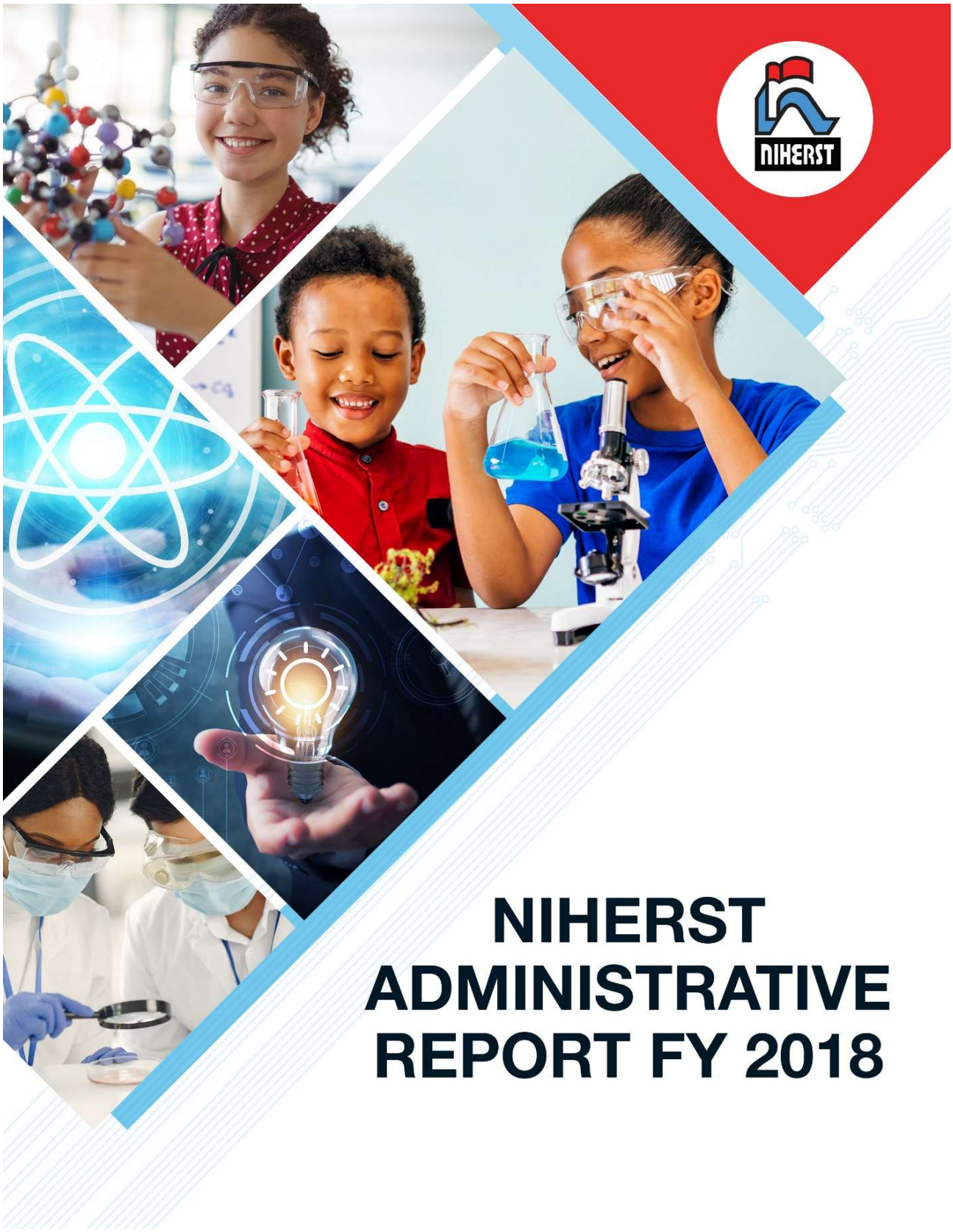
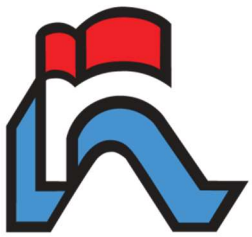


NIHERST ADMINISTRATIVE REPORT FY 2018



NIHERST

NATIONAL INSTITUTE
OF HIGHER EDUCATION
RESEARCH SCIENCE AND TECHNOLOGY

INCORPORATED BY ACT OF PARLIAMENT ACT NO. 20 OF 1984

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LIST OF ACRONYMS AND ABBREVIATIONS

COSTAATT	College of Science, Technology and Applied Arts of Trinidad and Tobago
CYSF	Caribbean Youth Science Forum
EAP	Employee Assistance Programme
INVOCAB	Improving Innovation Capacities in the Caribbean
NASA	National Aeronautics and Space Administration
NASA I^2	NASA International Internship Program
NIHERST	National Institute of Higher Education [Research, Science and Technology]
NSC	National Science Centre
RICYT	Ibero American Network for Science and Technology Indicators
SIM	Sectoral Innovation Mapping
STEM	Science, Technology Engineering and Mathematics
STI	Science, Technology and Innovation
UNESCO	United Nations, Educational, Scientific and Cultural Organisation

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FOREWORD

In the fiscal year 2017/2018, the National Institute of Higher Education (Research, Science and Technology) [NIHERST] continued to deliver its programmes and projects, despite a reduced budget caused by the challenging economic climate faced by the Government of Trinidad and Tobago. Using innovative strategies, some of the Institute's major projects were successfully executed, while others were tailored to make optimum use of limited resources and ensure high quality standards were maintained and the projects' goals and objectives were achieved.

NIHERST sustained prominence by making important contributions in the sphere of science and technology through ongoing sectoral Innovation Mapping Studies (SIMs), and the collection of key statistical data in areas of relevance to advance economic development in the country. This was also achieved with the support of highly recognised international science organisations and participation in programmes such as the NASA International Internship Programme, National Science Youth Camp and LEGO® Mindstorms. NIHERST facilitated privileged access and exposure for aspiring science professionals training in Science, Technology, and Innovation (STI) in the global arena and to progress in STI areas of priority.

By and large, the monitoring and evaluation reports on the Institute's activities, reflected the most positive feedback of general satisfaction with its offerings. This degree of satisfaction placed the Institute on solid footing for the continuance of its non-formal science education initiatives, which included the interactive science exhibits at the National Science Centre (NSC), vacation science and innovation camps, science clubs and NIHERST participation in external outreach activities.

1 Vision, Mission and Strategic Objectives

1.1 Vision

The Institute aspires to:

- be a focal point for research and information dissemination on science and technology and higher education;
- provide advice to government on policy and planning in science and technology and higher education;
- consolidate and expand its science popularisation activities through the establishment of a National Science Centre of Trinidad and Tobago; and
- be an active member of regional and international networks in relevant fields of endeavour in science and technology and higher education.

1.2 Mission

The NIHERST's mission is: To provide intellectual leadership and to promote research, development and quality service in the areas of Science, Technology and Higher Education.

1.3 Strategic Objectives

The work of NIHERST placed emphasis on three strategic focal areas as follows:

- Popularisation of STI - Programmes and projects under this strategic area sought to achieve the following:
    - build public awareness and literacy in science and technology;
    - help foster a national culture of creativity and technological innovation;
    - recognise Trinidad and Tobago's icons and preserve the scientific heritage; and
    - support formal science education.
- Policy, Research and Intelligence Gathering - Programmes and projects under this strategic area sought to achieve the following:
    - influence policy formulation and advice;
    - compile statistical research on science education and STI development; and
    - innovation mapping studies to inform and support evidence-based decision-making.
- Building collaborative global relationships - Projects under this strategic area are aimed to:
    - build international relationships with world-class STI institutions.

2 Organisational Structure

2.1 Organisational Profile

NIHERST has developed three key competencies in fulfilling its mandate to grow and develop science and technology.

The first key competency is the Institute's ability to disseminate and impart Science, Technology, Engineering and Mathematics (STEM) education practically and interactively to a wide cross-section of the population. Such NIHERST programmes were delivered mainly through the in-house and outreach activities of the NSC, D'Abadie. The NSC is the only facility of its kind in the Caribbean and houses over two hundred interactive science exhibits and manipulatives. It occupies an area of 65,000 sq. ft. of exhibit and office space and visitor facilities. The programmes offered support classroom science learning through engaging teaching strategies, illustrating how science and technology permeate all aspects of daily life and reducing the barriers between science and society.

Through its Innovation department, NIHERST has also pioneered programmes and activities that develop young minds to be creative, inventive and entrepreneurial using science and technology, a key component in the shaping of a cohesive national innovation system. The department focuses on:

- staging the biennial Prime Minister's Awards for Scientific Ingenuity (formerly the Prime Minister's Awards for Innovation and Invention);
- conducting formal and non-formal training in creative thinking, the process of innovation and invention, and entrepreneurship for students;
- staging exhibitions and outreach activities that build awareness of innovation and invention; and
- providing assistance/information to local inventors regarding the protection of creative ideas, developing prototypes and attending international invention expositions.

NIHERST also administers Awards for Excellence in Science and Technology, which aim to highlight and honour the achievements of nationals working in all scientific fields, both at home and abroad.

The second key competency is NIHERST's unique capability in the collection of data on STI indicators. The data collected has been used to assess the country's status on STI, to inform policy decisions and give support to evidence-based research. Also visible is the Institute's strength in the deployment of various research tools to conduct policy research and its skill in analysing the data to formulate policy.

The promotion of STI, which is influenced largely by the government's national agenda, is NIHERST's third key competency. During fiscal year 2017/2018, a key driver of government that influenced the work programme of the Institute was the need to grow an innovative knowledge-driven society. This aimed to ignite at the individual level the desire in young citizens to explore, investigate and understand different phenomena impacted by science and technology. Several projects and programmes were therefore executed for the period under review, with a focus on

igniting and harnessing the creative and inventive powers of nationals, as well as raising awareness of STEM concepts and other issues related to STI. To support this intent, NIHERST adopted a promotional mix strategy thereby increasing public engagement as well as strengthening and expanding strategic partnerships and collaborations with key entities.

STI promotion was accomplished by leveraging digital media advertising via social media, website and mobile applications, video and animation augmented with the traditional media of press, television, radio and billboards. Other strategies also used were outreach promotion in schools, communities and events; direct promotion inclusive of email marketing and online adverts; and public relation activities that included efforts to ensure there was media coverage at the Institute's major events.

NIHERST recognises that some of its earlier initiatives, namely science and innovation camps, have been adopted and replicated by other market players, signalling the traction gained in the Institute's STI efforts. The Institute continues to occupy a unique space as the only Institute with the specific responsibility to grow and develop STI.

2.2 Corporate Structure

NIHERST is governed by a Board of Governors whose term of office is for a period of three years. The NIHERST Act Chap. 39:58 allowed for fourteen members, excluding the NIHERST President who is an ex officio member. During the reporting period, the Board, which was installed on July 27, 2017, for a period of three years, comprised of thirteen members as follows:

- Prof Emeritus Winston Mellowes - Chairman
- Dr Cheryl Bennett - Vice-Chairman (resigned on September 30, 2017)
- Dr Ruel Ellis - Member
- Mr Garvin Warwick - Member
- Mr Shakka Subero - Member
- Dr Fasil Muddeen - Member
- Mrs Cavelle Joseph-St Omer - Member
- Mr Kurleigh Prescod - Member
- Mr Barry Parasram - Member
- Mrs Angela Hordatt - Member
- Mrs Rhonda Jaipaul-O'Garro - Member
- Ms Gillian Pollidore - Member
- Ms Diane Jebodhsingh - Member
- Ms Sylvia Lalla - Member (ex-officio)- Ag President)

There were also six appointed committees of NIHERST Board of Governors – Operations, Finance and Investments, Human Resources, Communications, Procurement and Audit – that considered matters in their respective areas and provided recommendations to the Board.

In April 2018, the permanent position of Registrar was filled by Ms Julia Charles-Joseph. However, the Senior Management's structure, remained lean, comprising of the Ag. President and the Registrar, as the post of Vice President, Science and Technology remained unfilled. During the fiscal year, the expertise of the management team was strengthened with the appointment of two

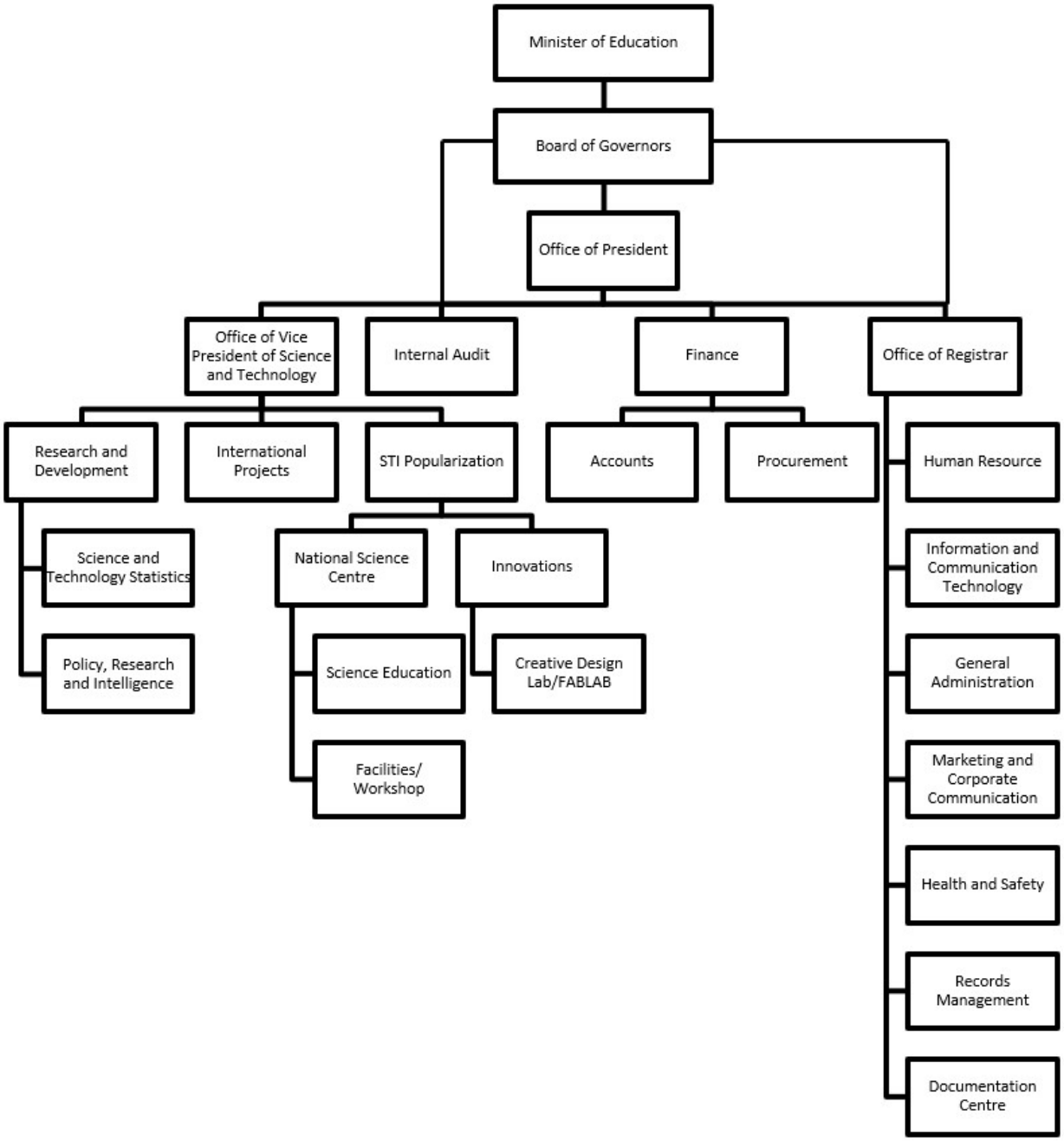
executives. Mr Pedro Pierre joined the team as the Internal Auditor in March 2018 followed by Mrs Cindy Poonwasie who joined in April 2018 as Health and Safety Officer. The composition of the management team is shown in **Table 1**.

Table 1: Composition of NIHERST's management team during the 2017/2018 fiscal year

Position	Name of staff member
Acting President	Ms Sylvia Lalla
Vice President, Science and Technology	position vacant
Registrar	Ms Julia Charles-Joseph
Senior Human Resource Officer (Head of Human Resources)	Mrs Giselle Dinzey
Senior Accountant (Head of Accounts)	Ms Sylvia Lalla
Senior Policy Analyst (Head of Policy Research and Intelligence)	Ms Julie David
Senior Economist (Ag) Head of Science and Technology Statistics	Ms Sharon Parmanan
Senior Project Officer (Head of International Projects)	Ms Lovaan Superville
Interim Procurement Coordinator	Ms Georgia Le Gendre/ Ms Donna Hall
Systems Analyst II (Head of Information and Communication Technology)	Mrs Kathy-Ann Joseph-Creese
Internal Auditor (Head of Internal Audit)	Mr Pedro Pierre
Interim Science Education Coordinator	Ms Adafih Thomas
Senior Research Officer (Head of Monitoring and Evaluation)	Ms Nandi Ogiste
Administrative Officer IV (Head of General Administration)	Mrs Lorraine Rollock
Health and Safety Officer	Mrs Cindy Poonwasie
Records Manager	Dr Lillibeth Ackbarali
Project Officer (Head of Innovation)	Mrs Toni Hinds-Joel
Senior Librarian (Head of Documentation Centre)	Ms Karen Ross

The organisational structure of the NIHERST during the 2017/2018 fiscal year is presented in **Figure 1**.

Figure 1: NIHERST Organisational Structure (2017-2018)



2.3 Business Locations

During the reporting period, NIHERST operated from various locations. In August 2018, the Head Office which occupied premises at #77 Eastern Main Road, St Augustine was relocated to Level 13 of the Ministry of Education Towers at #5 St Vincent Street, Port of Spain. The NSC continued its operations from the building situated on the corner of Old Piarco Road and Churchill Roosevelt Highway, D'Abadie.

2.4 Services/Products

The services and products provided to the national community by NIHERST during the 2017/2018 fiscal year are detailed in **Table 2**.

2.4.1 STI Popularisation

Table 2 shows the services and products provided by NIHERST in the area of STI popularisation during the fiscal year.

Table 2: Services and Products Provided by NIHERST in the Area of STI Popularisation

Services/ Products	Description	Target Group
NSC Visitor Programme	Hands-on interactive STI exhibition, science shows, demonstrations and activities	Schools, individuals, families, community and special groups, the public
Caribbean Youth Science Forum	An annual, week-long regional, non-formal STEM education programme for nurturing the next generation of scientists and engineers in the region.	Lower Sixth Form Science students from the Caribbean
Robotics and Creativity Design	The Robotics and Creative Design Labs workshops, road shows and themed visits at the National Science Centre.	Secondary school and tertiary students and the public
Fab Lab	Workshops and access to equipment for 3D design and 3D printing.	Student, teachers, designers, engineers, inventors, artisans, hobbyists, entrepreneurs and makers.
Outreach Workshops for Secondary Students	Electricity and Electronics workshops provides hands-on experience in difficult areas of the physics Caribbean Secondary Education Certificate syllabus. Robotics workshops assist with the aspects of the Information Technology syllabus that focus on programming.	Secondary school students
Vacation Camps	A variety of STI themed camps ranging from one to three weeks	Children – 5-12 years Teenagers – 13 – 16 years

Services/ Products	Description	Target Group
	held at various venues in Trinidad and Tobago	
Clubs	Science Club (NSC), Robotics Club (NSC)	Children – 7 – 12 years Teenagers – 13 – 16 years
Outreach through events staged by external public and private agencies	NSC and the Innovations Department by invitation exhibit at events hosted by government agencies, Non-Governmental Organisations, schools and private bodies on specific STI themes relevant to those bodies, for celebrations, and the needs of society.	The public

2.4.2 Research and Intelligence Gathering

Table 3 shows the services and products provided by NIHERST in the area of Research and Intelligence Gathering during the fiscal year.

Table 3: Services and Products Provided by NIHERST in the Area of Research and Intelligence Gathering

Services/ Products	Description	Target Group
STI Statistical Surveys and Publications	Survey publications on STI include statistical data and inform research policy formulation and planning	Policy makers, Ibero American Network for Science and Technology Indicators (RICYT), UNESCO Institute for Statistics, stakeholders, researchers, education specialists, students
STI analytical studies	The SIM studies are micro-level studies targeting priority sectors in Trinidad and Tobago. SIMs map the innovation system of the targeted sector – identifying internal and external actors of the sector, the linkages that exist among actors and the factors and gaps/challenges that drive and impede innovation. The studies also analyse and make recommendations to improve innovative capacity and enhance performance of targeted economic strategic sectors	Government, industry, academia
Policy support and advice.	Provides comments, contributions, guidance and advice on policy-related documents or relevant policy documents focussed on improving the	Ministry of Education and other government Ministries, STI agencies, international organisations

Services/ Products	Description	Target Group
	impact of STI on economic transformation	
STI Policy Development	Collaborates to formulate and/or formulates national or sectoral policies in STI	Government Ministries, STI agencies

2.4.3 Special Projects and Collaborative Relationships

Table 4 shows the services and products provided by NIHERST in the area of Special Projects and Collaborative Relationships during the fiscal year.

Table 4: Services and Products Provided by NIHERST in the Area of Special Projects and Collaborative Relationships

Special Project	Collaborating Agency	Strategic Intent/ Objective
Establishment of a NSC - Science City	Ministry of Education Ministry of Planning and Development	To advance the levels of scientific and technological literacy and innovative capacity in the citizenry of Trinidad and Tobago
International Centre for Genetic Engineering and Biotechnology research grant, fellowship opportunities and meeting and courses opportunities.	International Centre for Genetic Engineering and Biotechnology	To build national research capability in molecular biology and biotechnology
National Aeronautics and Space Administration (NASA) International Internship (NASA I^2) Program tenable at NASA Ames Research Center, California, USA	NASA	To promote interaction and collaboration among United States of America and international students, with the view to enhancing students' knowledge of STEM, developing skills in novel areas of research, developing leadership abilities, fostering cross-cultural understanding, and enabling future multinational missions and collaborations in science. NASA I^2 is open to tertiary students pursuing science, technology, engineering or mathematics (STEM) in such areas as space exploration, scientific discovery and aeronautics research
Improving Innovation Capacities in the Caribbean (INVOCAB) project – Teacher	Scientific Research Council, Jamaica	To contribute towards improving the levels of innovation in the Caribbean by building and strengthening capacities in the areas of STI,

Special Project	Collaborating Agency	Strategic Intent/ Objective
Professional Development Workshops, Science Club initiatives, School equipment and manipulatives and Innovation Competition		specifically Science Education, as an enabler for poverty reduction, growth and socio-economic development of Caribbean countries. Specific objectives include improving the competence of teachers in the transfer of knowledge and technical skills of Science subjects at the primary and secondary levels; and improving primary and secondary school students' capacity to think critically, problem solve and apply science
Seismology in Schools programme hands-on seismological activities.	University of Leicester, Durham University, Imperial College London, the British Geological Survey, the Ministry of Education and the University of the West Indies Seismic Research Centre.	To foster a deeper understanding among secondary school students and inspiring careers in the field of Geosciences by introducing practical seismology activities that demonstrate the application of theories and principles taught in physics, mathematics and geography
National Youth Science Camp, West Virginia, United States of America and NASA I^2	Embassy of the United States of America, Port of Spain	To inspire lifelong engagement and ethical leadership in careers in STEM and related professions through its proven educational model for mentoring, challenging and motivating Sixth Form students
E-Scientia Exhibit	Institute of Electrical and Electronics Engineers	To enable pre-university students, teachers and the public to learn and/or improve their understanding of key principles of science and engineering and their applications
Shell Youth Build – design-based solutions to community problems	Shell Trinidad Limited (formerly BG Group) and Sacoda Serv Limited	To encourage students to improve and broaden their knowledge of STEM concepts - creating stronger attractions to STEM subjects. To enable students to grapple with and work together to find solutions to pressing issues in their local communities
FIRST® LEGO® LEAGUE Animal Allied Competition – Robotic missions and student	FIRST® LEGO® LEAGUE	Geared toward participants of nine to sixteen years (ages vary by country of participation) the programme utilises theme-based challenges to engage

Special Project	Collaborating Agency	Strategic Intent/ Objective
research project on human/animal interactions		children in research, problem solving, and engineering

2.5 Delegated Levels of Authority

The Acting President reported directly to the Chairman of the Board of Governors. As the Head of the Institute, the Acting President was responsible for the management of the day-to-day operations of the Institute, and in the absence of the Vice President, Science and Technology, assumed responsibility for all STI related functions.

According to the Institute's procurement policy, a Head of Department can approve expenditure up to $25,000 for specified operational goods and services, which include inter alia stationery and office supplies, utilities, maintenance services, and up to $10,000 otherwise. The Acting President, and in her absence the Registrar, can approve expenditure up to $75,000 for specified operational goods and services. A Management Tenders Committee oversees the procurement of goods costing in excess of $10,000 and can approve expenditure up to $100,000. Expenditure exceeding $100,000 and up to $450,000 requires approval of the President on the recommendation of the Management Tenders Committee. The Board of Governors approves expenditure above $450,000.

2.6 Legislative and Regulatory Framework

NIHERST was established by an Act of Parliament No. 20 of 1984 (Chapter 39:58 of the Laws of Trinidad and Tobago). The Act places the Institute under a Ministerial portfolio for policy direction, finances and the appointment of the President of the Institute inter alia.

The NIHERST Act can be accessed at:
http://rgd.legalaffairs.gov.tt/laws2/alphabetical_list/lawspdfs/39.58.pdf OR www.niherst.gov.tt

2.6.1 Finances

With respect to finances, NIHERST is governed by Section 20 of the NIHERST Act No. 20 of 1984. Other governing regulations include *The Financial Regulations of Trinidad and Tobago 1965*; *The Financial Instructions 1965*; *Exchequer and Audit Ordinance Act No 20 of 1959* (and Amendments); and Call Circular issued by the Ministry of Finance for the relevant year in which the Budget is due.

2.6.2 Human Resource Management

The Human Resource Management function is governed by all relevant legislation and NIHERST related documents such as the National Institute of Higher Education (Research, Science and Technology)–Public Services Association Collective Agreement (January 1, 2008 to December 31, 2010); NIHERST- Public Services Association Memorandum of Agreement (dated 18 September 2015) for Salaries and Cost of Living Allowance for the period January 1, 2011 to December 31, 2013; the NIHERST Pension Fund Plan Rules and Trust Deed, and NIHERST policies.

2.7 Reporting Functions

The President (Ag.) reported to the Chairman of the Board of Governors on the matters of the Institute. By law, the President is required to submit an annual report to the line Ministry on the activities of the Institute within six months of the end of each financial year. In addition, NIHERST also reported on its finances and budget, both annually and monthly to its line Ministry and the Ministry of Finance, and quarterly to the Ministry of Planning and Development for funds under the Public Sector Investment Programme. Special reports were submitted on request.

As obtained in the previous fiscal year, all heads of departments were requested to submit a departmental quarterly report to the President (Ag.).

NIHERST also received international grant funding and corporate sponsorship and was required to submit reports to the funding agency or sponsor.

Tables 5 and **6** show the internal and external reports which were prepared and submitted by NIHERST to recipients and receiving agencies over the fiscal year 2017/2018.

Table 5: NIHERST Internal Reports during the fiscal year 2017/2018

Report	Frequency	Recipient
President's Report	At each ordinary Board Meeting	NIHERST Board of Governors
Financial Reports	Monthly	NIHERST President/NIHERST Board of Governors
Departmental Reports	Monthly	Registrar/NIHERST President/ NIHERST Board of Governors Sub-Committees

Table 6: External Reports submitted by NIHERST to the Ministry of Education and the Ministry of Finance during the fiscal year 2017/2018

Report	Frequency	Receiving Agency
Annual Budget	Annually	Ministry of Finance and Ministry of Education
Annual Financial Statements/Annual Report	Annually	Ministry of Finance and Ministry of Education
Annual Performance Appraisal	Annually	Ministry of Education
Administrative Report	Annually	
Board Minutes	One week following confirmation at Board Meeting	Ministry of Education
Monthly Cash Statements of Operations	Monthly	Ministry of Finance and Ministry of Education
Quarterly Returns Report	Quarterly	Ministry of Finance
Quarterly Status of Loan/Overdraft/Investments in Securities Portfolios and Litigation Proceedings	Quarterly	Ministry of Finance

Report	Frequency	Receiving Agency
Return of Award of Contracts	Monthly	Ministry of Finance
Internal Audit Reports	Quarterly	Ministry of Finance
Quarterly Reports – Work Plan	Quarterly	Ministry of Education

3 Policies and Development Initiatives

3.1 Short-, Medium- And Long-Term Plans

During the reporting period, the work undertaken by NIHERST followed from the 2011-2015 Strategic Plan, focusing on the following three strategic areas:

- fostering a national culture of science, technology, innovation and entrepreneurship, including an extensive science popularisation programme and national awards schemes;
- undertaking strategic research and intelligence gathering in science, technology and innovation to inform policy development and guide public and private sector investment, towards greater economic diversification; and
- promoting national advancement in science, technology and innovation through establishing and strengthening collaborative relationships with institutions of excellence worldwide.

In light of the reduced budget, the Institute reviewed and refined its core activities, all aimed at strengthening national capacity in science and technology to better support the government's development agenda and, in particular, economic diversification. Fee structures for programmes/services offered were reviewed and upgraded with a view towards sustainability and revenue generation. The Institute continued its leadership role in national STI development in accordance with its mandate, and to advance the mission and goals of the line Ministry.

3.2 Performance Objectives and Accomplishments

NIHERST recognises the need for full accountability and transparency in the use of public funds and for providing value for money to its stakeholders by ensuring the Institute's interventions have significant impact on the country's citizenry and contribute to the country's development and diversification efforts.

To improve on the Institute's performance under the strategic plan, during the fiscal year, the Institute, through work under NIHERST results-based Monitoring and Evaluation, initiative continued to:

- guide and assist staff in incorporating Monitoring and Evaluation in the Institute's interventions to more aptly measure, report and improve on the performance of the Institute's programmes, projects and developmental policies;
- promote and support decision making on the basis of sound knowledge and results gained from monitoring and evaluating the Institute's interventions; and
- build staff's capacity in Monitoring and Evaluation through knowledge sharing sessions, working meetings and the sharing of learning resources.

Programmes and initiatives undertaken during the period, maintained momentum within the three strategic areas. Key details are presented in relation to each strategic goal.

3.2.1 Strategic Focus Area 1: Popularisation of Science, Technology and Innovation

3.2.1.1 Establishment of a National Science Centre - Science City

Cabinet by Minute No. 2351 of August 2014, agreed to establish on fifty-four acres of land at Indian Trail in Couva, a world-class, state-of-the-art, purpose-built, 'Science City'. In August 2017, a new Board of Governors was appointed, under which the decision on the way forward for the project was determined. After careful consideration of the project's history, status and constraints including insufficient funds for construction, in October 2018, the Board agreed that the project should be closed subject to legal advice being sought. Work on all open contracts was halted until further directive and invoices for work completed as at that period were received from Arquitectonica, BCQS International, CEP Limited and General Earth Movers Limited. Following this, the Science City Project Management Team was disbanded and only the Project Engineer was kept to assist in closing off the Project.

Legal advice received recommended that in order to terminate ongoing contracts and settle final payments, special expertise, which did not reside in-house, was required. In light of this, it was then agreed by the Board of Governors that an external firm with the requisite expertise, would be hired to assist with closure of the project in the next financial year.

3.2.1.2 National Science Centre - Science Popularisation Programme

The NSC's science popularisation and education programmes are geared towards the advancement of scientific and technological literacy in children and adults of Trinidad and Tobago and the wider Caribbean. In particular, the NSC offers enrichment programmes/out-of-school curriculum-based learning opportunities to reinforce and enhance the learning of STEM subjects and develop key skills including problem-solving, critical thinking, creativity, and innovativeness – to encourage the nation's youth to pursue careers in STI fields. The NSC also offers programmes that engage citizens in the experiential learning of STEM through hands-on and interactive exhibits and activities. These programmes provide lifelong learning opportunities to promote a culture of STI and stimulate public interests in STI and on STI issues. The programme comprised activities as outlined hereunder.

Activity 1: NSC's Visitor's Programme

During the reporting period, a total of sixteen thousand, two hundred and fifty-six (16,256) visitors to the NSC were recorded, which showed a 7.5% increase from the previous year. Visitors were exposed to over two hundred (200) interactive exhibits which featured a variety of topics such as astronomy, animation, energy, climate change, natural disasters, the human body, music, sports and wellness, information and communications technology, robotics, road safety, and water conservation.

In the TechKno Theatre, visitors of all ages were treated to entertaining science shows and live demonstrations while immersive storytelling remained an attraction for younger children. In addition, new activities and programmes were developed for varied audiences. These included thematic activities and workshops to support the formal science curriculum, lab activities and United Nations observances. Results from the survey of adult visitors to the NSC showed that 88.6% were satisfied with visits and the offerings of the Centre.

Picture 1: Mr. Julius Akinyemi Resident Entrepreneur, MIT Labs visits the NSC, September 7, 2018

Activity 2: STEMinar

As a result of the unavailability of funds to host the week-long Caribbean Youth Science Forum, the decision was taken to stage a one-day STEMinar. This event provided an opportunity for secondary and tertiary students to attend lectures, workshops, network and socialise with prominent local professionals in STEM fields. It appeared that owing to the lack of pertinent information many students were unable to think beyond the foundational tracks in engineering and medicine. The NIHERST STEMinar therefore exposed participating students to new career opportunities and guided them towards programmes that inculcate the spirit of entrepreneurship and the power of building a local economy in a global context. Additionally, hosting this activity allowed NIHERST to maintain and develop links with a range of organisations that provide appropriate opportunities for graduates in STEM fields, including opportunities for further study.

STEMinar was held on August 21, 2018, at the University of the West Indies St. Augustine Campus' Engineering Block 13. The itinerary included four interactive lectures/presentations and one hands-on workshop. The twenty-eight participants acquired knowledge of topics such as Art Psychotherapy, Computer and Electrical Engineering, Social Entrepreneurship, Climate Change and Renewable Energy. Participants also repurposed components from discarded computers to design and build their own power supply.

Positive feedback was received from STEMinar participants as follows:

- the majority of participants (72.3%) indicated that knowledge was gained on the role and application of STI in society (33.5% to a large extent; 38.8% to some extent);
- the majority of participants (96.3%) were engaged and inspired by the lectures and workshop;
- an average of 74.7% of participants indicated that the STEM-based presentations and workshop increased their knowledge of careers in science and technology; and

- a significant majority of the participants indicated that they utilised the following skills during the workshop: leadership (95.8%), communication (100%), teamwork (100%), critical thinking (95.8%), problem-solving (95.8%), and creativity (91.7%).

Picture 2: Students participate at NIHERST one -Day STEMinar, at the University of the West Indies St. Augustine Campus, August 21, 2018

Activity 3: Creative Design Lab Projects

NIHERST has been a pioneer in popularising robotics and encouraging creativity and innovation across all sectors of the national community. During this period, the Institute paid special attention to the execution of projects through its Creative Design Lab, Robomania, E-Scientia, Electricity and Electronics Workshops. These projects provided students of all ages with knowledge of, and insights into the application of this type of technology.

The activities of the robotics lab, Robomania, provided students with the real-life application of the programming and IT skills learnt in theory in the classroom setting. Students saw the transition from theory to practice as they used algorithms to program a robot's tasks. The students were required to use their critical thinking skills to logically arrange the robot's tasks in sequential steps.

a. E-Scientia Exhibit

The E-Scientia exhibit simulates a large, spaceship like environment equipped with modern computational, electric circuit hardware and audio-visual equipment. Students engaged in this activity were exposed to simulations and training on how to solve some of the energy, monitoring and detection, sensing of the environment, communication, and biomedical measurement challenges encountered in a space flight. Fifty students visited the *E-Scientia* in fiscal year 2017/2018.

b. Electronics and Robotics Workshop

NIHERST's Creative Design Lab executed secondary school workshops in electronics and robotics which are geared towards assisting in innovation within the school curriculum. The workshops expose the students to various concepts and hands-on activities in robotics and engineering technology. During the second quarter of the fiscal year, seven secondary schools benefitted from the workshops.

c. Visits to the Fab Lab

During the reporting period, two thousand and twenty-five (2,025) persons visited the Fab Lab. The labs trained persons in the use of prototyping and robotics technologies, design and hands-on projects using Computer-Aided Design, Computer-Aided Manufacturing, Electronics and Robotics, and therefore developed practical skills in these technologies. The machinery at the Fab Lab was also used to generate forty-nine paying jobs by both agencies and individuals. In these instances, the Epilog Fusion Laser Cutter, Makerbot 3D printer, robotics kits and 3D pens were used.

Activity 4: STEM Vacation Camps

The STEM Vacation Camps programme provided youth with an opportunity for constructive learning of STEM-related content during breaks in the school year. Camps were developed and executed by the Science Education and Innovation Departments. Science Education's camps were offered for children between the ages of five and thirteen years old. These camps engaged youth in hands-on activities that excited their interest in learning about phenomena in the natural and physical world. It also aimed to develop 21st century skills such as creativity, critical thinking, problem-solving, communication and teamwork, and encouraged youth to pursue further studies and careers in STEM fields.

Innovation's camps catered to children aged five to seventeen years, exposing them to the fundamental concepts in several areas of Science, Technology, Reading, Engineering, Arts and Mathematics and awakening their innate creative potential. These camps intended to nurture their innovative spirit by guiding them through the inventive process in an environment that encouraged the use and expression of non-traditional ways of thinking. The camps also showed children that invention and innovation is a rewarding process that often involves making mistakes.

NIHERST continued to offer the following camps during the Easter and July/August vacation periods as shown in **Table 7**.

Table 7: Camps held during the Easter and July/August Vacation period

Description	Target Group	Results	Client Feedback
Easter Vacation – One-Day Fun-Day STEM Camp			
Three camps were held daily for children. Each camp comprised three STEM activities, playtime, lunch and breaks. The camp topics included Animal Adaptions, Modes	5 – 6 years 7 – 9 years 10 – 13 years	Twenty-seven one-day camps conducted to deliver eighty-one themed STEM activities over a nine-day period.	82.8% agreed and strongly agreed that the camps made them more interested in science. 64.7% indicated that the camps made them

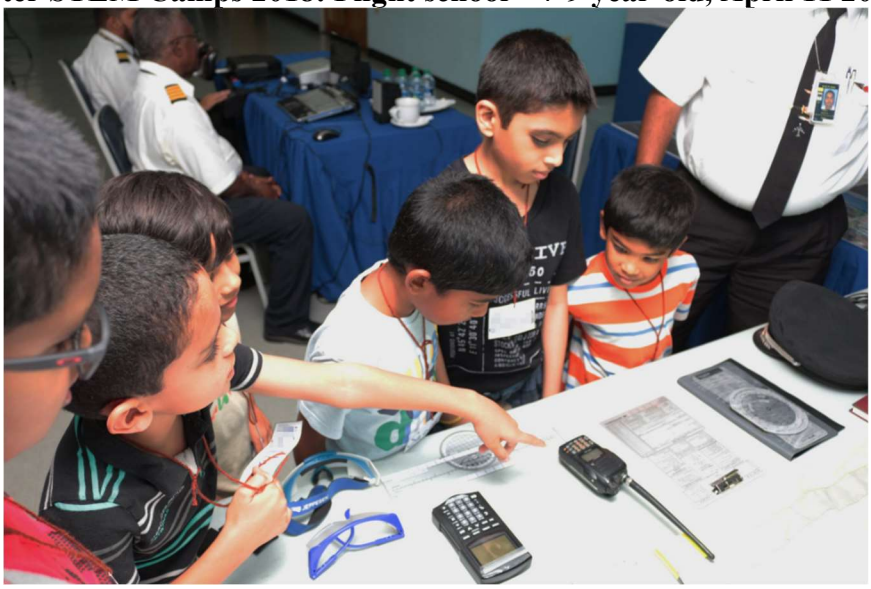
Description	Target Group	Results	Client Feedback
of Transportation, Genetic Engineering, Palaeontology, Motion Science, Hygiene, Food and Nutrition, Astronomy, Music, Art, Geology, Coding and Programming, Sound Engineering, Chemistry, First Aid, Flight Science, Anatomy, Destructive Science, Molecular Gastronomy and Climate Change.		Enrolment in 479 camp spaces by 137 campers meant that each camper attended at least three one-day camps. Fifty-five campers also interacted with STEM professionals in the field of flight science via flight simulators and pilot instructors from BRIKO Air Services Ltd.	want to study more science at school. 69.4% agreed and strongly agreed that they felt more confident about studying science. At the end of camp, 50.6% of campers indicated interest in pursuing careers in science and technology.
July/August Vacation: NIHERST x Chuck E. Cheese's			
NIHERST, partnered with Chuck E. Cheese's, to conduct a series of one-week science-themed vacation camps over 9 weeks at the Chaguanas and San Fernando branches of Chuck E. Cheese. Each camp comprised fourteen STEM activities and breaks for playtime and lunch. The camp topics were Animal Adaptations, Chemical Reactions, Senses, Animal Life Cycles, Naval Transportation, Speed and Velocity, Properties of Metals, Potential and Kinetic Energy, Geometry and Symmetry. Other topics included were 3D and 2D shapes, Nets, Tangrams, Sequences and Patterns, Form and Function, Textures.	5 – 6 years 7 – 9 years 10 – 13 years	378 STEM activities over nine-week period at the Chuck E. Cheese locations. Enrolment in 144 camp spaces facilitated exposure for 106 campers. This meant that some campers attended more than one camp session. Twenty campers also interacted with STEM professionals in the field of waste management via a mini workshop conducted by Solid Waste Management Company.	75.6% agreed and strongly agreed that the camps made them more interested in science 76.9% indicated that the camps made them want to study more science at school. 79.5% agreed and strongly agreed that they felt more confident about studying science. 60.3% of campers indicated interest in pursuing careers in science and technology.
Creativity and Innovation Camps*:* Funology, Explorer, Robotics			

Description	Target Group	Results	Client Feedback
Tech camps - X-STREAM Engineers, eMagination, E-Builders, GrafX			
One-week long camps with the objectives of developing campers' interest in STEM with a focus on Innovation, Invention and Technopreneurship and developing collaboration, creativity, critical thinking and problem-solving and communication skills. Camper skills in the use of new technology and software such as 3D pens, computer programming, robotics, prototyping, graphic design and more were also increased.	5 -7 years 8 -12 years 13 – 17 years Tech camps 7-11 years 13-17 years	Enrolment in 275 camp spaces.	94.4% campers indicated interest in the use of science and technology to solve problems in the real world. 9.7.3% had increased interest in generating new ideas, creating new things and being able to earn money from it. 86.9% had increased interest in solving problems for their community.

Picture 3: Easter STEM Camps 2018: Anatomy Academy - 7-9 year-old, April 12, 2018

Picture 4: Easter STEM Camps 2018: Superhero Me for campers 5-6 year-old, April 12, 2018

Picture 5: Easter STEM Camps 2018: Flight school – 7-9 year-old, April 11 2018



Picture 6: Easter STEM Camps 2018: Young Jedi - 4–6 year-old, April 1, 2018

Picture 7: Easter STEM Camps 2018: IAMovement – Small Change Climate Talk, 10 April, 2018

Picture 8: Easter STEM Camps 2018: Night Adventures and Young Medics - 5-6 and 7-9 year-old, April 10, 2018

Picture 9: Easter STEM Camps 2018: Robotics, April 13, 2018

Picture 10: Easter STEM Camps 2018: Artful Antics - 10-13 year-old, April 13, 2018

Picture 11: Easter STEM Camps 2018: Science in Motion - 7-9 year-old, April 13, 2018

Picture 12: Easter Stem Camps 2018: Viva la Musica - 5-6 year-old, April 13, 2018

Picture 13: Ms. Nailah Blackman, Singer and the Chuck E. Cheese's mascot entertain the campers at the Chuck E. Cheese Camp, 16 August, 2018

a. Tech It Out

NIHERST signed a Memorandum of Cooperation with the Institute of Electrical and Electronics Engineers Trinidad and Tobago Local Section in 2015 to execute joint projects of relevance. From August 13 – 24, 2018, NIHERST partnered with the Institute to facilitate the hosting of three one-week Arduino vacation camps for participants eleven to seventeen years old. This pilot initiative utilised Arduino i.e., easy-to-use hardware and software designed for anyone involved in interactive projects. A total of twenty-eight campers were exposed to STEM initiatives on technological innovation, such as: coding, creative thinking, problem solving, innovation and invention and prototyping.

There was favourable feedback from campers as follows:

- 67.9 % of campers indicated an increased interest and 25% had a marginal increase in interest in learning more about how science and technology can be used to solve problems in the real world.
- 50% of campers indicated an increased interest and 42.9 % had a marginal increase in innovation, invention and technopreneurship. Increased interest in coming up with new ideas, creating new things and being able to earn money.
- 92.9% of the campers indicated that based on their experience at this camp, they would attend another NIHERST Camp.

Picture 14: Tech It Out Camps at UWI, St. Augustine – August 13-17, 2018

Picture 15: Tech It Out Camps at NSC, August 13-24, 2018

Picture 16: Vacation STEM Camp, Tech It Out at Chuck E. Cheese, August 7, 2018

Picture 17: Fear Factor Camps - 5-6, 7-9, and 10-13 year-old, at Chuck E. Cheese, August 7, 2018

Picture 18: Campers learn about a 50-foot-long solar balloon at the at the Chuck E. Cheese Camp July 17, 2018

Picture 19: e-Magination and Robotics Camps for 7-11 and 13-17 year-old respectively at Chuck E. Cheese, July 12, 2018

b. Pop-Up Fun Days

In response to growing requests for NIHERST camps by East-West corridor clients during the July/August period, the Science Education Department developed an impromptu offering for seven- to thirteen-year-olds using available materials and content. Fourteen one-day camps were designed to deliver forty-two themed STEM activities over a three-week period. One camp comprising three STEM activities, playtime, lunch and breaks was held daily.

Seventy-eight spots were booked for the camp and thirty campers, which represented the participation of each camper in at least two one-day camps. The topics and fields covered in camps included: Coding, Brain Anatomy and Function, Types of Phobias, Palaeontology, Tangrams, Patterns and Sequencing, Climate and Weather, Acid-Base Reactions, Reptiles, Forensic Science, Astronomy, Stop Motion Animation, Light, Balance and Stability, and Optical Illusions. The camp objectives were to inspire and increase campers' interest in STEM studies and careers through the use of inquiry-based, interactive learning about phenomena in the natural and physical world. A strategy used in the programme to help achieve this was the providing of opportunities for campers to interact with STI professionals and science role models (scientists, engineers, science specialists and other experts). In keeping with this objective, eleven campers had the opportunity to meet and interact with a licensed herpetologist. Herpetology is the scientific study of amphibians and reptiles.

The campers' feedback was favourable as follows:

- 89.8% agreed and strongly agreed that the camps made them more interested in science and 67.8% indicated that the camps made them want to study more science at school.
- 74.6% agreed and strongly agreed that they felt more confident about studying science and 84.7% wanted science in school to be as fun and interactive as delivered in camp.
- At the end of camp, 42.4% of campers indicated interest in pursuing careers in science and technology while 30.5% were still unsure.

- 78.0% of students identified "being creative" as being one of the best parts of their camp experience; 62.7% said "working in a team" and 59.3% said "solving problems".

Activity 5: Clubs

NIHERST's Science Education Department administered one science and technology club for students ages five to thirteen years old.

a. Science Club

Science Club enhanced and reinforced students' understanding of STEM concepts linked to national curriculum. Lesson objectives and pedagogical strategies were adapted to suit the developmental and learning needs of the target group. The club intended to increase members' interest in science and continuing further studies and careers in science and to develop students' creativity, collaboration, communication, critical thinking and problem-solving skills as well as nurture their innovative spirit as required by the 21st century. The club used several methods of teaching including hands-on activities, use of information technology, audio-visual aids, workshops and theatre arts to meet the needs of its membership with various learning styles and abilities.

Nineteen club meetings were designed to deliver over one hundred STEM activities to the one hundred and thirty-eight (138) club members registered across all three terms of the 2017/18 academic year. Members were divided into the following age ranges: 5 – 6, 7 – 9 and 10 – 13 years old. Each three-hour meeting comprised one to two STEM activities per age group. Meetings engaged members in a variety of interactive activities in the areas differently themed areas per term as follows:

- Term 1 – Innovation in Natural Sciences: fifty-six members explored and prototyped solutions to various problem-based questions.
- Term 2 – Innovative Designs and Solutions: thirty-nine members were exposed to topics and fields such as: Aerodynamics, Newton's Laws of Motion, Air Resistance, Magnus Effect and Simple Heat Engines.
- Term 3 – Introduction to Marine Technology: forty-three members were exposed to topics and fields such as in marine science, coastal degradation and naval architecture.

Exceedingly positive feedback was received from both members and parents as depicted below:

- 96.5% of members enjoyed the activities during the academic year; 68.4% of members additionally identified the activities as one of the best elements of Science Club.
- As a result of their participation in Science Club, 91.2% of members indicated that they are more interested in science and 96.5% of members indicated that they wanted to continue studying science subjects in school.
- 84.2% of members indicated that Science Club helped them to understand science better in school.
- Parents agreed that their child/children demonstrated improvement in all learning and innovation skills as a result of participating in Science Club: oral and written communication (71.6%), teamwork and collaboration (90.5%), problem solving (79.7%), critical thinking (83.8%), creativity and innovation (95.9%).
- 98.6% parents/guardians would recommend Science Club to other parents.

Activity 6: External Outreach

NIHERST also made an impact on the national community by taking part in events hosted by valued partners and outreach activities of external agencies. Participants were engaged through the promotion of STEM education and by highlighting specific socio-economic issues relevant to the national community. The Institute's participation in these initiatives meets the goal of building and improving science literacy and raising awareness in the general population of the impact of science and technology on everyday life. It also showcases how the uptake and use of this knowledge improves the quality of life of citizenry.

During the reporting period, NIHERST participated in thirty-six events which benefited nine thousand, nine hundred and sixty-two (9,962) visitors. Some of these events were as follows:

- 2017 World Cocoa and Chocolate Day;
- ASJA Girls' College, Charlieville – Career Day;
- Atlantic LNG Biodiversity Fair;
- Bishop's Tobago High School – Career Fair;
- Diego Martin Central Secondary School - Mathematics Day;
- Girls in Information and Communications Technology – Ministry of Public Administration;
- Guardian Life - Socacise 5k walk;
- La La Land Children's Show;
- Lakshmi Girls' Hindu College - Science Fair;
- Princes Town Presbyterian Primary School - Career Fair;
- St Joseph's College - Career Fair;
- Telecommunications Authority of Trinidad and Tobago – Girls in Information and Communications Technology Animation Workshop;
- Tunapuna Secondary School - Innovation Fair; and
- University of the Southern Caribbean - Science Fair.

Picture 20: NIHERST Booth

Picture 21: NIHERST booth at the World Cocoa and Chocolate Day Expo 2018

3.2.2 Strategic Focus Area 2: Research and Intelligence Gathering

A key strategic goal of NIHERST has been to strengthen its research and intelligence gathering capability to better support evidence-based decision-making through clear policy direction supported by data and strategic foresight. During the fiscal year, NIHERST continued to make strides in this area through the work of the Science and Technology Statistical, Policy Research and Intelligence, and International Projects Departments.

3.2.2.1 Science, Technology and Innovation Statistics

The Science and Technology Statistical Unit has been responsible for the collection, compilation, analysis and dissemination of STI data for the benefit of policy analysts, researchers, educators, entrepreneurs and decision-makers and also contributes to international and hemispheric databases. Since 1996, the unit has issued thirty-seven sector-relevant surveys and publications. These were conducted in the following areas:

- Science and Technology Indicators including expenditure and human resources dedicated towards Research and Development;
- innovation in the manufacturing and tourism sectors;
- teaching of Mathematics and Science in primary and secondary schools;
- environmental awareness and practices; and
- public perception of science and university graduate tracer studies.

Science and Technology Indicators are uploaded annually onto the Science and Technology Statistical Research page on the NIHERST website along with the key findings of the completed surveys.

During the reporting period, the studies undertaken by the Science and Technology Statistical Department were designed to measure and support the development of STEM education in the country, to provide Science and Technology indicators and to give insights on the innovative activities in key sectors in Trinidad and Tobago with a view to improving the innovative capacity in the country. With regard to the innovation surveys, planning commenced in the last quarter of

the fiscal year for a Survey of Innovation in the Tourism Sector utilising for the first time in the business sector, an electronic medium for data collection. The proposed Survey of Innovation in the Financial Services Sector was delayed until funds became available.

The details of four surveys that were undertaken are detailed hereunder.

Survey of Science and Technology Indicators, 2017

The Survey of Science and Technology Indicators is an annual survey which is designed to measure the investment in science and technology in Trinidad and Tobago by gathering data on financial and human resources dedicated towards science and technology. Science and technology activities measured in this study include Research and development and scientific and technological services. This survey is guided by RICYT, of which NIHERST is a member and the UNESCO Institute for Statistics. The purpose of collecting these indicators is to improve evidence-based decision making by policymakers and decision-makers in Trinidad and Tobago.

The formulation of any science and technology policy or programme for the promotion of sustainable development require current, reliable and comprehensive data on the science and technology capacity of the country. In addition, the data is also submitted to RICYT and UNESCO Institute for Statistics annually and used to populate the regional and global databases of science and technology indicators which ensures Trinidad and Tobago representation in the global sphere. Some key indicators captured in this survey are used to monitor Trinidad and Tobago National Development Strategy 2016-2030 (Vision 2030): Theme 4 Building Competitive Businesses, Sustainable Development Goal Target 9.5 as well as in the calculation of global indices.

Survey of Mathematics in Secondary Schools, 2016

In the first quarter of the fiscal year, three hundred copies of the report were printed and distributed to key stakeholders including the Ministry of Education and all secondary schools in Trinidad and Tobago. The study aimed at improving the quality of STEM education in Trinidad and Tobago as data showed that approximately 50% of secondary school candidates failed Mathematics at the Caribbean Secondary Education Certificate general proficiency level. The survey was a two-part enquiry of Mathematics teachers and of students in Forms 1 to 5 in all public and private secondary schools.

The survey provided insights into the key factors contributing to the low level of performance in the subject by:

- monitoring teachers' qualifications and training needs;
- adequacy of teaching materials and textbooks;
- areas of difficulty – teaching and understanding;
- teaching and assessment methods;
- issues that limit the teaching of Mathematics;
- students' views toward Mathematics;
- Mathematical careers; and
- changes in Mathematics education over time.

The publication is expected to increase evidence-based decision-making in Mathematics education in the following areas:

- teaching training and development;
- teaching resources;
- assessment methods;
- difficulties and limitations to teaching Mathematics; and
- students' attitudes towards the subject.

Survey of Mathematics in Primary Schools, 2017

This study commenced in the first quarter of the previous fiscal year and was completed and approved for printing in the third quarter of the 2017/2018 fiscal year and the Unit received funding to publish the report in the last quarter of the 2017/2018 fiscal year.

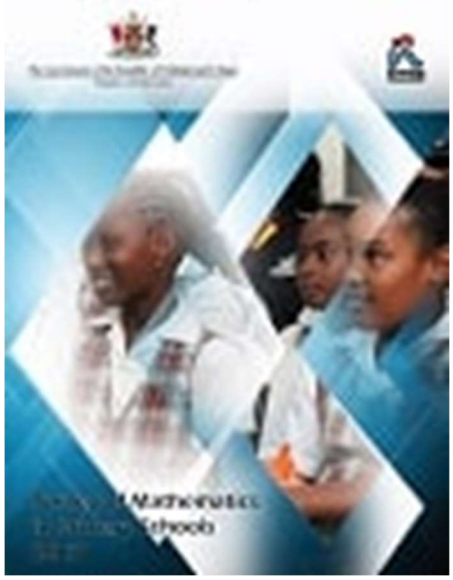
This survey was a two-part enquiry of both principals and teachers, designed to provide empirical data on the teaching of Mathematics in primary schools that would generate essential indicators for comparison with similar studies. The impetus for this study to collect data on Mathematics at the foundational stage of the primary school level was based on the record of students' poor performance in Mathematics at the Caribbean Secondary Education Certificate level over the past years. The study will provide insights into the teaching of Mathematics at the primary school level.

A summary of the key findings is as follows:

- Principals:
    - Almost all (98%) of the principals indicated that there were Mathematics resources available to the teachers in their schools.
    - The data revealed that teachers in the lower class-levels used Mathematics resources more frequently than their counterparts in the higher class levels.
    - Most principals (88%) stated that numeracy was a component of their school development plan. A significant majority (86%) of the principals reported that their schools participated in Mental Mathematics competitions and approximately a half (49%) of the schools had established a numeracy wall/corner.
    - Principals identified problem solving/critical thinking as the most important priority area (95%) followed by conceptual thinking (83%) and teaching methods (77%).
    - Principals identified teaching methods (45%), critical thinking/problem solving (30%) and concept teaching with the use of resources (26%) as the top three (3) areas for teacher development.
    - The main suggestion provided by principals on methods that could be used to improve students' performance in Mathematics at the primary level was the teaching of concepts using manipulatives (28%), followed by increasing teacher development (27%) and making Mathematics more hands-on and fun (18%).
- Teachers:
    - Approximately a quarter of the teachers who participated in the survey (26%) was male while 74% was female.
    - Over half (56%) of the sample of teachers had a B.Ed. degree while 26% possessed a teacher's diploma in education and 8% had a M.Ed. degree and above.
    - Compared to a similar study undertaken in 2007, the data showed an increase in teachers' qualification in education. The percentage of teachers with a B.Ed. degree increased from 8% in 2007 to 56% in 2017, while teachers with a M.Ed. qualification increased from 2% in 2007 to 8% in 2017.

- The majority (84%) of teachers surveyed reported an O Level/CSEC pass as their highest qualification in Mathematics while 7% obtained an A Level/CAPE pass and 3% and 2% possessed a diploma and bachelor's degree respectively.
- The majority (65%) of teachers who participated in the study reported service of fifteen years and over.
- Generally, teachers had a very positive attitude towards teaching with the majority of teachers indicating that they identified 'all the time' and 'most times' with the following statements: ‘I love teaching’ (92%), ‘I find my work full of meaning and purpose’ (91%), ‘My work inspires me’ (84%) and ‘I am going to continue teaching for as long as I can’ (75%).
- The most frequently used methods of teaching Mathematics by teachers were asking students to listen to them explain new Mathematics content and asking students to listen to them explain how to solve problems.
- Almost all (97%) of the teachers agreed that Mathematics was a hands-on subject.
- A significant percentage (83%) of the sample of teachers agreed that there were suitable Mathematics resources available in their schools.
- The most common resource teachers used to develop their scheme of work was the curriculum (97%) followed by textbooks (74%) and the Internet (63%).
- Most of the teachers who participated in the survey used concrete resources (97%), worksheets (97%) and textbooks (94%) in their Mathematics class while 51% used Information and Communications Technology.
- Forty-six percent (46%) of the teachers indicated that students were assessed in Mathematics at the end of each topic while 43% of the teachers administered weekly assessments and 11% reported monthly assessments.
- Thirty-seven percent (37%) of the teachers indicated that students indiscipline limited how they taught Mathematics 'a lot' and approximately one-third of the teachers assigned a similar rating to students absenteeism (32%) and parents not interested in their children's learning and progress (32%).
- Over 90% of the teachers indicated that they were well-prepared to teach Number, Statistics, Measurement and Geometry.
- Thirty percent (30%) of the teachers identified Number as the most difficult topic for students to conceptualise, followed closely by Measurement (29%) and Geometry (28%).
- Compared to the study undertaken in 2007, the data show an increase in the level of difficulty for students in all topics except Number which decreased from 58% in 2007 to 30% in 2017.
- A significant majority of teachers (91%) agreed that primary level Mathematics prepared students for Mathematics at the secondary school level.
- Over a half (59%) of the teachers surveyed attended Mathematics workshops during the last three years while 41% did not attend.

Picture 22: Cover of Survey of Mathematics Report



Collaboration with Other Departments

The Science and Technology Statistical Unit continued to provide support in Monitoring and Evaluation of key programmes of the Institute. This included assisting the Innovation Department with the 2018 First Lego League competition. The Science and Technology Statistical Unit assisted in designing the feedback instruments, collating the data and generating statistical tables and charts for the Monitoring and Evaluation report. The Unit also provided support in the preparation of Monitoring and Evaluation reports of the Institute's innovation vacation camps.

3.2.2.2 Policy, Research and Intelligence

The STI Mapping and Priority Setting Programme

The SIMs seek to acquire a more comprehensive understanding of different types of Innovations (product, service process and marketing) introduced by the targeted industries. These studies are aimed at assessing the intensities and types of interactions linking various actors of specific industries that are involved in initiating, importing, modifying and diffusing new and improved innovations and technologies. Each SIM was divided into four phases: Phase 1: Preliminary Research; Phase 2: Primary Research; Phase 3: Analysis; Phase 4: Publication and Communication.

During the reporting period, significant progress was made in the mapping of the innovation systems of the SIM exercises which were launched in Animation subsector of the Information and Communications Technology industry, Software and Web Development SIM and the Energy Services Sector as Phase 3 of the exercise was completed. In this regard the analysis of eligible innovative Software Development and Energy Firms was conducted, and potential investable firms were also submitted as candidates to Tambourine Innovation Ventures, a United States based venture investing company for the Regional Entrepreneurial Asset Commercialisation Hub Programme funded by the Inter-American Development Bank. Two software development firms and energy firms were nominated to participate in the Regional Entrepreneurial Asset Commercialisation Hub programme. Participants in the Regional Entrepreneurial Asset

Commercialisation Hub Programme would have greater access to financing their innovative projects, as well as mentoring and support for commercialisation of their ideas.

The exercise entered the fourth phase with the development of an Action Plan for the three sub sectors selected in Tobago and the compilation of the key performance indicators for the Animation and Energy sectors. Key indicators for the Software and Development industry in Trinidad and Tobago were completed.

3.2.3 Strategic Focus Area 3: Building Strategic Alliances

Central to NIHERST's mission to promote and advance STI in Trinidad and Tobago, is the building and strengthening of collaborative alliances with national, regional and international agencies. Such partnerships, particularly with global centres of excellence, tap into resources and expertise that can advance the institute's mission, help build national capacity and accelerate progress in the country's priority areas. Some collaborations and exchanges enable NIHERST in turn to share its expertise with other national and regional agencies to support capacity building.

Details on collaborative projects undertaken during the reporting period are as follows:

3.2.3.1 NASA International Internship Programme (NASA I^2)

In August 2012, NIHERST signed an agreement with the National Aeronautics and Space Administration (NASA) to facilitate local students' access to NASA's International Internship Programme (NASA I^2).

The promotion of the programme to sensitise the public to the NIHERST/NASA I^2 Summer 2018 opportunity for the selecting of candidates for the 2018 internships started on November 1, 2017. The programme was promoted using Social Media advertising as funding was not available for paid advertisements.

The call for applications resulted in the receipt of twenty-one applicants. The applications were screened by a panel that employed a rigorous two-stage process. The first stage, Phase 1, involved an assessment of the application form and supporting documents. This assessment measured the applicant's suitability in accordance with NASA's criteria, as well as fitness for further research and their potential to represent Trinidad and Tobago. Sixteen candidates were selected, and each candidate's application documents were subjected to a standardised scoring profile completed by the technical review judges.

Candidates were interviewed by a panel of four judges, after which based on scores and judges' recommendations, four candidates were submitted to NASA for the final selection of the two potential interns. NASA Ames interns are selected on the basis of academic merit, exemplary character, exceptional potential for leadership, and the sense of promise that they may one day make contributions of enduring importance to the betterment of the human condition in Trinidad and Tobago.

Two interns, Mr Keenan Chatar and Ms Ariel Chitan, were selected by NASA mentors to pursue research in the summer 2018 term. Both of the interns spent the ten-week summer internship at

NASA Ames Research Centre where they received training to perform research under the guidance of NASA's Science and Engineering researchers.

The first public sharing session post-internship was successfully conducted at the University of the West Indies. This public lecture series was hosted by NIHERST and delivered by the interns. Both Mr Chatar and Ms Chitan shared their technical research and experiences at the internship via PowerPoint presentations. These interactive sessions were attended by one hundred professionals and members of the public.

By the end of September 2018, the interns were contributing to local and international research papers and publications. One past intern was able to assist the Trinidad and Tobago Electricity Commission to develop methods for energy forecasting. Both interns were of the opinion that the internship allowed them to learn valuable laboratory techniques, which they have been able to apply. It also showed them how industry and government could work collaboratively in implementing improved/new processes and procedures.

Picture 23: NASAI^2 Flyer

3.2.3.2 TEACH ME

The TEACH ME project aimed to improve the underperformance of students in STEM subjects in the primary and secondary school system through teacher and student development, the donation of science kits and lab equipment and the establishment of science clubs in the participating schools. The project budget for fiscal year was deferred and thus, the major project deliverables were not executed according to the implementation plan.

The 2018 cohort was still inducted whereby three new schools were provided with the project details, and support material namely lesson plans to start their school Science Club. All Science Clubs under the Teach Me Cohorts for the years of 2016 and 2017, were subsequently encouraged to continue with their student activities.

Marabella Government Primary School held a week-long Mathematics Camp in July 2018 with the support of the Teach Me team. The camp engaged a total of thirty-eight students and successfully provided preliminary training to five new teachers. The teachers also received an introduction to, and copies of the Primary Math Curriculum Support Manual developed under INVOCAB. Resources for the Science activities held in conjunction with the Math Camp was provided through the school, and the Math manipulatives that formed the basis of the lesson plans were used from in-house resources. Approximately 70% of teachers agreed that their students who participated in the camp were more interested in Math. Approximately 95% stated that they had a better understanding of the various Math topics.

All eleven primary schools under Teach Me received the Curriculum Support Manual in Primary Math (delivered to all teachers who participated in the Professional Development Workshops). Over one hundred curriculum support manuals were delivered to teachers for their use in addressing topics that were deemed most difficult for students to grasp, utilising manipulatives and additional methods for teaching. The manuals also addressed issues such as Math anxiety and ways to manage this in the classroom. These manuals were developed through the INVOCAB project, by the curriculum experts, and were guided by initial feedback from teachers and students. It stressed on the use of alternative teaching methods, and the use of more tailored manipulatives.

3.2.3.3 Seismology in Schools

The programme is an adaptation of the successful Seismology in Schools project developed in the United Kingdom and adopted by schools around the world. NIHERST partners on this initiative with the Ministry of Education and the University of the West Indies Seismic Research Centre, as well as institutions at the helm of Seismology in Schools in the UK, namely, the University of Leicester, Durham University, Imperial College of London and the British Geological Survey. The activities of the project were as follows:

- Eight schools were involved in the programme with the seismometers located at two schools being relocated to new schools due to instrument neglect and prolonged information technology infrastructure issues. 64% and 80% in 2017 and 2018 respectively are the percentages of students who indicated an increased interest in geoscience related subjects and careers in this field. The project progressed with the installation and maintenance of Seismology Equipment and the installation of seismometers at all the participating schools.
- Seismometers that were not functioning at Signal Hill Secondary School, Tobago and Queen's Royal College were successfully relocated and operational at Fatima College and Bishop's High School, Tobago.
- Iere High School undertook the process to relocate their instrument to a more suitable and reliable room on the school compound. The software Jamaseis was updated at all schools during the 2017/2018 cycle of annual workshops. Jamaseis is the software use to connect the seismometer to the international network and to conduct analysis on seismic data. All of the desktop computers were reported to be functioning and in good condition.
- Re-Training of Teachers - the teachers involved in the programme were retrained along with their students in the use of Jamaseis and selected seismology activities from the workbook. The teachers were previously trained over a two day workshop when the programme was first launched in 2014.

- The completion and distribution of the Seismology in Schools Physics and Geography Workbooks during the workshops to all schools including the Ministry of Education and the University of the West Indies Seismic Research Centre.
- Students' Workshops (annually) - executed one day student-oriented workshops at eight of the secondary schools. The students were trained in the use of Jamaseis. Students were introduced to seismology and geophysics using practical activities that included earthquake analysis using the seismometer.
- The second annual Seismology in Schools Competition held on March 6, 2018 - Titled 'Shake Squad- Mission 2', students were challenged in using the skills gained during the workshop to solve a real-life scenario.
- Second Internship at the UWI's Seismic Research Centre - the winning students were awarded a one-week internship alongside experts in the field of geophysics. The winning school was St. Stephen's College.
- Participation in the Discussion Workshop on Educational and Citizen Seismology which was held from February 15 - 16 in London, United Kingdom. New collaborations opportunities were in discussion with other seismology programmes in the United States of America, France, Australia and the United Kingdom.
- Meetings were held with the developers of the IRIS network who were given feedback based on issues with our local network. Most of the issues were addressed throughout the year.
- A donated seismometer was received from Raspberry Pie, Panama. The instrument was installed at the NSC.
- Partners for the 'Twinning Component' of the Seismology Clubs were confirmed.

Picture 24: A group of students analyse seismic data using Jamaseis

Picture 25: NIHERST and the UWI Seismic Research Centre present the 1st Prize to the Shake Squad 2018 winners, St. Stephen's College

3.2.3.4 National Youth Science Camp

Since 2012 NIHERST has been partnering with the United States Embassy in Trinidad to select sixth form students in Trinidad and Tobago to attend the annual National Youth Science Camp in Virginia in July/August. It is open to secondary school students, sixteen to eighteen years old, from two educational districts which are rotated annually. Two candidates are selected and receive a full scholarship. This is a four-week intensive residential science education programme for young scientists. Students from around the world are challenged academically to explore new areas in biological and physical sciences, art and music and to exchange ideas with leading scientists and other professionals from academic and corporate worlds.

During the fiscal year, the scholarships were offered to the St. George East and the South-Eastern educational districts. A total eleven applications were received from five schools; ten applicants met all the criteria for eligibility and seven were shortlisted and interviewed. Two were selected as the 2018 delegates and two were selected as alternates. Mr Sebastian Rudden of North Gate College and Mr Josh-Michael Ashman of Bishop Anstey Trinity College East were selected and participated in the National Youth Science Camp 2018 which was held from June 27 – July 21, 2018.

The hands-on experiences and lectures exposed them to current work across the spectrum of scientific disciplines. They interacted with visiting scientists who were invited based on their reputation as leaders in their fields and on their ability to share up-to-date research with the delegates.

Picture 26: Trinidad and Tobago Representatives

3.2.3.5 Deep Sea Wonders of the Caribbean

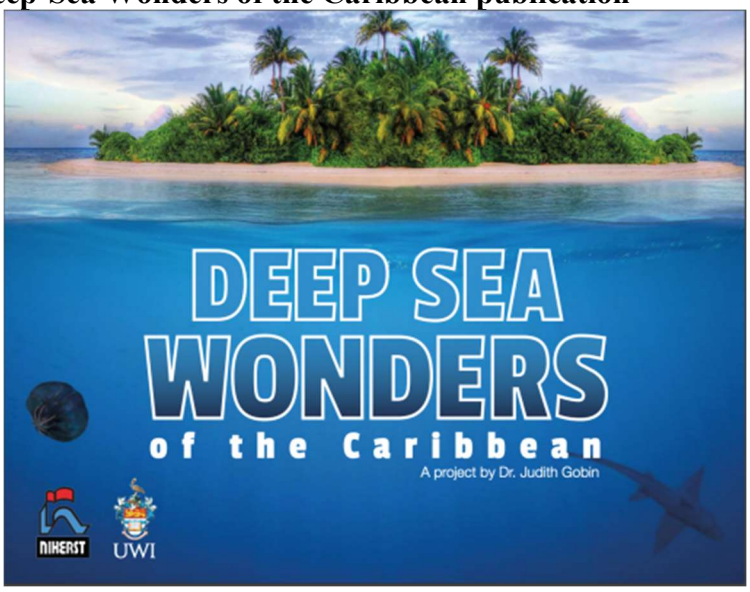
In January 2017, NIHERST in collaboration with the University of the West Indies, St. Augustine Campus and the Caribbean Council for Science and Technology, embarked on a project entitled "Deep Sea Wonders of the Caribbean". The project aims to foster a deeper understanding and appreciation of the deep-sea environment in the region, through the introduction and distribution of an educational video series and photo book detailing this previously unexplored natural feature.

The project was completed during the fiscal year with the finalisation and distribution of the project's outputs of the Deep-Sea Wonders of the Caribbean DVD, a documentary series of five episodes as a Deep Sea Wonders of the Caribbean photobook. The DVD series and photobook were distributed to various stakeholders. The recipients of these resources included 151 local secondary schools and educational institutions, thirty national libraries, thirteen environmental institutions, local media house, project sponsors and international partners of the project and thirteen countries within the region.

General access to these resources were made available online and promoted via NIHERST's social media pages. Collaborations were undertaken with the Ocean Exploration Trust for the promotion of the resources on their social media platforms.

In celebration of World's Ocean Day on June 8, 2018, an all-day showing of the video series with a question and answer session was held at the NSC. Episode five – An Ocean of Opportunities, was featured at a video screening event on Marine Science which was hosted by Green Screen, an annual film festival that features movies on environmental topics. The video series was also shown on Caribbean Airlines' in-flight programme.

Picture 27: The Deep-Sea Wonders of the Caribbean publication



3.2.3.6 Environmental Solutions for Sustainable Communities Programme - Rainwater Harvesting Systems

The Rainwater Harvesting Systems initiative was the genesis for the "Resilient TnT" project, which was funded by the ALLIARSE Foundation of Costa Rica through an International Coca Cola grant. The project aims to improve the social and economic dimensions associated with potable water in the Matura to Toco communities. The Matura to Matelot network consists of rural communities many of which have remained without a pipe borne supply of water or any potable source of water. Many residents have expressed concerns for a regular supply of potable water and welcomed the opportunity to have the Rainwater Harvesting Systems installed in their community.

The project focused on providing increased access to drinking water for the rural community of Cumana. A Rainwater Harvesting Systems constructed by members of the community in the Cumana Community Centre now delivers a capacity of 4,800 gallons of water to members of the community. One hundred and seven residents of Matura to Toco communities now have improved knowledge and understanding of the importance of water conservation and the benefits and opportunities of Rainwater Harvesting Systems.

Picture 28: Completed installation of the Rainwater Harvesting Systems at the Cumana Community Centre

To strengthen the stakeholder capability to create, adapt and use innovation and scientific knowledge, eighteen persons from Matura to Toco who were trained have been able to sell this service in and beyond this community.

Over one thousand residents would benefit from an increased supply of water at a disaster shelter in the Cumana Community Centre and improve the social and economic dimensions associated with potable water. Besides supplying a source of water to the centre that houses various daily community events, the Community Centre would also provide water to the residents in time of shortage. A tap providing the collected rainwater could also be accessed from the roadside.

At a stakeholder consultation on August 2, 2018, five residents expressed interest in installing a Rainwater Harvesting System. Two additional requests for Rainwater Harvesting Systems in the communities were also received from the Toco Regional Complex (where the public education was held) and Nixon's place.

3.2.3.7 The International Centre for Genetic Engineering and Biotechnology

The International Centre for Genetic Engineering and Biotechnology conducts innovative research in life sciences for the benefit of developing countries. It provides a scientific environment of top international standard for advanced research and education and for the development of biotechnology products for over sixty Member States via collaboration, training/capacity building, grants, technology transfer and advisory services to member states. The programme aims to provide Trinidad and Tobago with opportunities in research, training and technology transfer to industry, in the areas of genetic engineering and biotechnology, which are in line with the highest international standards, and which foster achievement of sustainable development goals.

In 2018 Cabinet appointed an official local representative and alternate representative on the Board of Governors for the International Centre for Genetic Engineering and Biotechnology. This

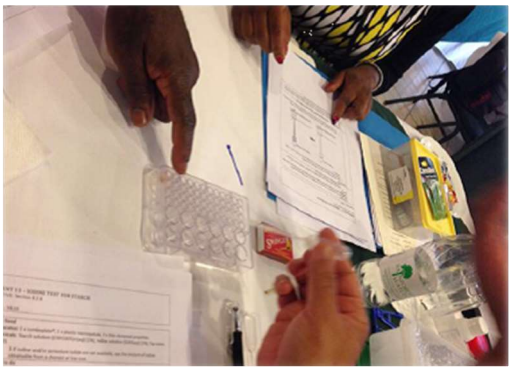
representative participated in the Board of Governors to the 24th AGM Session of the International Centre for Genetic Engineering and Biotechnology.

NIHERST as the focal point, received two applications for research grants in May 2018. These were reviewed by a local panel of experts; however, no awards were granted.

3.2.3.8 Microscience TT

The microscience kits are mini-laboratories that facilitate hands-on science education. Formulated especially for use in developing countries, the kits are small, inexpensive and virtually unbreakable as opposed to traditional lab equipment and can be used in any setting. This engaging teaching tool enhances the delivery and quality of science and technology education, while at the same time promoting inquiry-based learning and encouraging the development of problem-solving and critical-thinking skills. Less consumables are also used during experimentation with these kits.

Picture 29: Iodine Test for Starch Lab



The group of students targeted are those who are at the cusp of adolescence, which is the stage of development when general attitudes toward education are determined. A thrust in science education at this period of their studies aims to increase the number of students interested in science subjects for further studies and careers. During the fiscal year, twelve primary and secondary schools were selected for this pilot intervention aimed at enhancing science education pedagogy by providing microscience kits as a tool for meeting the requirements of science curricula and increasing students' exposure to inquiry-based learning through use of practical activities. These schools were as follows:

- Arima Girls' R.C. Primary School;
- ASJA Girls' College Tunapuna;
- Bishop Anstey High School East;
- Chatham Government Primary School;
- East Mucurapo Secondary School;
- Laventille Boys' Government Primary School;
- Matelot Community College;
- Montrose Government Primary School;
- Mucurapo Girls' R.C. Primary School;
- Penal Secondary School.
- Shiva Boys' Hindu College; and
- St. Augustine South Government Primary School.

Each school received twenty modified microscience kits, chemicals and content manuals matching the experiments to curricula in April 2018. Based on feedback from teachers who attended the central workshop, it is expected that there will be significant improvement in the teaching of science once implemented.

3.2.3.9 FIRST® LEGO® League Trinidad and Tobago

With the support of the Ministry of Education and its Social Investment partner, Shell Trinidad and Tobago Ltd., NIHERST was able to conduct the FIRST® LEGO® League competition for the 2017/2018 cycle. Twenty-one teams participated in the National Championships held in March 2018 at the National Cycling Velodrome. This represented a 110% increase in participation from the pilot season. Representatives from NIHERST, the Ministry of Education and Shell Trinidad Ltd. assisted as referees and judges for this event. Dr the Honourable Lovell Francis, Minister of State in the Ministry of Education, delivered the feature address at the closing ceremony for the National Championship.

The all-girls team 'Bionic Wolves' of St. Joseph's Convent, St. Joseph emerged as the overall winning team for the National Championship. The team went on to compete against ninety international teams at the FIRST® LEGO® League World Festival in Houston, Texas but did not place at the World Festival.

The programme seeks to establish and nurture core values within participants that emphasise important concepts such as: the contributions of others, friendly competition (coopertition®), learning, and community involvement. Based on feedback gathered, the FIRST® LEGO® League 2017/2018 program results were favourable as evidenced below:

- Team Experience:
    - At least 60% of the participants were actively involved in all of the project, team and robot-related activities. The area in which the participants were most involved was in designing the team's robot and the area where they were least involved was in the raising of funds for the team.
    - Most team members (84%) had the opportunity to work with an adult with technical expertise (a team coach, mentor or volunteer). Team members reported that these skilled adults helped them to solve a problem with building or programming their team's robot (77%), to think about the areas they needed to study if they wanted to become a scientist or engineer (66%) and to learn about science and technology careers (65%).
    - Ninety-five percent (95%) of the coaches saw the importance of the Research Project in relation to the overall importance of the FIRST® LEGO® League experience. 75% saw it as 'very important' and 20% saw it as 'somewhat important.'
    - The majority of coaches reported that the Project having a real-world focus had positive impacts. They found by the Project having a real-world focus, it motivated them and their team members to get and stay involved along with increasing their interests to complete the Project and making the Project more fun and exciting. They also found that it allowed them to have an impact on their community.

- Responses from team members pointed to a quality experience. Most participants (83% or more) stated that they had the opportunity to do lots of different jobs and make important decisions for their projects, and were able to develop skills in project management, working in a team setting, communication in a team and also learning about new careers in Science and Technology.
- Team members also reported overall high levels of satisfaction from participating in FIRST® LEGO® League. Fifty-eight (58%) participants rated their experience as "Excellent" and 31% rated it as "Good." Seventy-six percent (76%) reported that they plan to participate in the next cycle. Ten percent (10%) stated they would not be returning to participate as they would not have time, and 9% said they would be over the age limit for participating

- Participant Experience:
  - Coaches reported seeing an increase in Science and Technology and educational success within their team members. All coaches reported positive increases in their team members' interest in learning more about computers and technology and their awareness on how science is used to solve real world problems (85%); increased interest in jobs or careers in science and technology and interest in succeeding in school (80%); and increased interest in their math or science classes at school (80%).
  - The majority of coaches (at least 75%) also reported seeing gains in the knowledge, skills and attitudes of team members. This included an increased understanding of science and technology (90%); increased life and workplace skills (80%-90%); impacts on traditional academic skills (75%-90%); and helping others (85%).
  - Participants showed an increased interest in science and technology, careers, and school. Most team members agreed or strongly agreed that they would like to learn more about science and technology (92%); learn more about computers and robotics (92%); learn more about how science and technology can be used to solve problems in the real world (93%). They also reported that they have become better at Math and Science than before (80%); have a stronger will to perform at school (91%); are more interested in having a job that uses science or technology (83%); would like to become a scientist or an engineer (72%). Ninety-eight percent (98%) reported that they believed that they could succeed if they worked hard and, in the future, would like to be able to solve problems for their communities (92%). Participants reported that they also plan on further pursuing other inventions/ideas, their team's invention and more interested in going to college/university with 89%, 90% and 91% respectively.
  - Participants reported gains in their knowledge and understanding about science, school, and themselves. FIRST® LEGO® League participants indicated that they experienced increases in their understanding of science (83%-94%), the role of education (94%), and the importance of being able to work with others on their team and in the community (93%-95%).
  - Most participants (at least 95%) also reported increased life and workplace-related skills with at least 60% stating that they learnt 'a lot.' These skills include successfully functioning on a team, research skills, problem-solving skills, time management skills, creative thinking, decision making and communication skills.

- Many parents saw positive changes within their child as a result of participation in FIRST® LEGO® League. At least 53% of parents reported an observed increased interest in their child in science and technology and in their school, and 63%-100% reported positive impacts on their child's skills, knowledge and attitudes.

Picture 30: The Cyber Nation Team begin the Robotic Game Rounds in the FIRST® LEGO® League competition

Picture 31: National Champions of the FIRST® LEGO® League, Bionic Wolves of St Joseph's Convent, St Joseph celebrate their victory with Ms. Sylvia Lalla (centre), President (Ag), NIHERST

4 Financial Operations

4.1 Budget Formulation

In response to a memorandum from the Permanent Secretary, Ministry of Education and the accompanying Ministry of Finance Call Circular No 03 dated March 13, 2018, NIHERST commenced preparation of budget estimates for the 2018/2019 fiscal year. The Draft Estimates of Income and Recurrent Expenditure for the 2018/2019 fiscal year, together with projections for 2020 and 2021, were approved by NIHERST Board of Governors. These estimates were sent to the line Ministry for assessment and forwarding to the Budget Division, Ministry of Finance.

4.2 Financial Performance

4.2.1 Revenue

In addition to government subvention, NIHERST derives income from registration fees and admission fees from some of its activities including clubs and camps and an entrance fee for visitors to the NSC. The income derived is referred to as *Other Income*.

For the fiscal year 2017/2018, NIHERST received $20.9 Mn. in government subvention. Other income earned during the fiscal year amounted to $0.69 Mn., relating to earnings from bank interest, registration and admission/entrance fees. This amounted to total income of $21.6 Mn., as shown in **Table 8**.

Table 8: Revenue of NIHERST for the 2017/2018 fiscal year

Revenue Category	Budgeted Revenue (TT$) (A)	Actual Revenue (TT$) (B)
Recurrent Subvention	27,720,000	20,948,687
Bank Interest	10,000	4,633
Other Income	1,300,000	686,960
Total Income	**29,030,000**	**21,640,280**

4.2.2 Expenditure

The NIHERST incurred operating expenditure of $21.3 Mn. as shown in **Table 9**, with a resulting deficit of $0.38 Mn. over government releases, which was financed from other income.

Table 9: NIHERST Expenditure for the 2017/2018 fiscal year

Expenditure Category	Budgeted Revenue (Subvention plus Other Income) (TT$) (A)	Actual Releases (Subvention only) (TT$) (B)	Actual Expenditure (TT$) (C)	Surplus /Deficit (TT$) (B-C)
Personnel Expenditure	7,371,400	6,490,222	6,337,449	152,773
Goods and Services	20,108,600	12,908,465	13,530,007	(621,542)
Current Transfers and Subsidies	1,550,000	1,550,000	1,457,298	92,702
TOTAL	**29,030,000**	**20,948,687**	**21,324,754**	**(376,067)**

4.2.3 Public Sector Investment Programme

Table 10 shows the expenditure under the Public Sector Investment Programme for the fiscal year. Releases amounted to $1.3 Mn. with expenditure of $0.4 Mn., resulting in a surplus of $0.86Mn.

Table 10: NIHERST Public Sector Investment Programme Allocation and Expenditure for fiscal year 2017/2018

Project	Allocation (TT$) (A)	Releases (TT$) (B)	Actual Expenditure (TT$) (C)	Surplus /Deficit (TT$) (B-C)
Establishment of a National Science Centre	1,000,000	999,940	312,119	687,821
TEACH ME	300,000	299,432	124,778	174,654
STI Mapping and Priority Setting	176,000	0	0	0
TOTAL	**1,476,000**	**1,299,372**	**436,897**	**862,475**

The Establishment of a National Science Centre Project was suspended during the 2018/2019 fiscal year. Expenditure of $312,119 was incurred for salaries and minor works to the site against releases which amounted to $999,940, resulting in a surplus of $687,881.

The TEACH ME Programme received $299,432 and expended $124,778, the surplus of $174,654 was committed to ongoing projects for the following year.

The STI Mapping and Priority Setting project, ground-work for the Sectorial Innovation Mapping Studies in the Animation, Information and Communications Technology and Energy sectors was completed. The Animation Final Report was completed and work on the Energy SIM Final Report began.

4.2.4 Audit

The audit of the Financial Statements for the years 2010, 2011, 2012 and 2013 was completed in the fiscal year 2017/2018 by the office of the Auditor General.

5 Human Resource Development Plan

5.1 Organisational Establishment

NIHERST was established by Act No 20 of 1984 (now Chap. 39:58) with a permanent establishment of 118 posts. This was reduced to fifty-four positions with the creation of the College of Science, Technology and Applied Arts of Trinidad and Tobago (COSTAATT) in the year 2000 and the consequent transfer of the NIHERST Colleges and sixty-four posts to COSTAATT. The Institute has not been able to update its structure and the job positions which were ascribed to it since 1984, owing to constant changes in plans for the Institute over the years.

This has posed many challenges for the management of the human resources capacity and capabilities of the Institute which are necessary for advancing the mandate of the Institute. Some of the challenges faced have been the obsolescence of posts, lack of relevant job positions, inadequate number of posts, uncompetitive compensation packages and an absence of avenues for career progression and advancement opportunities. These factors have impacted negatively on employee engagement, performance and recruitment. As a solution to filling the gaps, the Institute continued to hire required personnel on contract. Also, efforts were made to develop and implement a new structure and compensation plan that would move the Institute forward.

5.2 Organisational Restructuring Exercise

In May 2017 HRC Associates, engaged for the development of a new organisational structure and compensation system for NIHERST, including the undertaking of a job evaluation and compensation survey, delivered the Final Report entitled *Organisation Transformation Study…the Restructuring of NIHERST.* The report on the *Job Evaluation Exercise for Non-management Jobs* was submitted to the recognised majority union – Public Services Association of Trinidad and Tobago for comments.

The Report was subsequently provided to the newly installed Board. However, the focus first had to be on the development of a new strategic plan since the previous one had expired in 2015. During the period under review, arrangements were made for the procurement of consultancy services for the facilitation of the strategic planning exercise.

5.3 Category of Employees

Operations at NIHERST are carried out by four categories of staff, viz permanent, contract, short-term and part-time staff. At the end of the reporting period, NIHERST employed eighty-seven persons on a full-time basis comprising thirty-six permanent employees, forty-four on contract, and seven short-term employees. NIHERST also employed 20 part-time staff, comprised mainly of science demonstrators who were asked to report to work as required to assist with the explaining of science exhibits and concepts to visitors of the NSC.

During the fiscal year, twelve trainees of the government's On-the-Job-Training programme gained professional work experience at NIHERST's offices.

Funding was not available under the Institute's student employment programme to hire undergraduate students on vacation who wish to acquire job experience.

5.4 Career Path Systems

The organisational structure and positions on the permanent establishment had not been updated since its establishment. Gaps were met through contract employment.

5.5 Performance Assessment/Management Strategies

Full-time employees are assessed annually using the Performance Management System utilised by the Public Service. The Human Resource department continued to provide support to supervisors responsible for the completion of these reports where necessary by preparing draft standards/targets for job duties against which the performance of employees was measured. The department also provided training to new managers and supervisors on the Performance Management System and its importance to achieving the institute's goals and objectives.

5.6 Promotion – Selection Procedures

The selection procedure for promotion in the NIHERST-Public Services Association Collective Agreement (Article 4: Employment and Promotion) was applied to both permanent and contract employees.

In addition, selection methods used included interviews, work sampling (a job-specific ability test), and past performance appraisal records. Interviewing panels comprised an officer from the Human Resource Department along with persons with an appropriate mix of competence and rank, usually officers who are at least two levels higher in rank that in the position which the panel is set up to consider. Panels sometimes included external persons with relevant expertise if such did not reside internally.

During the reporting period, management commenced development of a Recruitment and Selection policy for approval by the Board of Governors.

5.7 Staff Development and Training

The Institute's training and development programme strives to enhance individual, departmental and organisational effectiveness by facilitating access to training and fostering professional development of its human resource which ultimately contributes to attainment of organisational objectives.

The programme may include in-house customised training courses, sponsorship to pursue training courses externally, fellowships or long-term professional degree programmes, seminars and conferences and opportunities for the sharing of knowledge and skills gained with other employees. NIHERST was unable to pursue its training plans due to insufficient funding but was able to benefit considerably from programmes delivered at the government's Public Services Academy, which were at no monetary cost to the Institute. Fifteen employees (approximately 16% of the staff) received such training.
Details of the training programme attended attached as an ***Appendix***.

5.8 Employee Support Services

5.8.1 Group pension, Health and Insurance Plans

NIHERST's pension plan for its permanent employees was established on January 1, 1988. The plan also provides benefits to the staff of the NIHERST colleges which were transferred to COSTAATT with effect from November 6, 2000, under the COSTAATT Act Chap. 39:56. As at September 30, 2018 there were fifty-two active members, twenty-three pensioners and six deferred pensioners participating in the Pension Fund Plan. Of the fifty-two active members, thirty-six are from NIHERST and sixteen from COSTAATT.

NIHERST and COSTAATT contributed to the Fund at the rate of 17.7% of basic salary and the members contributed at the rate of 6% of basic salary. This was a major contributor to the Plan's assets which were valued at TT$57.2m as at the end of the Plan's financial year October 31, 2017.

The Plan continued to perform fairly well, notwithstanding economic conditions. The next triennial actuarial valuation of the fund as required by the Trust Deed is for the period November 1, 2015 to October 31, 2018. The Actuary is required to submit the final report to the Central Bank of Trinidad and Tobago by July 31, 2019.

NIHERST provides a Group Health and Life Insurance Plan for all full-time employees, permanent and contracted. As at September 30, 2018, there were sixty members of the plan including five retirees. The Life Insurance and Accidental Death and Dismemberment benefit attached to this plan was $200,000 and NIHERST contributed 50% of the premium for this benefit. Major medical coverage was $500,000 and NIHERST contributed 60% of the premium in respect of the health insurance benefit.

5.8.2 Employee Assistance Programme

Petrotrin EAP Services Limited continued to supply services for the Employee Assistance Programme (EAP), which is open to all NIHERST employees. During the period of this report, the scope of services was as follows:

- management consultations;
- access to the 24-hour hotline;
- provision of quarterly and annual reports and EAP brochures and promotional items;
- counselling and referral service – eight sessions per issue per annum for employees and dependants;
- ongoing consultations with peer support volunteers; and
- prevention services including educational outreach and workshops.

The staff continued to make use of the services of the EAP through the counselling sessions which ensures strict confidentiality and promotes the wellbeing of staff.

The programme's utilisation statistics show that a total of eighteen clients were counselled, sixteen cases were opened and a total of thirty-six sessions were conducted.

The utilisation rate increased during the period by 2% compared to the previous years where the utilisation rate was 4% for the same time period. According to the International Employee

Assistance Professional Association, the benchmark for healthy utilisation of the EAP counselling services is 3% of staff. NIHERST's utilisation rate of 6% is double the benchmark which indicates employees' knowledge about the service and confidence in using the EAP. The increase in the rate also provides optimism about future growth regarding employees' use of the EAP service.

6 Information Governance

6.1 Records and Information Management

The Records and Information Management department continued to adopt a strategic approach to managing the Institute's information and content. This approach involved developing the Institute's capability in knowledge and information management to support Trinidad and Tobago's knowledge-based economy and the Institute's alignment to Ministerial Goal 1 Effective Governance and Administration of the Education system. Further, in order to function in the knowledge economy, the Institute continued its efforts to operate within an information governance framework, not only to meet external regulations, but also to guide users' behaviour with respect to corporate content.

During period under review, the department continued to implement specific aspects of the records management programme within the information governance framework. Further, Public Sector Investment Programme funding ended for the document management project. Activities of the records management programme follow.

6.1.1 Records Management

Building on the departmental records profiles of all seventeen departments of the organisation, those profiles were used to improve inefficiencies in the records management lifecycle process on departmental shares, in preparation for migration from departmental shares to the cloud.

The implementation of document libraries on Microsoft Office 365 continued. Parallel work continued with Heads of Departments and Records Stewards to further streamline departmental shared drives in a more consistent and standardised manner, adhering to internationally acceptable standards and guidelines. During the period October 1, 2017 to September 30, 2018, the number of departments migrated to the cloud, was maintained at twelve out of seventeen departments adopting the technology and the platform in its daily communication, collaboration and document management activities. The remaining five departments continued as slow adopters, facing various departmental challenges.

The department also spearheaded detailed plans to build out information, communication and services modules available in Microsoft Office 365 and worked closely with the Information and Communications Technology department to plan and implement same. These included the development of a strategy to implement a NIHERST intranet on Microsoft Office 365, which was subsequently branded the NIHERST NUCLEUS, and a strategy to implement user services, selected workflow processes, and business intelligence modules in Microsoft Office 365. Selected departmental business processes, in preparation for possible rollout of selected workflow processes in Microsoft Office 365 were documented for future reference.

The nine-month Service Level Agreement entered into with a Service Provider in early March 2017, continued through December 2017 to January 2018. Work involved the administration, support and customisation of a Microsoft Sharepoint Microsoft Office 365 platform to support NIHERST's operations. A joint Service Provider/NIHERST implementation team continued work

on the design, layout, development, content management and departmental roles and responsibilities for:

- the NIHERST NUCLEUS (Intranet) home page;
- forms development;
- departmental "internal public" and home pages;
- project sites, departmental sites and document libraries;
- development of metadata fields; and
- preliminary development records centre development; a NIHERST NUCLEUS banner design and development which utilised in-house expertise, task identification and action logs.

Skype and face-to-face project update and technical meeting were held and monthly status reports were submitted by the Provider.

No development or rollout of either the Business Intelligence functionality in Microsoft Office 365 was undertaken, since funding for this Public Sector Investment Programme project had now come to an end within its original scope. Further, an overall reduced enterprise-wide budget did not allow for any new projects to be undertaken. The purchase and implementation of the Power BI module to compute and display information on programmes and projects for improved statistical reporting, using dashboards to visually represent the status of projects, and to manage the organisation's information for improved decision-making, were relegated to the 'backburner' pending the approval of a new strategic plan and the availability of funds for the procurement of products and services to maximise the use of available functionality.

In August 2018 and in preparation for the re-location of NIHERST's St Augustine Head Office to the Education Towers, Port-of-Spain, priority was given to ensuring that all departmental paper and electronic records that were housed at the St Augustine Head Office were organised, migrated and/or weeded and in a state of readiness to be transported. The Records and Information Management and Information and Communications Technology departments collaborated to ensure that access to/security of documents/records were uninterrupted at the new location.

6.1.2 Compliance - Policies, Procedures, Guidelines

The Institute continued to adhere to the development of good information governance through policies, systems and practices in the context of the changing technology landscape, and legislative demands placed on the Institute regarding its records. Progress slowed on further development of various Records and Information Management policies and procedures as priority was given to the implementation of Microsoft Office 365 across the Institute. This required substantial hands–on user training, communication, problem-solving, and managing change management issues that arose in the operational phase of the project among users and non-users.

6.1.3 Storage and Archiving

Consolidation of archival storage space and archival files continued with a view to increasing storage cost savings as well as efficiencies in access to consolidated files. Due to extreme budget constraints, the organisation's contractual agreement with a records management storage company had to be modified from annual to six-month agreements, beginning October 1, 2017 to March 30,

2018 and April 1, 2018 to September 30, 2018. These measures required that NIHERST review the frequency and volume of records being sent to off-site storage. Storage consolidation activities continued at one other non-records storage site in an attempt to reduce archival storage costs.

6.1.4 Risk Management

For the most part, risk management activities focused on minimising the risk of inappropriate and unauthorised information usage of departmental and project site records and documents and as such the Information and Communications Technology department continued to implement appropriate controls to protect the organisation's information according to its sensitivity, importance and risk profile. During this period, no breaches were identified. Checks were made as is customary to ensure that Heads of Departments know the level of access being granted to the department's document libraries and to whom they would have approved access.

The archiving of files to an official records' centre storage facility, reduced the impact of a risk on the ability of the organisation to satisfy its obligations to its employees, customers, partners, auditors and regulators. The Records and Information Management department continued to work with all relevant departments to ensure that the organisation and management of records complied with retention and disposition schedules and regulatory and contractual requirements regarding records/information availability, quality, integrity, privacy and retention and disposition. Retention and disposition schedules for e-records were yet to be finalised and implemented.

6.1.5 Successes/Challenges to Implementation

During this review period, Records and Information Management department core staff was reduced to one staff – the Records Manager – to continue to develop and implement the records management programme; to work one–on-one with five departments on their document migration exercise, and to liaise with the Service Provider Team and the Information and Communications Technology department to complete implementation of the Service Level Agreement.

The department continued to register qualitative and quantitative improvements in the organisation's commitment to the principle of "good information governance" in the areas of:

- improved accountability;
- transparency, compliance and communication;
- collaboration in document management; and
- other record-keeping principles.

Improvement in the management of the Institute's information assets, records, information and knowledge management systems was evident. Record Stewards, supported by the Records Department continued to work with their departmental staff to re-organise outstanding departmental shares in keeping with industry standards.

Existing challenges continued regarding the future state of organisational awareness/behaviour, records stewardship, risk management, records/information lifecycle management, security and privacy, information quality, monitoring and auditing and e-discovery. Revisions continued to be made to the draft Records and Information Management policy to ensure that information

governance practices were monitored against agreed unambiguous baselines and maintained. Gaps in various internal approval processes continued to be exhibited as "bottlenecks" in selected business and workflow processes.

The need for focus and discipline requiring changes in behaviour and governance, cross-domain awareness, shared accountability and constant "value-selling" remained, with significant change management challenges to be addressed in varying degrees particularly by middle and late adopters of the new system. Late adopters of Microsoft Office 365 continued to exhaust and provide a continuous challenge to the department’s change management initiatives and approaches. The heavy reliance on the Information and Communications Technology department’s personnel hindered the further development and rollout of Microsoft Office 365 services and information and document management. This therefore continued at a slow pace due to the need to share resources among competing priorities.

7 Procurement

The role of public procurement has evolved from a simple buying function to an established centralised unit of the Institute - crucial in achieving the overall organisational outcomes and results, through procurement procedures and with the guidance of the Ministry of Finance *Standard Procurement Procedures.*

The Procurement Unit adheres to proper procurement principles, by ensuring transparency, accountability, integrity, efficiency and value for money in acquiring goods and services that conform to the NIHERST Procurement Policies and Procedures and the *Public Procurement and Disposal of Public Property Act, 2015* with amendments.

NIHERST recognises three forms of tendering: Open Tendering, Selective Tendering and Sole Tendering. In the majority of cases selective tendering is used. However, for large contracts either an open tendering process or a selective tendering process - based on an open prequalification process is used.

The NIHERST Board of Governors is required to approve all contracts for goods and services valued in excess of $450,000.

7.1 Award of Contracts

For the year under review there were no matters for consideration that required Board approval.

7.2 Improvement of Procurement Processes Review

In September 2017, the President (Ag.) invited interested staff to voluntarily participate in an in-house review and improvement exercise of NIHERST procurement processes and procedures with recommendations. This invitation was based on a request from the Chair of the Procurement Committee of the NIHERST Board of Governors to set up a Procurement Review Team. The review of the procurement system is ongoing. During the period, with the assistance of the Information and Communications Technology department, an in-house vendor database was developed and data entry into this system was completed, facilitating easier sourcing of vendors for required products and/or services.

8 Public, Community and Stakeholder Relations

8.1 Client and Public Access to Services/Service Delivery Systems

NIHERST's marketing efforts have continued to leverage digital platforms as a counter measure to lean marketing budgets to promote products, services and events to key stakeholders in Trinidad and Tobago. Recognising that internet penetration was on the rise, digital media facilitated both a creative and cost-effective mechanism to promote and engage audiences. The Marketing and Corporate Communications Department utilised traditional media to augment the promotion of key events and programmes to ensure that there was optimal reach and engagement of stakeholders on a national level, which aligned with the Institute's mandate of Science Popularisation and advancement.

Figure 2: NIHERST's Promotional Mix Strategy

The adopted promotional mix strategy to promote NIHERST's offerings incorporated both traditional and new media advertising, outreach promotion in schools, communities and at events; direct marketing which also leveraged email, the use of collaterals and branded paraphernalia; and securing strategic public and private partnerships for programmes, public education sessions and public relations activities. The Marketing and Corporate Communications Department continued to work closely with all programme departments of NIHERST to understand the value propositions and communicate effectively to relevant audiences. The process of formulating initiatives and programmes leading up to the creation of communications before project execution were all

systemically interwoven to ensure that executed marketing campaigns offered the best return on marketing spend for the initiative. **Chapter 3** of this Report has detailed all the programmes that have leveraged some, if not all of the elements of this promotional strategy to achieve expected outcomes and tangible stakeholder benefits.

As the pace of social media adoption increased, NIHERST continued to optimise stakeholder engagement by incorporating a rich mix of media such as video, animation, sound clips, text and graphics in its communications. Additionally, as media consumption habits of users evolved, the department has been on the pulse of exploiting channels that offer better access and connectivity to followers such as YouTube and Instagram. This strategy has worked well for many of NIHERST's science education programmes and events.

Public relations activities have been geared towards building relationships with the media and other influential stakeholders that offer earned publicity either through brand mentions, publicity of stories and events and extending the life of public interest stories to garner continuing sponsorship support for NIHERST's initiatives.

In the area of strategic partnerships, the Marketing and Corporate Communications Department has continued to work with programme departments to identify and pursue partnerships with organisations that would likely support the work of the Institute. A list of agencies and organisations that collaborated with NIHERST as sponsors on key initiatives and/or exhibitors and facilitators at key event is as follows:

- Atlantic LNG;
- British Gas;
- British Geological Survey;
- Caribbean Academy of Sciences;
- Caribbean Council for Science and Technology;
- Embassy of the United States in Port of Spain;
- European Union;
- Fab Foundation;
- *FIRST*®LEGO®LEAGUE;
- Institute of Electrical and Electronics Engineers – Trinidad and Tobago Section;
- Institute of Electrical and Electronics Engineers – Global;
- Intellectual Property Office;
- LEGO Education;
- Massachusetts Institute of Technology;
- Massy Foundation;
- Ministry of Education - Curriculum Division and Information Communication Division;
- NASA;
- NASA Ames Research Centre;
- Nautilus;
- Organisation of American States;
- Scientific Research Council, Jamaica;
- Seismic Research Centre, University of the West Indies;
- Shell Trinidad Limited;

- The National Gas Company of Trinidad and Tobago;
- The University of the West Indies;
- The University of Trinidad and Tobago; and
- UNESCO.

9 Internal Audit

During the period under review, the Internal Audit department functioned in spite of the limitations of inadequate staffing and lack of resources, to develop both an Internal Audit Charter and an Internal Audit Plan. These were incorporated into the operations of the Institute.

The department also revised the Terms of Reference of the Audit Committee of the Board of Governors. It also embarked upon a comprehensive programme of audit activities into the key risk areas of the Institute. It is anticipated that the department will further fulfil its mandate to add significant value to the Institute in the areas of internal control, risk management and governance processes.

10 Conclusion

The operational activities of the NIHERST for fiscal year 2017/2018 reflected the achieving of its stated mandate by advancing STI through research, education and training. Its contributions on the national landscape aligned to the vision for building and strengthening capacity in science, technology and innovation. This was evident in the positive feedback received from its stakeholders in the delivery of its programmes and resulting successful outputs. The seminal work of the Institute in the areas of the science and technology, statistics and sectoral innovation mapping for policy research and formulation continue to be critical for charting the way forward for the country's economic growth and improving its global competitiveness.

Overall, NIHERST continued to occupy a unique and important position as the only Institute in Trinidad and Tobago with specific responsibility to grow and develop STI.

11 Appendix: Staff Training and Development

Department	Training Institution	Training Programme	Training Period	No. of Persons Trained
International Projects	University of Leicester, British Geological Survey Imperial College	British Geological Survey Discussion Workshop on Education and Citizen Seismology	February 15 – 16, 2018	1
Science Education	Public Service Academy	Monitoring and Evaluation	April 23 – 27, 2018	1
Office of the President - Monitoring and Evaluation - Policy, Research and Intelligence	Public Service Academy	Protocol and Etiquette	May 13, 14, 2018	2
Science and Technology Statistical Unit	Public Service Academy	Cabinet Note Writing for Senior Officers	May 18, 20, 21, 2018	1
Information and Communication Technology	Public Service Academy	Leading for Results from the Middle	May 24, 28, 29, 2018	1
Office of the President (Monitoring and Evaluation)	Public Service Academy	Protocol and Etiquette for Public Officers	June 13 – 14, 2018	1
General Administration	Public Services Academy	Office Etiquette for Administrative Support	July 16 – 18, 2018	1
Human Resource Office of the President (Monitoring and Evaluation)	Public Services Academy	Ethics, Accountability and Good Governance	July 17 – 18, 2018	2
Accounts	Public Services Academy	Succession Planning	September 11 – 13, 2018	2
Human Resource	Public Services Academy	Training Trainers	September 20 - 27, 2018	1
Human Resource	Public Services Academy	Disciplinary Procedures	September 25 – 27, 2018	1