was 50.23%.

Table13 2021 Income Balance Sheet

Unit: Thousand NT$

Item	2021 Yearly budget Amount	2021 accounts Amount	2020 accounts Amount
Business Income	284,644	333,867	356,448
Service Income	46,575	24,760	43,620
Exhibition Halls	20,000	8,292	15,641
Special Exhibitions	14,705	12,378	20,343
Theater	7,070	2,178	3,874
Experience Facilities	4,800	1,912	3,762
Cooperative Education Income	34,531	58,380	59,799
Educational Promotion Income	10,073	9,506	14,502
Social Education Institution Development Grant (A)	180,219	180,219	200,244
Other Subsidy Income	11,935	57,113	38,283
Miscellaneous Income	1,311	3,889	0
Other Business Income	32,148	28,202	35,441
Interest Income	1,600	1,673	1,883
Gains on Exchange	0	0	217
Asset-use and Royalties Income	30,437	21,949	25,948
Donation Income	0	3,851	4,556
Breach and Fine Income (including reparations)	50	81	343
Miscellaneous Income	61	648	2,494
Total Income (B)	316,792	362,069	391,889
Business Costs and Expenses	449,125	472,312	500,577
Service Costs	258,947	266,678	284,167
Cooperative Education Costs	23,934	51,649	56,860
Educational Promotion Costs	6,612	5,908	8,121
Management Costs and General Expenses	159,632	148,077	151,429
Other Business Expenses	0	97	1,587
Losses on Exchange	0	86	11
Miscellaneous Expenses	0	11	1,576
Total Expenses	449,125	472,409	502,164
Yearly Surplus (Shortage-)	-132,333	-110,340	-110,275
Government Current Grants Ratio(A)/(B)	56.89%	49.77%	51.10%
Agency Current Self-Raised Ratio 1-(A)/(B)	43.11%	50.23%	48.90%
Self-Raised Income	136,573	181,850	191,645

Source: Annual Budgets, Financial Accounts

Annual Capital Expenditure

The total amount of annual capital budget expenditure budget in the fixed asset was NT$92,029,000, which included NT$40,225,000 from government support, NT$47,599,000 from self-raised funds

Table14 2021 Fixed Asset Facility Improvement / Expansion Balance Sheet

Unit: Thousand NT$

Projects	Available Budgets	Yearly Accounts
Fixed Asset Additions		
Government Support	45,798	40,225
Self-Raised Funds	46,231	47,599
Total	92,029	87,824

Past Revenues, Expenditures, Budgets and Final Accounts

Table15 Past Revenues, Budgets and Final Accounts

Unit: Thousand NT$

Item / Year	Budgets					Financial Accounts				
	Total	Social Education Total Institution Development Grant	%	Self-Raised	%	Total	Social Education Total Institution Development Grant	%	Self-Raised	%
2017	302,100	196,446	65.03	105,654	34.97	396,913	196,446	49.49	200,467	50.51
2018	328,754	200,244	60.91	128,510	39.09	392,815	200,244	50.98	192,571	49.02
2019	324,346	200,244	61.74	124,102	38.26	410,110	200,244	48.83	209,866	51.17
2020	330,880	200,244	60.52	130,636	39.48	391,889	200,244	51.10	191,645	48.90
2021	316,792	180,219	56.89	136,573	43.11	362,069	180,219	49.77	181,850	50.23

Source: Annual Budgets, Financial Accounts

Table16 Past Expenditures, Budgets and Final Accounts

Unit: Thousand NT$

Item / Year	Budgets					Financial Accounts					
	Total	Recurrent Expenditures	%	Capital Expenditures	%	Total	Recurrent Expenditures		%	Capital Expenditures	%
							Staff Costs	Recurrent Costs			
2017	503,526	385,669	76.59	117,857	23.41	570,062	128,863	325,381	79.68	115,818	20.32
2018	489,074	426,560	87.22	62,514	12.78	534,857	134,166	338,366	88.35	62,325	11.65
2019	505,695	423,797	83.80	81,898	16.20	586,775	134,679	370,499	86.09	81,597	13.91
2020	505,554	437,232	86.49	68,322	13.51	565,027	137,591	364,573	88.87	62,863	11.13
2021	541,154	449,125	82.99	92,029	17.01	560,233	136,692	335,717	84.32	87,824	15.68

Source: Annual Budgets, Financial Accounts

Chronicle of Events

2021 NATIONAL SCIENCE AND TECHNOLOGY MUSEUM ANNUAL REPORT

Date	Summary	Proposing Unit
01/01-12/31	Sponsored by MOST, NSTM organized the ''19th Sunday Science Reading Master'' popular science lectures in cooperation with National Cheng Kung University. A total of 17 activities (including four sessions of live broadcasting) were held in 2021.	Technology Education Division
01/15	NSTM's cultural and creative product "Linkage Materials Package" were added to the shelves.	Cultural and Creative Team
01/15-02/27	NSTM co-organized the Hsieh Hsin-Chang Drawing Exhibition with Hsieh Hsin-Chang at the art and culture exhibition area on the 1F.	Exhibition Division
01/15-05/09	Relocation of ''KidsFest of 5 ASEAN Countries Exhibition'' at Buddhist Compassion Relief Tzu Chi Foundation – Bade.	Exhibition Division
01/19	NSTM held the 1st seminar for outdoor clubs in 2021, with a total of 38 representatives of 19 outdoor clubs.	Secretariat
01/20-04/25	Relocation of "Disease Prevention Combat Camp – Dengue Fever and Influenza" touring exhibition at Jingsi temple of Hualien City.	Exhibition Division
02/1-02/15	NSTM organized the "Smart Technologies: The Turnaround" Chinese New Year activity.	Visitor Services Division
02/2 -02/7	Free movie screening for the residents of the 14-square-mile neighborhood was held between February 2 to 7, 2021, with 8 movie screenings each day, totaling 48 movie screenings in 6 days. The event was participated by a total of 1,811 people.	Visitor Services Division
02/04-2023/02/06	NSTM co-organized the ''Glory of TANG PRIZE Laureate and Diploma Exhibition'' with Tang Prize Foundation at the east corridor on 1F.	Exhibition Division

Date	Summary	Proposing Unit
02/05-05/09	NSTM co-organized the ''Underwater Archaeology – Underwater Cultural Heritage Multi-media Interactive Exhibition'' with the Bureau of Cultural Heritage, Ministry of Culture at the 1st exhibition hall.	Exhibition Division
02/20	Chairman Chiu Hsin-Fu of Solarfarm Corporation led the staff to visit NSTM to negotiate on cooperative businesses.	Visitor Services Division
02/25-04/23	Relocation of "Compound Disaster Prevention Education Campus Exhibition" at Xin-Yi Elementary School, Taitung County.	Exhibition Division
02/25	Shishang Discovery Co., Ltd. obtained the "Green Museum Cultural and Creative Park" leasing project with contract period from March 1, 2021 to February 28, 2024, and both parties notarized the rental contract at the Office of Civil Notary Yang Shihong.	Cultural and Creative Team
03/01	NSTM's cultural and creative product '' Diffuse Stone Turning Mold Materials Package'' were added to the shelves.	Cultural and Creative Team
03/02	The new contract manager Ying-Yi Liu of the cultural and creative team took office on March 2, 2021.	Cultural and Creative Team
03/03	NSTM signed a 3-year MOU with Tainan Bilingual International Education Association to assist in organizing 5 scientific empowerment training activities for domestic and foreign teachers.	Technology Education Division
03/03 -04/11	NSTM and Chen Yueh-Mei jointly organized the ''Chen Yueh-Mei Oil Painting Art Exhibition'' at the art and culture exhibition area on 1F.	Exhibition Division

Date	Summary	Proposing Unit
03/04	NSTM incorporated "Food" into the cultural and creative product categories, and applied for registration with the Department of Health, Kaohsiung City Government.	Cultural and Creative Team
03/05	NSTM held the ''Science and Technology Close to Our Hearts – Kaohsiung City Supplementary Education and Quality Assurance Association Pink Trumpet Tree Appreciation Party'' , participated by a total of 12 representatives.	Secretariat
03/12 -2022/05/01	Relocation of the "Eureka! The Fun Science Zone Touring Exhibition" at the Tainan Astronomical Education Area.	Exhibition Division
03/12	The opening press conference for "Water Knowledge – Water Conservation and Disaster Prevention Cultural Relics Exhibition" at the Open Storage was held on March 12, 2021, focusing on the large-scale triaxial compression that was built in 1984 at Zengwen Reservoir. Deputy Director Wang Yi-Wen of the Executive Yuan's Office of Disaster Management, Deputy Director Wang Yi-Feng of the Water Resources Agency, and Director Chen Chun-Hung of the Water Resources Planning Institute have attended the press conference.	Collections and Research Division
03/12	The Taipei Astronomical Museum organized the ''Observation Time Service – Ancient Astronomy and Timing Instruments Special Exhibition'' in NSTM' s Armillary Sphere Exhibition space.	Cultural and Creative Team
03/14-06/20	MOST sponsored the 2020-2021 "18th Sunday Science Reading Master" popular science lectures in cooperation with National Cheng Kung University and a total of 8 lectures were held in 2021.	Technology Education Division
03/19	Principal Hui-Cheng Chang has led a group of VIPs to visit the NSTM.	Visitor Services Division

Date	Summary	Proposing Unit
03/19-03/28	NSTM co-organized the "Climate Crisis Interactive Experience" environmental promotion and education activity with Greenpeace Foundation at NSTM's lobby on 1F.	Exhibition Division
03/26	In 2020, NSTM's ODF-CNS15251 standard format for government documents ranked first place in the Second Minister for Education, with a score of 98 points on average.	Information Team
03/26-05/16	NSTM co-organized the water conservation promotional activity with Water Resources Agency of the MOEA, Southern Taiwan Joint Services Center of the Executive Yuan, Environmental Protection Administration of the Executive Yuan, and Jia Liu Yuan Construction Corp. The "Love Water – Water Saving" challenge was held at the NSTM from March 26 to April 5, 2021, while the Love Water and Love the Earth Puppet Show was planned to be held in Penghu County from April 22 to 26 and from May 14 to 16, 2021 in Chiayi County, of which the activity held in Chiayi County was canceled on May 12, 2021 due to COVID-19 pandemic.	Technology Education Division
04/07-04/18	Relocation of "Wolbachia-A Biological Control Method for Dengue Fever" at Wujia Senior Citizens Activity Center and hall of the Department of Health, Kaohsiung City Government.	Exhibition Division
04/07-08/31	Shih Chien University Department of Fashion Styling and Design Communication renovated the "Perfect Doll" clothing exhibition at the Textile & Clothing exhibition hall.	Exhibition Division
04/09	NSTM added a new sales channel for cultural and creative products: Yuan Shan Club of Kaohsiung.	Cultural and Creative Team
04/09-04/11	NSTM co-organized the 2020-2021 FIRST Robotics Competition Taiwan Championship with ESUN ROBOT ASSOCIATION, including challenges FTC, FLL-Challenge, and FLL-Explore, with a total of 3,640 participants.	Technology Education Division

Date	Summary	Proposing Unit
04/17-04/18	NSTM held the 2020 Creative Science Education Competition and Exhibition at the outdoor Technology Avenue, Equality Avenue and Theater Plaza in response to COVID-19 pandemic, while the award ceremony was held in the Wind Plaza.	Technology Education Division
04/22-04/26	NSTM organized the ''Love Water and Love the Earth Puppet Show'' which was opened on April 22, 2021 together with the Penghu International Sea Fireworks Festival, covering water conservation challenge activities and popular science shows.	Technology Education Division
04/20-05/16	Relocation of the "Soil and Water Conservation for Disaster Prevention" exhibition at the National Museum of Marine Biology and Aquarium. (Originally scheduled to be exhibited until August 30, 2021, but was closed earlier than expected on May 16, 2021 given the impact of COVID-19 pandemic.)	Exhibition Division
04/22-04/27	NSTM co-organized the "2020-2021 Caring for the Environment Design Competition" award-winning products touring exhibition with the Environmental Protection Administration, Executive Yuan at NSTM's lobby on 1F.	Exhibition Division
04/26	The "Academic Impact Awards Conference" was held by the National Central Library on the morning of April 26, 2021. According to databases such as Taiwan Citation Index – Humanities and Social Sciences, the National Central Library announced and awarded the units with academic impact and present relevant awards for role models. NSTM's ''Technology Museum Review'' ranked first in the "Imminent Journal Communication Award: Art" and 5th place in the "Long Term Journal Communication Award: Art." Director Lin Chung-Yi was authorized to represent NSTM to receive the award.	Collections and Research Division
04/28-08/06	Relocation of "Compound Disaster Prevention Education Campus Exhibition" at the Taipei Municipal Zhongshan Junior High School.	Exhibition Division

Date	Summary	Proposing Unit
04/28	NSTM set up the "Solar House Exhibition" together with Ecolohas Energy Technology Co., Ltd., and held the opening press conference in the morning of April 28, 2021.	Technology Education Division
04/30	Director Eiji Kato of the Kaohsiung Office of Japan–Taiwan Exchange Association visited the NSTM.	Visitor Services Division
04/30-05/02	NSTM co-organized the 2021 (61st) Kaohsiung City Primary and Secondary School Science Fair with the Education Bureau of Kaohsiung City Government at the 4.5 Exhibition Hall.	Exhibition Division
05/02-06/03	NSTM co-organized the ''TGM- Mokume Art Work Exhibition'' with Huang Chieh Metal Composite Material Tech. Co. Ltd. at the Art Café on 2F.	Exhibition Division
05/07	NSTM's cultural and creative product ''Coral Restoration Folders'' were added to the shelves.	Cultural and Creative Team
05/07	NSTM's cultural and creative product ''Underwater Archaeology Tool-Benchmark Modeling Pencil'' were added to the shelves for the Underwater Archaeology – Underwater Cultural Heritage Multi-media Interactive Exhibition.	Cultural and Creative Team
05/08-05/15	Relocation of "Disease Prevention Combat Camp – Dengue Fever, Influenza and COVID-19 pandemic" touring exhibition at Chiayi City Gymnasium.	Exhibition Division
05/10	Principal Liang Hua-Chen of Kaohsiung Liou-Guei Senior High School and General Manager Li Chien-Yang of the sponsor – Cargill Taiwan Corp. – came to NSTM and participated in the MOU signing ceremony for the relocation of "Nanometer: the Invisible Scale" exhibition, with NSTM Director-general Shiunn-Shyang Chen and Principal Liang Hua-Chen of Kaohsiung Liou-Guei Senior High School as the authorized representatives.	Exhibition Division

Date	Summary	Proposing Unit
05/18-07/12	NSTM was temporarily closed from May 18, 2021 until July 12, 2021 in response to Kaohsiung City Government's announcement of the closure of eight types of public venues in compliance with the Central Epidemic Command Center’ s announcement of COVID-19 Level 3 Alert on May 19, 2021.	Visitor Services Division
05/23-10/31	Relocation of ''KidsFest of 5 ASEAN Countries Exhibition'' to Buddhist Compassion Relief Tzu Chi Foundation – Nantou.	Exhibition Division
06/06	NSTM was commissioned by MOE to organize Project on Creative Science Education Competition and Exhibition. However, due to the impact of COVID-19 pandemic, the project results switched to online broadcasting from July 16 to 18, 2021.	Technology Education Division
06/11	The "Moving Towards AIoT Fantasy Sound Wall" at the at the Taiwan Industrial History Exhibition Hall won the 62nd U.S. Communication Arts Design Annual Winner in 2021. The device has an avant-garde appearance. When everything is connected by AI empowerment, it will visually show "The hidden data logistics of AIoT" in the future. The design combines mobile/dynamic components, projection mapping and related explanatory animation graphics, exhibiting the major products that were representative in Taiwan's industrial process, which thereby depicted how AIoT improved our daily lives.	Exhibition Division
06/15-08/28	"From June 15 to August 28, 2021, NSTM’ s lobby was used as a vaccination station for Kaohsiung City Government for 21 days and a total of 17,875 Kaohsiung citizens were vaccinated at NSTM. Remarks: June 15th, 16th, 20th, 21st, and 22nd (1,637 people in 5 days). July 2nd, 3rd, 4th, 9th, 10th, 11th, 12th, 13th, 14th, 26th and 27th (11,116 people in 11 days). August 5th, 10th, 13th, 23rd and 28th (5,122 people in 5 days)"	Secretariat

Date	Summary	Proposing Unit
07/06	NSTM's cultural and creative products ''Robot Balance Beams'' and ''Penguin Spinners'' were added to the shelves for the Stationery Island Adventure exhibition	Cultural and Creative Team
07/08	Obtain subsidy of NT$1.04 milloin for the Marine Education Promotion Plan from the Ocean Affairs Council. The planning and production of large-scale interactive learning materials provide diverse marine knowledge and experiences, which promote marine education and care for the oceans.	Technology Education Division
07/13-08/31	NSTM's curated the Vaccination Miniature Exhibition at the gallery on 2F.	Exhibition Division
07/20-09/26	The NSTM co-organized the "Precautions and Monitoring – Soil and Water Conservation Measures and Landslide Disaster Prevention" with the Soil and Water Conservation Bureau of the Council of Agriculture of the Executive Yuan at the Open Storage, which exhibits the soil and water conservation artifacts that have completed reconditioning, repair and interpretation in 2021.	Collections and Research Division
07/20	NSTM's cultural and creative product "Robot Birilla and Birillo Keychain and Pressure Point Massage Stick" were added to the shelves	Cultural and Creative Team
07/22	Passed the ISO 27001:2013 information security management system re-examination.	Information Team
07/23	Passed the BS 10012:2017 personal information management system re-examination.	Information Team
07/29	For the collection, preservation and conservation of cultural artifacts and cultural heritage of the Taiwanese film and broadcasting industry, NSTM has signed the MOU with the Tainan National University of the Arts (executed by the Multi-Media Center) to promote activities related to social science, culture, education, and establish cooperative relationships for long-term research and create mutual benefits.	Collections and Research Division

Date	Summary	Proposing Unit
07/30-10/24	Relocation of the "Underwater Archaeology – Underwater Cultural Heritage Multi-media Interactive Exhibition" jointly organized by NSTM and the Bureau of Cultural Heritage, Ministry of Culture at Matsu Folk Culture Museum.	Exhibition Division
08/10-11/14	The launch of Cine Equipment Exhibition in the Open Storage.	Collections and Research Division
08/11-09/30	Stationery Island Adventure Exhibition at the 2nd exhibition hall. (The opening press conference is tentatively scheduled for December 24, 2021, and the exhibition will be until March 13, 2022.)	Exhibition Division
08/13-09/06	NSTM co-organized the 2020 Long-Term Care 2.0 Home Assistance Drawing Contest award-winning products touring exhibition with Taiwan Province Chapter of The Red Cross Society of The Republic of China, held at the art and culture exhibition area on B1F.	Exhibition Division
08/18-09/09	NSTM co-organized the "Come and Look! A Cool Adventure of Reality and Imagination Mobile Museum" with the National Museum of Taiwan History at Jiuru Road.	Exhibition Division
09/01	Reopened the NSTM Shop to sell cultural and creative products, with overall improvements in terms of commodities, store environment and service, appointing NSTM staff to assist in selling and customer services.	Cultural and Creative Team
09/01-09/26	NSTM co-organized the "Yu Yi: 2021 Kaohsiung Museum of Fine Arts Association Member Joint Exhibition" with Kaohsiung Art Research Association at the art and culture exhibition area on 1F.	Exhibition Division
09/10	NSTM co-organized the "Introduction of Central Weather Bureau Old Seismograph and Maintenance Workshop" with the Central Weather Bureau at the Open Storage, assembling and restoring three sets of seismographs including the Omori horizontal seismograph, Wiechert seismograph (vertical), and Wiechert seismograph (horizontal), in order for visitors to understand the mechanisms and components of these seismographs.	Collections and Research Division

Date	Summary	Proposing Unit
09/10	NSTM organized the "2021 NSTM Maker Party" to promote exchanges between makers, which included 15 exhibition booths, Warring States crossbow experience, four cultural and creative product DIY experience activities, two survival bracelet courses, and two card weaving courses, with a total of 1,000 participants, which generated total income of NT$109,241.	Cultural and Creative Team
09/12-2022/02/28	Relocation of the "Soil and Water Conservation for Disaster Prevention" exhibition to Penghu Living Museum.	Exhibition Division
09/17-2022/03/31	Relocation of "Compound Disaster Prevention Education Campus Exhibition" at Taichung Municipal Sha-Lu Junior High School.	Exhibition Division
09/21-11/20	NSTM co-organized the "Celebrating 60 Years of Soil and Water Conservation" exhibition with the Soil and Water Conservation Bureau of the Council of Agriculture, Executive Yuan at the corridor on 6F.	Exhibition Division
09/28-10/31	NSTM co-organized the "Listen to the World – Members and Artists Joint Exhibition" with Kaohsiung Elite Association of Fine Arts at the art and culture exhibition area on 1F.	Exhibition Division
10/01	NSTM's cultural and creative product "NSTM Medical Masks" were added to the shelves.	Cultural and Creative Team
10/01-10/17	NSTM co-organized the "Taiwanese Girl's Future Diary" special exhibition with Taiwan Love and Hope Association and National Cheng Kung University at the corridor on 4F.	Exhibition Division
10/01-10/17 10/19-10/31	NSTM and National Kaohsiung Normal University co-organized "MOE's 2020–2021 CO2 Monitoring, Research and Hands-On Experience Environmental Education Promotion Program" – Achievement Poster Exhibition at the corridor on B1F.	Exhibition Division

Date	Summary	Proposing Unit
10/05	NSTM received a certificate of appreciation from Kaohsiung City Government for the assistance in COVID-19 prevention and setting up large vaccination stations to provide care for Kaohsiung citizens.	Secretariat
10/07-2022/03/13	Relocation of "Disease Prevention Combat Camp — Dengue Fever and Influenza" at Tzu Chi Taichung Jing Si Hall.	Exhibition Division
10/17	To promote robot education, NSTM co-organized the "2021 MakeX Robotics Competition World Championship (Kaohsiung)" with Jinyuan iPOE International Co., Ltd., in which 20 teams applied for Starter (junior high and high school), and 20 teams applied for Challenge (high school/vocational high school). The competition was participated in by 200 students and coaches.	Cultural and Creative Team
10/18-10/21	Implemented the "2021 Soil and Water Conservation Outdoor Learning and Diversification Promotional Program" and "Soil and Water Conservation Artifacts and Stories" oral history interviews on soil and water conservation, and completed interviews and filming of seven seniors and experts in soil and water conservation.	Collections and Research Division
10/19	The First Vice-President Chang Cheng-Chung of MD300 Taiwan Lions Clubs International, has led 10 members to visit the NSTM.	Visitor Services Division
10/27-12/08	NSTM applied for the "2021 MOEA Energy Efficiency Benchmarking Contest" F Team (Public Affairs, National Defence and Education) Gold Award, and on December 8, 2021, NSTM Director-General Shiunn-Shyang Chen received the award on behalf of the museum.	Secretariat

Date	Summary	Proposing Unit
10/27-10/29	On October 27–29, 2021, NSTM and eight organizations including the Graduate Institute of Conservation of Cultural Relics and Museology of Tainan National University of the Arts (TNNUA), NCKU Museum, the Graduate Institute of Arts Management & Entrepreneurship of National Sun Yat-sen University, Asia-Pacific Heritage Preservation and Restoration Start-Up Technology Research Center of Cheng Shiu University, Chinese Association of Museum and its Conservation Committee and Committee for Museum Exhibition, and the Department of Communication Arts of Wenzao Ursuline University of Languages jointly held the "2021 International Conference on Professional Development in Museums". On the first day of the conference, it was held at TNNUA, and was relocated to the NSTM on days 2 and 3. The conference invited three foreign and seven native speakers to give lectures, providing a professional seminar platform and published 60 papers to enable participants to further exchange information and acquire new knowledge.	Collections and Research Division
10/30-10/31	NSTM and MOE's Office of Talent Cultivation for the Integration and Application of Clean Energy Systems co-organized the Clean Energy Creative Competition. The teams of university/college contestants include localized practice team, the green energy building team and micro film team, while the teams of senior high school contestants include practice team and micro film team. Also, junior high school contestants were included. Forty-two winning teams were selected during the final competition on October 30–31, and awards were presented to 204 students.	Technology Education Division
11/02-11/14	Organized the "Telecom@Taiwan Online-VR Exhibition" of the "2021 Telecom and Museum Cooperation Plan" which move the "Telecom@Taiwan" exhibition to a digital space on the Digital Telecom Museum website by use of environment technology, with online promotion to encourage people to engage in the DIY experience activity of making Cardboard VR Goggles.	Collections and Research Division

Date	Summary	Proposing Unit
11/02	Renovation of the ''Climate Change'' permanent exhibition on B1F.	Exhibition Division
11/02-12/05	NSTM co-organized the ''Charming Persimmon – Authentic Taiwanese Flavor: Xinpu Persimmon Dyeing'' exhibition with the Soil and Water Conservation Bureau of the Council of Agriculture, Executive Yuan and Hsinchu County Persimmon-Dyeing Culture Association at the Art Cafe on 2F.	Exhibition Division
11/04	Obtained certification for the ISO 50001:2018 energy management system in 2021, and was registered with the Taiwan Accreditation Foundation (TAF) and received a certificate (valid until October 20, 2024).	Secretariat
11/06	NSTM has passed 10 donation cases submitted to the Ministry of Education, including one donation case which received a gold award which mandates prize money of more than NT$ 5 million, which was presented to NSTM to receive on its anniversary.	Collections and Research Division
11/06	Organized the opening ceremony of the 2nd Taiwan Science Festival of 2021 and NSTM's 24th Anniversary (Earth) Space Exploration activity.	Visitor Services Division
11/06-11/14	NSTM co-organized the ''Circle Journey'' exhibition with Formosa Petrochemical Co., Ltd., CPC Co., Ltd., and the Industrial Technology Research Institute at the corridor on B1F.	Exhibition Division
11/06-11/21	NSTM curated the Miniature Theme-Based Children's Science Education Self-Learning Box (Mixed-Age Series) Exhibition at the corridor on B1F.	Exhibition Division
11/06-2022/01/16	NSTM curated "Wolbachia – A Biological Control Method for Dengue Fever" at the corridor on 4F.	Exhibition Division

Date	Summary	Proposing Unit
11/06	NSTM curated the new Space Exhibition at the permanent exhibition hall on 6F.	Exhibition Division
11/06-11/14	MOE co-organized the 2nd Taiwan Science Festival in 2021 with NSTM and the other four science and technology museums, the county and city governments, private companies, colleges and universities. The event covers the Toddler Paper Science Exhibition, popular science shows, popular science booths, and the Toddler Science Fair.	Technology Education Division
11/09	The 2021 NSTM Lanterns of Love Program and Kaohsiung Feng Xin Rotary Club Award Recognition Ceremony received a subsidy of NT$200,000 to provide economically disadvantaged school children in Taiwan support and to visit NSTM for free. The program was participated in by Rotary Club of DAFA, Rotary Club of Kaohsiung Ocean, and Rotary Club of Chengcing Lake, Linyuan Rotary Club, Fengshan West Rotary Club, Fengshan South Rotary Club, Fengshan East Rotary Club, Rotary Club of Fengshan Chungshan, Rotary Club of Kaohsiung Wenshan, Mr. Wang Tai-Jung, Ms. Tsao Yu-Ching, Ms. Liu Hui-Chen, Mr. Hsieh Wu-Chi, Mr. Huang Sheng-Lung, etc. The event was participated in by a total of 268 teachers and students from Tainan Municipal Madou District Anye Elementary School and Shin Sheng Elementary School in Neipu Township, Pingtung County. NSTM and the principals of the two elementary schools presented certificates of appreciation to Feng Xin Rotary Club for their love and support to the economically disadvantaged students. The activity was successful, and the participating rotary clubs presented pennants to NSTM, which were displayed as collections in the gallery.	Visitor Services Division
11/11	NSTM was ranked 1st for outstanding organization of the MOE's Open Government Data Operations Evaluation in both 2020 and 2021.	Information Team
11/11-12/21	NSTM co-organized the ''Ethics Educational Calligraphy and Painting Exhibition'' with Taiwan Association for Academic Ethics Education at the art and culture exhibition area on 1F.	Exhibition Division

Date	Summary	Proposing Unit
11/12-2022/03/01	Relocation of "Underwater Archaeology – Underwater Cultural Heritage Multi-media Interactive Exhibition" to Lanyang Museum of Yilan County.	Exhibition Division
11/18-12/18	Relocation of ''Nanometer: The Invisible Scale'' to Kaohsiung Liu-Guei Senior High School.	Exhibition Division
11/20-11/21 12/04-12/05	NSTM co-organized the Rural Youth Market with the Soil and Water Conservation Bureau of the Council of Agriculture, Executive Yuan and the Agriculture Bureau of Kaohsiung City Government at the Wind-Chasing & Theater Square.	Exhibition Division
11/26-2022/05/22	Explore IoT Exhibition is relocated at Macau Science Center.	Exhibition Division
11/27-12/5	The Ocean Affairs Council of the Executive Yuan provided a subsidy of NT$1.04 million for the NSTM to implement the Marine Education Tourism Promotion Plan in 2021. NSTM developed three sets of large-scale interactive teaching materials and two sets of DIY teaching materials, and conducted the Ocean Energy Discovery Tour education activity during the Taiwan Science Festival, with a total of 2,520 visitors.	Technology Education Division
11/30	Updates made to Smart Mechanical Components – Motor at the Power and Machines exhibition hall on 2F.	Exhibition Division
11/30	NSTM curated the ''Treasure Box'' permanent exhibition at the corridors on 4F and 6F.	Exhibition Division
12/02	NSTM and the external units have jointly developed the ''Theme-Based Children's Science Education Self-Learning Box'' series which covers three age groups including ''4-6 year old kindergarten series'', ''Under 4 year old infant and young children series'', and ''Mixed age class for preschoolers''.	Cultural and Creative Team

Date	Summary	Proposing Unit
12/04-2022/01/19	NSTM co-organized the ''2021 Campus Rural Practice Co-creation Project – Achievement Exhibition'' with the Soil and Water Conservation Bureau of the Council of Agriculture Executive Yuan at the Three Square Exhibition Hall and the west corridor on 2F.	Exhibition Division
12/10	Ranked A in the Ministry of Education's 2021 On-site Visits and Inspections.	Secretariat
12/11-12/26	NSTM co-organized the ''Art Inheritance and Art for the Soul'' with the Kaohsiung Chinese Art Collectors Association at the Art Cafe on 2F.	Exhibition Division
12/13	The Exhibition Building Exterior Steel Structure Beautification Construction and South Building Lecture Hall Renovation and Repair received outstanding scores of 83 points and 84 points, respectively, given by the engineering construction inspection team of the Ministry of Education.	Secretariat
12/17-2022/04/10	Relocation of "Technology and Preparedness for Disaster Reduction" exhibition at the National Museum of Marine Science and Technology.	Exhibition Division
12/18-12/19	NSTM held the 11th ''Hand Launch Glider Flying Competition'' during December 18-19. Since the 1st term, the competition has received warm responses from students, and has attracted more than 400 junior high and high school students in Taiwan to participate in the competition every year. The event is classified into two categories of ''Straight Flight'' and ''Endurance Flight'', while taking into consideration the creativity and scientific principles of flight. National Pingtung Senior High School came first in the senior high school competition, National Puli Industrial Vocational Senior School second, and Dah Yung Senior High School third. As for the junior high school competition, Ming Cheng Junior High School of Pingtung County came first, and Tainan Municipal Jhongshan Junior High School second and third, respectively.	Technology Education Division
12/18-12/19	NSTM co-organized the ''2021 (4th) Competition on Creative Demonstration of Science'' and ''Surprise Eggs – Creative Science Competition'' with the R.O.C. Military Academy and Solar Farm.	Technology Education Division

Date	Summary	Proposing Unit
12/23-2022/01/13	NSTM co-organized the "Spirit of the Earth – 2022 Ho Hui-Bai Art Exhibition" with Ho Hui-Bai at the art and culture exhibition area on 1F.	Exhibition Division
12/28-2022/02/28	NSTM and Liao Chien-Hsun jointly organized the ''Liao Chien-Hsun Jade Exhibition'' at the Art Cafe on 2F.	Exhibition Division
12/29	NSTM organized the 2022 Chief of Village Feast at Chin Ding Seafood Restaurant. Eleven chiefs were invited and NSTM's director-general with directors and colleagues from each division, in total 27 persons, attended the feast. All got together for discussion and to share opinions on activities, major policies, and renovation planning in 2022.	Visitor Services Division

List of NSTM Personnel

2021 NATIONAL SCIENCE AND TECHNOLOGY MUSEUM ANNUAL REPORT

STAFF (In Alphabletical Order)

Director-General
CHEN, SHIUNN-SHYANG

Deputy Director-General
WU, PEI-HSIU

Secretary
JHENG, ZONE-JHE / SU, YI-HSIANG

Collections and Research Division
Director - LIN, JONG-I

CHEN, SHU-CHING / CHENG, TING –FANG

CHUANG, TING-YU / HSIAO, KUO-HUNG

HSU, TING-YUAN / HUANG, CHENG-CHONG

HUANG, JUN-FU / LIN, LI-CHUN / LIU, CHING-HO

TSAI, CHIA-JUNG / WANG, YUN-YING

WU, CHING-TAI

Exhibition Division
Director - CHEN, CHI-HSIA

CHEN, CHUN-AN / CHEN, MEI-TSEN

CHUANG, CHUN-LIN / CHUANG, SHENG-TENG

HONG, WAN-JHEN / HOU, CHIEH-LI

HSIAO,MING-HUNG / HUNG, HUANG-KAI

KAO, SHIH-WEN / LI, JU-CHING

LIN, CHAO-HUNG / LIN, CHIEH-YA

LIN, CHUAN-WEI / LIN, HUI-CHUAN

LIN, JIAN-LIANG / LIN, SHIS-TANG

LIN, SHU-CYU / LIN, WEN-HSIEN

LU, THAO-RONG / SU, FANG-YI

SUN, HUNG YU / SUN, YI-JEN

TSENG, HUI-CHANG / WU, SU-HUA

WU, YU-CHUN / WU, YUN-JU

YANG, YUNG-HSUAN

Technology Education Division
Director - CHANG CHIEN, CHIH-TING

CHANG, JIA-HWAI / CHEN, CHENG-CHIH

CHEN, YI-CHEN / CHEN, YU-HSIN

CHENG, CHIEN-CHI / CHENG, JUI-CHOU

HO, SHU-MIN / HONG, JHIH,MING / HSIAO, DER-REN

HUNG, HSUEH-CHIN / JIANG, SHU-FANG

KUO, HONG-BIN / LIN, HUAN-YU

LIN, PEI-YING / LIN, SUNNY-S

LIU, CHIH-YUNG / LIU, JIA-RU

MAI, HSIU-WAN / TSENG, JUI-LIEN

WANG, CHU-LIN / WANG, YU-HUNG

YANG, YI-TING / YEH, CHIN-YU

Visitor Services Division

Director - WANG, LIANG-CHUAN

CHANG, SIN-YI / CHEN, HSIANG-CHUNG / CHEN, I-WEN / CHEN, JUO-HAN

CHEN, TA-TSAI / CHENG, CHUN-HSIANG / CHENG, HSIEN-JEN / CHIU, PING

CHU, PEI-YING / CHUNG, YING-SHIUE / HSIEH, YA-WEN

HUANG, HUI-TING / HUANG, PEI-YU / HUANG, SHIH-TING

LEE, KUAN-CHING / LIN, JIAN-LIANG / LIN, SZU-YUAN / LIU, FUN-RU

LIU, JIN-YI / PU, CHING-CHING / SONG, GIANG / SU, PEI-JHEN

TSAI, FAN-YI / TSAI, PEI-YING / TSAI, YUNG-LIN / TSENG, I-HSUN

TU, MEI-FANG / WU, YI-NA

Secretariat

Director - CHOU, WAN-RONG

CHEN, LIN-YUAN / CHEN, CHING-MAO / CHENG,JO-LING / CHIEN, I-CHUN

GER, TZU-HSIANG / HORNG, JING-YI / JU, YUAN-CHING

KUO, CHUNG-HAO / LEE, CHIEN-HSING / LEE, HOUNG-JYH

LEE, SHUN-HSIUNG / LI, CHANE-WEN / LIAO, MIN-LING

LIN, WEN-CHIH / LIU, CHIN-HUNG / MO, HSIUNG-WEI / OU, Di-Ying

SU, YU-JEN / SUN, MING-SHENG / TAI, YU-CHIN / TSAI, CHENG-TE

TSAO, CHIH-HSIEN / WANG, CHIEN-PING / WU, CHENG-CHAN

WU, CHING-YUN / YANG, LI-WEI / YANG, MEI-HUI / YEH, CHIA-HSING

YOU, SHUN-PING / ZOU, JIA-PING

Personnel office

Director - KUNG, CHING-WEN

CHEN, YI-TING / HSU, TUNG-CHIA / KUO, LI-TING / LIN, YU-TING

Accounting and Statistics Office

Director - FU, CHEN-MEI (during 2021/1/1-4/30)
Director - HUANG, HUI-YU (assumed office on 2021/4/30)

HUANG, SHU-JUNG / LIN, HSIU-TZU / LIU, SHU-YI

VOLUNTEER (In Ascending Orde)

0860456	KUO, SHU-TUAN
0860474	CHUANGT, MEN-CHU
0860487	CHEN, JIA-SHIANG
0860502	TSAI, NENG-SHENG
0860511	CHIU, YU-MEI
0860512	LEES-M
0860513	SHUN, SHU-SHAN
0860539	CHUANG, YU-CHUNG
0860541	CHAO, LI-FENG
0860545	HUANG, SHU-HUI
0860549	ZHENG, SHOU-YAN
0860551	TSENG WEN, CHEN-YING
0860561	TSAI, LI-SHU
0860574	HE, YI-TING
0860575	HSU, CHI-FU
0860580	FU, YU-CHUAN
0860585	HUANG, KUEI-FENG
0860586	TSENG, SHU-LING
0860587	LIANG, HSIU-YUAN
0860599	CHUANG, MEI-CHING
0860609	CHANG, YAN-LING
0860670	CHEN, CHENG-HSIN
0860673	CHANG, SHU-MEI
0860707	LAI, HENG-HUA
0860712	LIANG, CHIN-O
0860714	YANG, KUEI-TAO
0860715	YANG, HSUEN-O
0860716	CHENG, SU-FEN
0860718	CHEN, SHU-YAN
0860743	LIN, CHAO-YIN
0860753	CHEN, NING
0860760	HUNG, MEI-YING
0860770	LO, YUEH-HSIU
0860781	CHANG, KUO-WEI
0860809	TSENG, PAO-HUI
0860825	LIAO, ZHEN-XING
0860841	KONG, FUN-CHUAN
0860845	KU, BAIR-HWA
0860852	SHAO, YU-TANG
0860876	CHUNG, WU-LING
0860883	HUANG, HUI-LIEN
0860929	LEE, TZU-CHI
0860945	CHENG, CHIN-KUEI
0860979	SHAN, SHOU-JU
0861001	KU, KUEI-LI
0861004	HUANG, CHIUNG-FANG
0861006	CHEN KAO, LI-CHU
0861014	LEE, HSIU-CHIN
0861018	LIANG, YU-YING
0861039	LEE, CHUN-JUNG
0861044	WANG, JIAN-HUA
0861046	SUN, LU-HUA
0861059	LIU, LING-YU
0861096	SHIAI, SHAO-ERE
0861101	LIN, CUI-DUAN
0861103	CHEN, SUE-HUA
0861154	LEE, SHU-CHING
0861158	HONG KO, MENG-LI
0861165	HONG, KANG-NAN
0861172	WANG, CHIN-CHENG
0861174	HSIEH, A-MEI
0861177	HUNG, HSIN-HUA
0861188	LOR, CHUN-LIN
0861207	SHIH, HUI-CHING
0861233	HUANG, KWEN-FENG
0861242	CHEN, I-LUN
0861256	CHEN, PAO-CHU
0861278	TU, PI-LIEN
0861283	YANG, GAO-GUI
0861287	TSAO, YU-HSIU
0861296	WU, YUEH-CHEN
0861314	WANG, SHU-CHING
0861320	LI, TERANG-CHUAN
0861327	CHEN, LIANG-PAI
0861335	SHIH, CHUAN-CHUAN
0861358	LIANG, CHIN-WEI
0861370	CHOU, FANG-HUA
0861400	LIN, HSIU-HUA
0861416	WU, WEN-CHING
0861419	CHOU, HUI-LIEN
0861421	WU, CHING-HUNG
0861500	HUANG, SU-SHIA
0861540	CHIH CHEN, KNEI-YING
0861553	SU, SU-HUI

0861560	LIN, HSIU-FANG
0861589	CHOU, PEI-YING
0861590	LEE, LI-HSIANG
0861619	LIN, PSAI-FA
0861629	CHANG, MAI-LING
0861630	HU, CHIN-CHAI
0861640	WANG, HUI-CHING
0861645	TSOU, HSING-YING
0861649	YANG, HSIU-YNU
0861653	LIN, SHAN
0861658	TSAI, LEE-FENG
0861672	CHENG, CHIN-CHAI
0861673	LIU, CHUN-TSENG
0861674	HSIEH, SHIANG-ER
0861675	LIN, HUI-MEI
0861676	CHUANG, PAO-AI
0861677	LI, SU-CHEN
0861678	LEE, SHIH-FANG
0861690	CHOU, HUA-KUEI
0861695	CHEN, SU-CHIN
0861703	CHEN YOUNG, CHING-MEI
0861718	LIU, YUE-JIAO
0861759	CHEN, MAY-LIE
0861781	CHOU CHEN, MEI-WEN
0870001	LIN, HUI-ZHEN
0870010	LIN, XIU-BEI
0870012	SHIH, PAO-HSIU
0870016	YE, YUE-YING
0870027	LI, SING-HONG
0870039	KUO, WEN-CHEN
0870058	LIN, SHU-WAN
0870061	YU CHEN, PI-LIEN
0870070	HUANG, TSAI-FZNG
0870071	TSAI, YU-CHEN
0870075	LIN, EN-HSIUNG
0870077	LIN, CHUEN-MEEI
0870078	CHEN, LI-HUA
0870084	CHEN, LI-YU
0870085	HUANG LIN, LIANG-HUI
0870088	CHEN, LI-HUA
0870091	LIN WU, MEI-LAN
0870103	TSAI, SHU-HSIEN
0870110	CHEN, JIN-RUI
0870111	LEE, YA-LINE
0870117	CHEN, CHUNG-SHENG
0870127	SU TENG, KUEI-YING
0870131	WU, TUAN-MEI
0870138	SU, CHIN-TSUNG
0870141	HO, YUAN-PIN
0870144	YANG, SHU-FEN
0870149	SHIEH, CHI-HUI
0870150	YU, SHUN-YI
0870152	SHIU, LI-CHUAN
0870190	TSAI, CHIN-CHIH
0870199	CHEN, LI-CHU
0870202	CHANG, HSIU-CHIN
0870226	CHEN, MEI-HUEI
0870229	YANG, SHU-HUA
0870231	CHUANG, CHIA-NU
0870242	LEE, LING-FEN
0870244	CHEN, MEI-CHU
0870246	LIN, HUI-YANG
0870248	LEE, SHU-CHEN
0870263	WANG, YA-LI
0870281	CHU, JUI-FANG
0870290	WANG, HSUAN-HAN
0870294	KAO, FEN
0870300	CHANG, SU-YING
0870306	ZHENG, LI-XIANG
0870315	LEE, HSIU-HUA
0870316	SHIH, LI-HUA
0870322	CHUANG, PI-YUN
0870330	ZENG, YAN-HUA
0870332	HSU WANG, LI-YU
0870333	WANG, LEE-BAO
0870338	KUO, MEI-JU
0870362	WEN, CHIU-CHU
0870372	ZHANG, MEI-YUN
0870403	WEI YANG, HSIU-HUA
0870411	LIN, SU-LING
0870413	QIAN, LI-ZHEN
0870415	LI, YUAN-XIAN
0870428	LIANG, ZHU-YAN
0870429	CHENG, YEN-PIN

0870431	LIN, KUEI-MEI
0870446	HONG, QING-XIN
0870451	WEN, XIN-LAN
0870459	CHEN YANG, SHOW-CHING
0870465	HU XU, XIU-QIN
0870483	GUO, MING-ZHEN
0880002	ZHANG, MEI-FENG
0880004	SU, HUI-MIN
0880007	YU, JUNG-SHIN
0880010	LIU, SHOU-YING
0880013	YANG, LING-FEI
0880017	CHUANG, CHUN-HUA
0880019	LIU, MING-CHU
0880034	WU, CHIN-JUI
0880037	CHAO, PI-LIEN
0880041	TIAN CHEN, MEI-ZHU
0880045	LIU, KE-SHIU
0880046	WU, SHU-YUE
0880055	TAI, CHING-MEI
0880058	CAI, ZHEN-FEN
0880064	TAI, CHIEN-HUI
0880078	LIN CHEN, MING-SHOW
0880082	LEE, HSIU-HSIANG
0880086	LIN, SHU-CHEN
0880087	PAO, CHIUNG-YING
0880093	HUANG, YU-LI
0880097	SUN, YU-CHU
0880123	HUANG, SHU-YING
0880138	CHEN, CHAI-CHIN
0880161	CHEN, NENG-YU
0880179	ZHENG WU, YING-LUAN
0880185	WANG, PIH-SIA
0880195	HUANG HUNG, HSIU-CHIN
0880236	WANG, FENG-YI
0880241	LAN, MEI-CHU
0890006	CHEN HSIEN, HUI-LI
0890008	CHU, LI-YU
0890009	YU CHEN, YUEH-HSIA
0890010	WANG, CHIN-HUAN
0890013	LI, HUI-CHEN
0890018	LIANG, LI-ZHU
0890021	LIN, YU-CHIUNG
0890022	YANG, LI-CHU
0890023	CHEN, CHUN-TAO
0890047	CHEN, JIAN-LONG
0890062	LIU, CHIN-YEH
0890065	WU, HSIU-LIN
0890073	HUANG, HAI-PING
0890074	CHANG, HUI-HSIEN
0890075	HUANG, SHIH-LIAN
0890080	TSAI JUAN, LI-CHUAN
0890083	LUO, YU-MEI
0890084	TSENG, SHU-HUI
0890086	LU, XIU-ZHU
0890097	YANG, HSUEH-CHIH
0890109	KUO, HSUEH-LU
0890111	LIU, CHEN-CHEAN
0890119	TSENG, YEN-HSIN
0890129	CHANG, YUN-HUA
0890132	CHEN, HUI-CHEN
0890133	CHENG, HUI-LING
0890140	TSAI, JIA-JUAN
0890145	CHAO, JUI-CHU
0890147	TING, MEI-HUI
0890151	WANG, CHIUNG-YUN
0890153	HO, SHU-LIU
0890155	DU, SHU-FANG
0890163	LIU, MAM-NING
0890189	KUO, FANG-MING
0890197	WU, JIAN-LANG
0890198	LEE, LING-FIENG
0890202	HSIEH, TUNG-PAO
0890203	CHANG, MANG-LING
0900004	XU, TIAN-DE
0900008	FENG, SHU-JUNG
0900010	LEE, YU-YAN
0900024	LIU, YU-HUA
0900027	LIEN, CHING-YUN
0900034	TSAI, QIU-YING
0900048	HSIEH, PAO-HUA
0900049	LIN, MIN-YI
0900050	CHEN, AI-LING
0900052	CHIANG, TAI-CHEN
0900053	PENG, CHIH-CHIANG

0900055	HSU, SHU-YING
0900074	HUANG HOU, HSUEH-YUEH
0900085	WANG, YU-CHUNG
0900086	ZHAO, ZI-WEI
0900089	CHEN, YUEN-HSIA
0900094	WU, MEI-CHIN
0900098	CHENG, CHUANG-CHUEI
0900109	WANG, JUN-KAI
0900125	HUANG, FENG-CHIEN
0900126	CHENG, I-CHEN
0900127	CHEN, CHI-YUAN
0900133	YEH, HSIEN-WEN
0900134	CHANG, CHIN-YON
0900141	HSIEH, MEI-CHEN
0900144	LIN, SHI-LANG
0900146	HSU, SU-CHEN
0900151	CHEN, KU-LAN
0900152	KUO, YU-LING
0900158	TU YUAN, LI-DE
0910039	HOU, WEN-FU
0910040	CHOU, YU-CHIAO
0910043	HUANG, CHING-MEI
0910047	HUANG, MEI-YING
0910051	LIU, GUO-CHIEN
0910052	SUN, JUI-HUNG
0910053	CHEN, MING-HUANG
0910054	YANG, MEI-LI
0910088	KUO, CHIU-TAO
0910091	SU, YUNG-PING
0910094	LIN, ENG-MIN
0910096	WENG, MEI-CHU
0910098	HUANG, CHIEN-CHENG
0910099	CHANG, CHIN-CHENG
0910104	TENG, CHIN-HSIANG
0910110	LAI, KE-NAN
0930002	CHEN, YUEH-HSIA
0930003	CHOU, SHIU-CHU
0930007	HUANG, MING-HUA
0930009	HSU, LI-HSIA
0930010	FAN, CHENG-YI
0930011	CHEN, HUI-HUA
0930012	HUANG, GUO-SHENG
0930016	SU, PAI-WEI
0930017	CHAN, MEI-CHU
0930018	CHEN, HSIUNG
0930020	CHIANG, AN-NAN
0930021	TSAI, SU-CHEN
0930024	LIN, BI-CHEN
0930025	CHANG, YUEH-YUN
0930026	LEE, YU-HSIA
0930031	KUO, CHAO-HSU
0930032	WANG, LI-YU
0930036	WANG, HSIU-CHING
0930043	HSIAO, LI-YING
0930045	WANG CHEN, SHOW-WONG
0930048	TSENG, YEN-MEI
0930053	SHYU, HUEY-LI
0930055	HSU, CHING-HUA
0930060	CHEN, SHU-NU
0930061	WANG, YA-CHIH
0930062	CHANG, JUNG-CHUN
0930065	LIU, FONG-HSIUNG
0930073	CHEN, NAI-JU
0930074	HU, YU-LE
0930078	LIN, SHU-CHUAN
0930081	YIN, WEI-HUNG
0930087	TSAI, LI-HSIANG
0930088	GU, YONG-JIE
0930095	LIN, CHIH-CHUNG
0930102	DAI, KO-LI
0930109	LU, SHU-CHEN
0930111	HUANG, HSUEH-CHIAO
0930119	YANG, LING-CHEN
0930124	WU CHEN, SU-YU
0930127	LIU LIN, CHAO-HUA
0930134	CHEN, TLU-CH
0930138	CHANG, LIEN-CHU
0930139	YU, KU-YUNG
0930142	SHEN, MING-CHIN
0930147	LI, YU
0930148	YANG, SHU-CHEN
0930150	LIN, JUI-MEI
0930151	SU, JUI-CHUAN
0930153	LIN, PI-CHAO

0930154	HUANG, TSAI-YUN
0940001	CHEN, LI-E
0940002	LIU WANG, WAN-MAN
0940003	SU, CHENG-CHIAO
0940007	CHIU, YU-LUN
0940008	CHUNG, CHIG-YEN
0940027	LIN, PEI-YU
0940033	CHUNG, JUI-HUA
0940036	CHEN, YU-YING
0940037	CHEN, HSIU-FENG
0940045	SHIH, WAN-YI
0940050	CHEN, HSIU-CHU
0940051	YANG, MAY-JU
0940052	YU, LEE-MEI
0940061	QIU, LIN-YUE
0940064	HOU, CHUN-HUA
0940070	LIN, HSIU-LING
0940080	HUNG, YI-WEN
0950001	CHOU LIN, CHIU-HSIA
0950003	CHEN LIN, CHIN-LUN
0950004	YU, SHU-ZHAO
0950005	HUANG, SHU-YEN
0950007	KUO, KUEI-CHU
0950008	CHANG, YUEH-YING
0950009	HUANG, CHIN-PEN
0950014	LIN, CHIN-MEI
0950015	JU, JIA-LING
0950020	TUNG, SHU-CHEN
0950023	CHU, LIEN-HWA
0950025	WANG, CHAO-YUAN
0950026	CHEN, LIN
0950027	WU, HUAN-JAN
0950030	TSENG, CHUAN-SUNG
0950031	LU, KAI-CHUAN
0950034	LEE, BAO-NAN
0950036	ZHANG, LI-MEI
0950039	HUANG, YU-LAIN
0950044	LU, YA-HUI
0950045	SUN, YU-HUI
0950046	HUANG, HUI-LING
0950047	LIN, CHUN-HUI
0950048	SHI XIAO, SEN-ZHI
0950051	SU, JU-SHU
0950054	LEE, YU-CHIN
0950055	TSAI, LI-MAN
0950062	WU, KUEI-MEI
0950063	TSENG, FONG-O
0950066	WENG, XIU-MIAN
0950071	TSAI, SHU-YUAN
0950076	LEE, MING-HUI
0950077	WANG, CHIA-TSENG
0950078	CHANG, HSIAO-HIS
0950079	YI, CHEN-YU
0950080	LAI, SHU-YING
0950081	CHUANG, HSIU-LI
0950084	HSIEH, MEI-YING
0950089	KUO, CHIUNG-CHU
0950090	LEE, MEI-YUEH
0950096	LIU, SHU-HUI
0950098	LIU, WEN-CHI
0950104	LIU, CHING-HIN
0950105	ZHANG, RONG-LAN
0950112	CHEN, XIU-YAN
0950113	HSIEH, PEI-CHU
0950116	TSAI, SU-CHEN
0950119	ZHOU, AI-YING
0950122	LIN, LONG-MIN
0950125	CHEN LIU, JIN-YING
0950128	HOU, JHAO-WUN
0950129	WU, SU-CHING
0950131	HUNG, LI-HWA
0950134	HUNG, JU-RUNG
0950136	TSO, TSUNG-YI
0950139	LU, DU-MEI
0950140	RUAN, ZHONG-QING
0950145	LIN, SEN-TIEN
0950147	LIAO, YU-CANG
0950153	HUANG, YU-HSIN
0950154	CHOU, PO-SHIUN
0950156	LIU, MEI-MAN
0950159	CHANG, KUEI-YING
0950163	CHEN, YI-LI
0950165	SU, XUE-MEI
0950166	WU, FU-I

0950175	CHENG, HSIU-CHING
0950176	LIU, CHUN-YUEH
0950177	CHENG, MING-HSANG
0950181	TSAI, HSIU-MEEI
0950185	CHEN, TENG-CHAO
0950186	CHAO, CHENG-CHIEH
0960001	MA, SAI-FEN
0960009	CHEN, YI-MING
0960010	XIE, YING-DONG
0960012	CHEN, SHENG-XIONG
0960017	WANG, HSIU-CHU
0960020	YANG, EN-YUAN
0960022	TSAI, JU
0960023	CHEN, NENG-CHI
0960029	PAN, JIN-LONG
0960040	WANG, YU-HSIANG
0960045	HUANG, TZU-CHUAN
0960048	CHUNG YAN, SUH-JAU
0960053	WANG, CHIU-HSIANG
0960054	CHEN, MEI-YIN
0960057	CHEN, NAN-SHENG
0960060	XU, YING-YU
0960063	CAI, JIN-ZHANG
0960072	YANG, HSUEH-FEN
0970004	WENG, TZU-SHUAN
0970006	LIN, JIA-HONG
0970032	HONG, ZHEN-SHAN
0970033	CHU, LI-HUA
0970038	HSU, SHIH-CHENG
0970039	HSIAO, LI-CHING
0970040	YU, CHIEH
0970041	TSAI, CHIA-YI
0970043	HU, JUI-HUI
0970051	CHEN, HSIAO-HUAN
0970052	CHOU, HUI-LING
0970055	TESNG, YUEH-HSING
0980002	YIN, JIAN-CHUNG
0980005	CHIANG, YU-YUN
0980007	CHEN, YU-CHIN
0980012	CHEN, JIE-PING
0980013	LI, YUN-YIN
0980014	CHANG, CHIEN-CHUN
0980015	CHEN, SHAN
0980016	CHIANG, HSIU-MAN
0980017	LIN, MEI-LAN
0980018	CHIANG, HUI-CHIN
0980022	CHOU, LING-CHUAN
0980025	HSU, MEI-JEN
0980027	HU, SHU-CHEN
0980028	CHEN, WEN-SHAN
0980031	CHOU, CHIU-LAN
0980032	LIU, XING-LIAN
0980036	LIN, DAR-NAN
0980038	HUANG, SU-MEI
0980039	YANG, HSIU-YING
0980042	CHEN, TZU-JIUN
0980045	CHEN, ZI-LING
0980046	PENG, HUI-CHEN
0980050	LIN, MEI-FEI
0980053	LIN KUNG, SHU-MAN
0980054	KUO, KUEI-LAN
0980061	CHUNG, MEI-LEE
0980074	CHANG, LI-CHING
0980081	TSAI, TSAI-LING
0980082	CHANG, MEI-JIN
0980084	LEE, LI-YING
0980085	CHANG, CHAW-YANN
0980086	LIN, XIU-LUAN
0980087	HSU, HSIEN-TANG
0980089	LIN, CHUN-SHIA
0980090	YEH, PAO-CHIH
0980091	CHEN, HONG-SHING
0980095	CHUANG CHEN, CHIN-YUEN
0980096	CHEN, LEE-HUA
0980101	CHANG, CHIEH-YUN
0980102	LEE, SHU-FEN
0990004	LAI, KUN-YI
0990005	TSENG, YU-LUN
0990006	CHEN, CHUN-HSIUNG
0990010	JIN, CUN-SHAN
0990013	TUNG, CHENG-LIANG
0990015	LEE, YI-HOUN
0990016	JIANG, HUI-TIAN
0990017	CHIU, CHIN-CHENG

0990019	HSU, HSIN-CHU
0990020	HUANG, KUN-TSE
0990021	CHEN, HSIU-HUA
0990024	SHI, XIU-ZHEN
0990025	KUO, CHING-MEI
0990026	LEE, MIAO- CHEN
0990028	LU, FU-MEI
0990029	CHEN, MEI-YING
0990030	CHU, YU-FANG
0990031	TONG, MING-CONG
0990040	CHANG, MING-SUNG
0990042	LIU, YU-LAN
0990044	HSU, CHIH-MING
0990045	LI, CHIEH-YIN
0990047	CHOU, YEONG-CHI
0990048	CHEN, SHUI-WANG
0990051	CHEN, WAN-FU
0990053	CHENG, RUEY-SHAN
0990054	HE, XIA-ZHI
0990056	LEE, YURN-CHONG
0990057	LIN, SHOU-SHAN
0990058	LIU, CHIN-CHIH
0990059	HSU, YUEH-YING
0990060	HUANG, CHIN-HUEI
0990062	LIN, HUI-LI
0990064	HUANG, JEN-TSUNG
0990066	TSAI, HSUEH-HSIANG
0990067	HSU, KUEI-JEN
1000003	HSIAO, CHIN-CHAO
1000005	YEH, PAI-MEI
1000006	HSU, SHU-CHUN
1000007	CHENG CHEN, SU-LUAN
1000008	CHENG, CHI-MING
1000009	TSENG, YEN-HUANG
1000010	WEI, CHIN-SHUN
1000012	KUO, YU-CHING
1000013	WANG, LUNG-YUAN
1000014	YUAN, YA-CHIN
1000015	JUAN, YUEH-YUN
1000017	ZHUANG, JIN-ZHI
1000018	HUANG, SU-HUA
1000019	CHEN, PI-ER
1000020	TSAI, CHEN-YUAN
1000022	CHANG, FU-SHAN
1000025	HUANG, HUI-HIS
1000027	LIAN, SHENG-LIN
1000029	WU, TSUN-NENG
1000030	HUANG, YI-CHENG
1000034	CHU, MAN-CHEN
1000035	HSIEH, HO-MING
1000036	FANG, SHU-LING
1000037	TSEN, HUI-CHAO
1000039	TSAO, EN-TE
1000040	WU, CHIU-HUAN
1000044	LIN, RONG-BIN
1000045	FENG, YU-KUEI
1000046	LIN, SHIU-SHIA
1000047	WU, SHIU-CHU
1000048	CHEN, MAI-YEN
1000049	SONG, LI-ZHU
1000050	CHAN, CHIN-YUEH
1000053	LIU, MEI-HSUEH
1000054	CHEN, YUAN-MING
1000055	CHUNG LO, CHUN-YING
1000056	HU, CHIA-LIN
1000057	LI, JIN-LING
1000059	KUO, HSIANG-JUI
1000062	TSAI, HSIU-CHIN
1000064	CHAN, MAY-CHING
1000070	CHIU, HSUEH-LING
1000071	YAN, YU-RU
1000072	WEN, HUI-YEN
1000073	YEN, CHING-KAO
1000074	ZHENG, BO-XIONG
1000075	YU, MING-HO
1000080	HUANG, PO-HSIANG
1000081	PAN, CHIEN-MEN
1000084	LI, YAN-XIANG
1000087	HUANG, MEI-CHI
1000088	CHEN, CHUN-KUANG
1000090	HSIEN, YU-CHIN
1000091	LEE, HSIU-CHU
1000093	YANG, WEN-CHUAN
1000097	LO, CHIEH-TSUN

1000099	KUNG LEE, SU-FEN
1000100	KUNG, TING-HUI
1000101	YU, CHIH-HUA
1000103	HUANG YANG, CHIH-HUI
1000104	YANG, CHAO-QUN
1000105	LI, DE-XING
1000107	LIN, BI-ZHU
1000108	YANG, HSIU-CHAO
1000110	YEH, HSIU-JUNG
1000118	HUANG, YU-CHUAN
1000119	LIN, YU-YING
1000120	YANG, CHING-YUN
1000123	LIN, DE-YU
1000125	LIN, LI-CHENG
1000127	HUANG, WEI-PING
1000130	PENG, GUANG-TANG
1000132	LUO, JIN-DAO
1000134	LEE, SHAO-MEI
1000136	XIE, GUAN-ZHENG
1000139	RUAN TANG, FENG-JIAO
1000142	LU, SHAO-YU
1000144	SHI, NAI-YING
1000145	CHIU, SUE-CHEN
1000146	WANG, TE-SHENG
1000147	ZHENG LIN, XIU-ZHU
1000148	LAI, HE-JING
1000149	LU, JIAN-CHENG
1000150	WANG LI, BI-XIA
1000151	CHEN, QING-SONG
1000152	CHENG, LI
1000153	CHANG, PAI-LIEN
1000154	YE, RUO-YI
1000155	HUANG LI, CHUN-QIN
1000159	TUNG, WEN-SHIANG
1000160	ZHENG, XING-XING
1000161	WANG, KUANG-HSIEN
1000162	HU, QIU-MEI
1000163	WU, KUEI-HSIANG
1000165	LIN HOU, XIU-ZHU
1000167	CHEN, SHU-DAN
1000168	LIU, MING-LI
1000169	TAO, SHU-CHIN
1000170	YANG, TSAI-CHUAN
1000171	XIE, FU-ZHEN
1000172	CHEN, CHUN-MAN
1000174	WANG, PAI-KUNG
1000178	CHUANG, YUNG-JEN
1000181	SU, TUNG-CHUN
1000182	LIN, CHING-YING
1000183	LI, MING-JANE
1000184	LI, QING-XIAN
1000185	CHEN, ZHI-SHENG
1000186	WEI, JU-HSU
1000188	LIAO, YI-CHUN
1000189	HUANG, MEI-LAN
1000191	HUNG, JUNG-YI
1000193	CHANG, FENG-CHEN
1000195	WU, PI-YUN
1000197	HSU, JIN-WEN
1000199	WANG, SHUN-HIEN
1000202	CHOU, HSIU-CHUN
1000203	PAN, TSUNG-MIN
1000204	CHEN, GUEY-SHIANG
1000205	WU, MING-ZHU
1000206	TAN, HAI-LIN
1000207	LU, ZONG-MING
1000208	LI, YUNG-CHI
1000211	FU, CHUN-YING
1000213	HU, RUEI-SHIAN
1000216	TSAI, SHU-CHIN
1010001	LI, CHUN-HUI
1010003	LU, JING-XIAN
1010005	CHOU, YU-CHING
1010007	WANG, ZAI-FU
1010008	WANG TSAI, MEI-HUI
1010009	ZHENG HUANG, YU-XIU
1010011	YE, HUI-MIN
1010012	HUANG, XIAO-ZE
1010013	HSU, YUEH-YEH
1010014	MAI, SHU-CHING
1010017	YE, LI-HUA
1010018	RAO, YU-TING
1010019	HSU, MING-HSIU
1010020	SHI, YU-YING

1010022	YANG, SEN-GUI
1010023	WU, SHU-YUAN
1010024	CHEN, ZHEN-MEI
1010026	SU, YUE-LI
1010030	WU, CHAO-JUNG
1010031	CHIU, PEI-DE
1010032	CHEN, MEI-CHING
1010034	JUAN, LU-CHIANG
1010035	CHEN, JING-KUAN
1010037	JIANG, RUO-ZHEN
1010039	CHEN, YUN-JUAN
1010040	LIU, HSING-KUEI
1010044	LI, YI-JU
1010048	CHUANG, PI-CHUAN
1010050	CHOU, SU-JEN
1010051	WU, WEN-LI
1010052	GUO, CHUN-CHING
1010053	TZENG, KUEI-YU
1010055	YU, SHU-FANG
1010056	HSIEH, HSIU-LI
1010059	LU, PEI-HUA
1010060	CHEN, XIANG-JUN
1010064	DING, HUI-MEI
1010065	SU, HSIU-LI
1010066	LI, LIAN-LIAN
1010068	GUO, XIU-YING
1010069	ZHUANG, XUE-YU
1010070	WANG, SHAO-HSIN
1010073	CHEN, XIU-XIA
1010074	CHANG, YUE-NU
1010075	LIU, SHAO-ZHANG
1010076	HUANG, HUI-YIN
1010080	YU, DE-XIAN
1010081	HUANG, YAN-HUI
1010082	ZHANG, SUI
1010084	LIN, LEE-HUA
1010085	HUANG, WAN-WAN
1010086	XIE, QIN-CHENG
1010091	ZENG, YU-JING
1010092	LEI, SHAO-YING
1010093	CHEN, KUEI-CHU
1010094	CHEN, LING-NA
1020001	CHEN, HUI-CHU
1020007	SUN, I-NAN
1020010	CHEN, CHIH-FANG
1020011	DING, YONG-CHING
1020012	CHEN, LIU-SHIH
1020013	HSIEH, TSUI-CHU
1020016	HUANG, SHAN-FU
1020019	WANG, FU-YING
1020021	YANG, BI-HUI
1020027	CHEN, CHIN-ZONG
1020029	CHEN, PEI-LIN
1020033	TSAI, LAN-XIANG
1020034	CHANG, TSUI-HUA
1020036	LEI, SHAO-LAN
1020038	DU, YI-YUN
1020039	HUANG, HUI-ZHU
1020040	HU, HUI-HUANG
1020042	SHEN, WEI
1020046	WANG, SZU-KO
1020047	KUO, SOONG-YU
1020048	XIE, CHUN-MAN
1020049	LIN, JIN-YAN
1020052	LIN, JUN-LI
1020055	GUO, GUI-XIANG
1020058	YI, QING-LING
1020060	GUO, CHUN-QING
1020061	DAVID, TSENG
1020063	CHAN, CHIU-YING
1020065	LO, PEI-JU
1020066	TU, CHIU-YU
1020067	ZHANG, CHENG-FANG
1020068	ZHENG, DING-FU
1020069	WU, YU-FEN
1030002	CHEN, KUN-CHANG
1030004	KUO, MING-CHU
1030005	KUO, YU-HSIANG
1030006	FENG, HUI-HSUEH
1030007	CHOU, CHIH-HAO
1030008	HSU, CHU-FEN
1030010	CHANG, PAI-YU
1030011	LIU, HSUEH-CHU
1030012	LIN, CHIN-CHEN

1030014	CHEN, MEI-LIN
1030017	HUANG, HSIU-LI
1030018	CHAI, CHIH-HSUAN
1030019	LIAO, YIHG-LI
1030020	WU, HSIANG-CHIH
1030021	CHANG, KAO-LAN
1030022	TSAI, LI-HAW
1030025	CHEN, HUO-YEN
1030026	WANG, AY-JANE
1030027	TSENG, SHU-FEN
1030028	TSAI, CHIUNG-YUAN
1030029	HUANG, HSIU-LUAN
1030030	HUNG, MEI-CHIH
1030039	TSENG, CHIN-CHAO
1030040	WU, HAI-LOU
1030044	KUO, MEI-LI
1030045	HSU, CHIN-PI
1030046	TSAI, FU-MEI
1030047	WU, PEI-SHAN
1030048	WANG, CHIOU-I
1030052	JAU, CHII-JONG
1030053	DAI, SHWU-NU
1030054	CHEN, YI-WEN
1030056	HSIAO, LI-CHEN
1030057	CHEN, HO-JUNG
1030058	LIN, LI-MEI
1030060	CHIH, MING-SHEN
1030062	YANG, WEI-CHANG
1030063	LIN, YU-LING
1030064	LI, MEI-LING
1030065	HSU, KUEI-HSIANG
1040002	HUNG, LI-YUN
1040003	TAI, CHING-SEN
1040004	CHEN, JUNG-SHENG
1040005	SU, YIN-JU
1040006	CHOU, KAI-CHUN
1040008	LO, YU-YUN
1040009	YANG, KUEI-YING
1040010	FENG, CHU-YING
1040011	CHANG, PEI-FANG
1040012	SU, PIN-YEN
1040017	CHEN, TSAI-HUA
1040018	TZENG, YUH-TYUG
1040020	LIANG, I-CHIEN
1040021	WANG, MING-HUI
1040022	HSIEH, MING-HAN
1040023	YEH, CHIA-CHEN
1040024	TZENG, YA-JIUAN
1040029	LI, CHING-LING
1040030	KUNG, SU-HSIANG
1040031	MICHAEL, CHANG
1040033	FENG, TSE-PIN
1040034	WANG, CHIA-HUEI
1040035	TSAI, HSUEH-MEI
1040036	LU, MEI-YU
1040038	LIN, YU-LING
1040039	HUANG, LI-CHIN
1040040	YANG, SAN-YU
1040041	CHEN, YU-CHIN
1040042	LEE, LI-MEI
1040044	WU, TZU-YUN
1040045	CHAO, LI-KUEI
1040046	LIN, HSUEH-JU
1040047	HSIOO, CHING-LAN
1040048	HUANG, CHEN-TAI
1040051	LIU, ZIH-CHUN
1040052	LIU, ZIH-YIN
1040053	LIN, CHIN-SU
1040055	MARY, WANG
1040056	HUANG, LI-YEH
1040057	CHIANG, JUNG-SHU
1040059	CHIU, SHIH-CHU
1040060	HUANG, YU-YEN
1040061	NE, FA-YUNG
1040062	CHEN, WEN-CHUN
1040064	TSAI, SHU-YUAN
1040065	SHIH, TENG-YUAN
1040066	HU, LI-HSIA
1040067	YEN, MING-FENG
1040069	CHEN, HSIA-CHIH
1040070	CHENG, LING-SHAN
1050001	CHI, TUNG-LAN
1050002	CHU, LI-CHEN
1050003	CHAO, HSIUNG

1050004	LI, HSIU-HUI
1050005	LIU, HUI-LING
1050006	TSAI, CHIU-YING
1050007	HSIEH, HSIU-LAN
1050008	HSU, YING-SHU
1050009	HUNG, KUEI-CHING
1050010	LI, LI-HSIEN
1050011	CHUANG, SHU-YUAN
1050014	CHOU, WEN-CHENG
1050015	CHIEN, JUNG-TE
1050016	YANG, HAI-JUNG
1050017	CHANG, YUN-CHING
1050018	LIN, MING-LIANG
1050022	TSAI, I-TA
1050026	CHEN, FENG
1050027	CHIU, YU-TING
1050028	LIN, CHUN-HUNG
1050030	HUNG, LI-CHIN
1050031	CHEN, SHU-HUI
1050032	KUO, LI-YU
1050033	TSAI, HUI-MIN
1050035	SUN, JU-CHIEN
1050036	TSAI, MING-LING
1050037	KU, TE-SHENG
1050038	HSIAO, KAO-FENG
1050039	CHENG, CHING-HUI
1050041	LI CHUANG, PEI-LIN
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2021

NATIONAL SCIENCE AND
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Annual Report

國立科學工藝博物館
NATIONAL SCIENCE AND TECHNOLOGY MUSEUM