REPORT OF THE NATIONAL INSTITUTE OF HIGHER EDUCATION (RESEARCH, SCIENCE AND TECHNOLOGY) (NIHERST)

to Parliament for Fiscal Year 2015- 2016

NIHERST
NATIONAL INSTITUTE
OF HIGHER EDUCATION
RESEARCH SCIENCE AND TECHNOLOGY
INCORPORATED BY ACT OF PARLIAMENT ACT NO. 20 OF 1984

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FOREWORD

During fiscal year (FY) 2016 NIHERST continued to strengthen its core and signature projects and embarked on new initiatives, all of which served to advance the institute's mandate – to grow and develop science, technology and innovation (STI).

Activities for the fiscal year 2016 have been aligned to three (3) strategic areas of focus:

- **Popularisation of Science, Technology and Innovation.** NIHERST's STEM education and popularisation activities, spearheaded by the National Science Centre (NSC) and the Innovations Department, have brought diversity and a greater feel of inclusivity to education in science, technology, engineering and mathematics (STEM) disciplines. A wide range of STEM programmes have raised scientific and technological awareness and literacy in the general population, built interest and engagement of both children and adults, and enhanced the STI capabilities of teachers and students, specifically to encourage more young people to pursue studies and careers in STEM.

- **Research and Intelligence Gathering**. Main activities in this area were conducted by two core departments: the Science &Technology (S&T) Statistical Department and the Policy, Research and Intelligence (PRI) Department. The implementation of several surveys and the preparation of related publications by the S&T Statistical Department measured the scientific, technological and innovative capabilities of key industries and supported the development of science education at the national level. The work of the PRI Department focussed on the conduct of exercises mapping the innovation systems of strategic sectors in Trinidad and Tobago, and providing contributions to policy documents and ministerial briefs prepared by Ministries and state agencies.

- **Building Collaborative Global Relationships**. The work in this strategic focus area is led by the International Projects Unit collaborating with other core departments. This afforded NIHERST access to resources and expertise in academia and global centres of excellence. These inputs accelerated progress in STI priority areas aligned to national development and paved the way for future collaborative opportunities.

Full details of activities and achievements for the reporting period are presented under the following seven sections requested by Parliament:

1. Vision, Mission, Philosophy and Strategic Objectives
2. Organisational Structure
3. Policy and Development Initiatives
4. Financial Operations
5. Human Resource Development Plans

6. Information Governance
7. Procurement Procedures
8. Public and Community Relations

Section 1: Vision, Mission, Philosophy and Strategic Objectives

Mission - To provide intellectual leadership and to promote research, development and quality service in the areas of Science, Technology and Higher Education.

Vision - The institute aspires to:

- be a focal point for research and information dissemination on S&T and higher education;
- provide advice to Government on policy and planning in S&T 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 S&T and higher education.

Philosophy – The generation, adoption and application of science and technology are pervasive in everyday living. Raising awareness, understanding and appreciation of S&T inspires people to think out of the box, be creative and innovative, offering solutions that can improve the quality of life for all.

Strategic Focal Areas:

The work of NIHERST placed emphasis on 3 strategic focal areas:

1. ***Popularisation of science, technology and innovation (STI)***. Programmes and projects under this strategic area sought to achieve the following:
   - build public awareness and literacy in S&T;
   - help foster a national culture of creativity and technological innovation;
   - recognize T&T's icons and preserve our scientific heritage; and
   - support formal science education.

2. ***Policy, Research and Intelligence Gathering***. Programmes and projects under this strategic area sought to achieve the following:
   - policy formulation and advice;
   - statistical research on science education and STI development; and
   - innovation mapping studies, to inform and support evidence-based decision-making.

3. ***Building collaborative global relationships***. Projects under this strategic area aimed to:
   - build international relationships with world-class STI institutions
   - undertake joint projects of relevance to the rapid creation of a sustainable, knowledge-intensive economy

Strategic projects under in this area maintained partnering arrangements with the following institutions:

- Technical Centre for Agricultural and Rural Cooperation ACP-EU (**CTA**);
- National Aeronautics and Space Administration (**NASA**);
- International Centre for Genetic Engineering and Biotechnology (**ICGEB**);
- Institute of Electrical and Electronics Engineers (**IEEE**);
- *FIRST*®LEGO®League;
- Embassy of the United States of America, Port of Spain;
  and many others as listed in Section 8 c).

Section 2: Organisational Structure

a) Organisational Profile

NIHERST has developed 3 key competencies in fulfilling its mandate to grow and develop science and technology.

1. First, is the ability to disseminate and impart STEM education in a practical and interactive way to a wide cross-section of the population. Such programmes were delivered mainly through the in-house and outreach activities of the National Science Centre (**NSC**), D'Abadie. NSC is the only facility of its kind in the Caribbean and houses over 200 interactive science exhibits and manipulatives. It occupies an area of 65,000 sq. ft. of exhibit and office space and visitor facilities. The programmes seek to support classroom science learning through engaging teaching strategies; to illustrate how science and technology permeate all aspects of daily life; and to reduce 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: (a) staging the biennial Prime Minister's Awards for Scientific Ingenuity (formerly the Prime Minister's Awards for Innovation and Invention); (b) conducting formal and non-formal training in creative thinking, the process of innovation and invention, and entrepreneurship for students, notably through one of its flagship programmes, the Community-Centred Design and Innovation (**COMDESI**) project, implemented in partnership with the Heroes Foundation, as well as its annual Robotics, Cre8tivity and Young Inventors camps for children 5-17 years); (c) staging exhibitions and outreach activities that build awareness of innovation and invention; and (d) 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. Creating a more diversified, knowledge-based economy depends to a significant degree on the understanding and regard that the wider national community has for the role of science and technology in development, and for those who contribute to that advancement.

A second key competency is the institution'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, but also to inform policy decisions and give support to evidence-based research. Also visible is the institution's strength in the deployment of various research tools to conduct policy research and its skill in analysing the data to formulate policy.

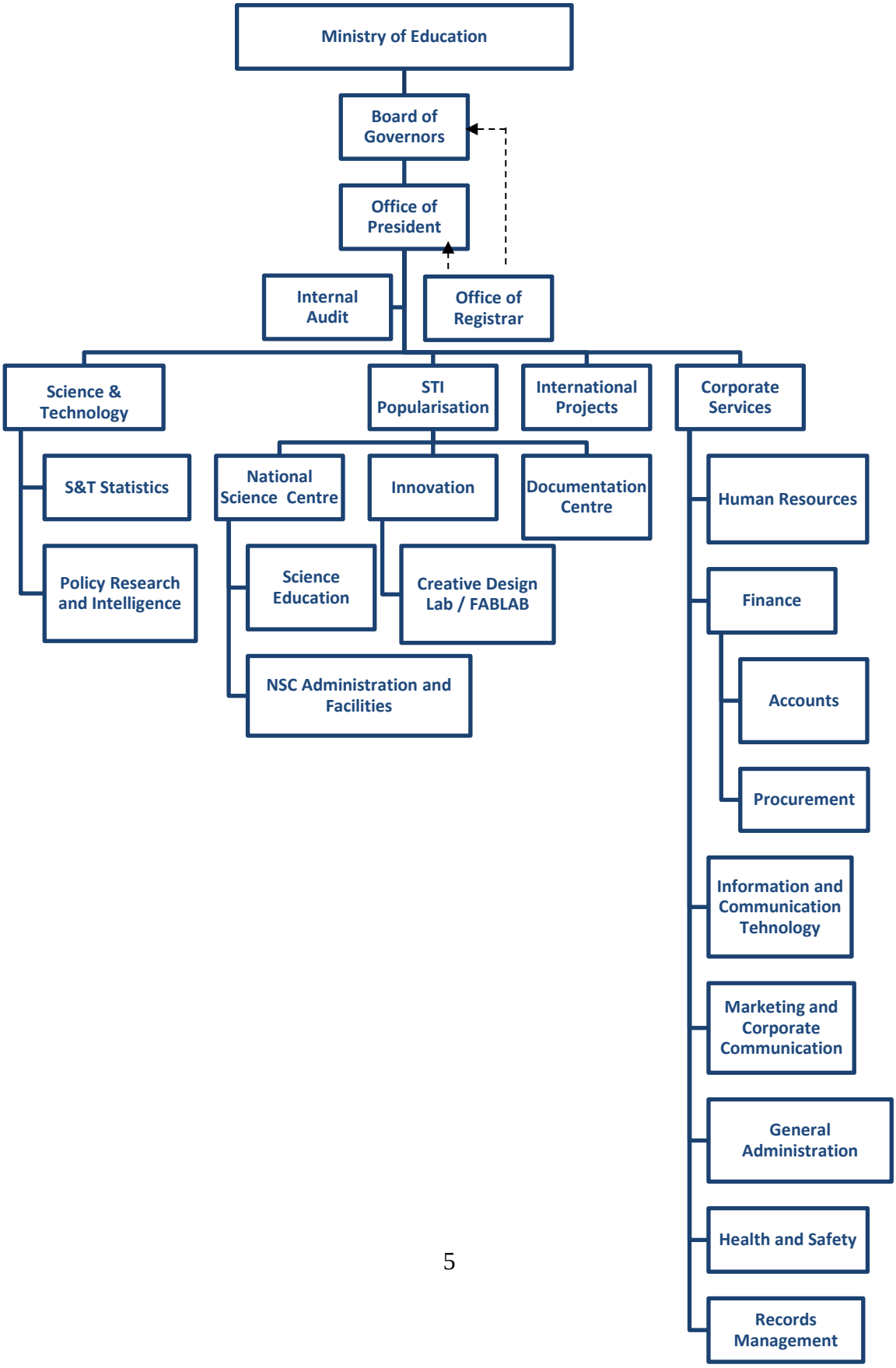
Third, NIHERST promotion of STI is influenced largely by the government's national agenda. For fiscal year 2016, a key driver of government that influenced the work programme of the organisation was the need to grow an innovative knowledge-driven society. Another key driver elicited at the individual level was the desire of young people to explore, investigate and understand different phenomena impacted by science and technology. Several projects were executed for the period under review and these activities are noted in the sub-section titled Services and Products. Most projects were aimed at igniting and harnessing the creative and inventive powers of people, as well as raising awareness of STEM concepts and other issues related to STI. NIHERST recognises that while some of its initiatives, namely camps, have encountered competition in the domestic environment, the institution continues to occupy a unique space as the only organisation with the specific remit to grow and develop STI.

b) Corporate Structure

With a new government installed in early September 2015, the organisation was placed under the purview of the Ministry of Education. Subsequently, all existing Board members tendered their resignations as is customary. In the absence of the appointment of a new Board of Governors, the organisation's executive team was led by Acting President, Joycelyn Lee Young, who assumed that position after the retirement of her predecessor, Mrs Maureen Manchouck. Ms Joycelyn Lee Young then proceeded on pre-retirement leave on February 1, 2016 and the Senior Accountant, Ms Sylvia Lalla, was appointed to act as President of the institution. The Senior Management structure remained lean, comprising the President (Ag) and the Registrar (Ag) with the post of Vice President, Science & Technology remaining unfilled.

The institute's corporate structure by function, as at September 30, 2016, comprised the key operational areas and departments outlined in Figure I entitled *NIHERST Organisational Structure 2015 - 2016*.

Figure I - NIHERST ORGANISATIONAL STRUCTURE [2015-2016]



- **The Office of the President and Registrar**. The President has overall responsibility for the management of the institute with the support of the Registrar who would also perform the function of Secretary to the NIHERST Board of Governors once installed. The office also includes a monitoring and evaluation function. The internal audit positions have remained vacant and this function is outsourced from time to time.
- **Science & Technology.** Two departments that fall under this area are guided by the President in the absence of a Vice President (VP) for S&T. These departments undertake research studies and statistical surveys which inform STI and Education policies in support of economic diversification, including international benchmarking and comparative studies on R&D/STI, competitiveness and innovation in selected countries, regions, sectors and areas.
- **STI Popularisation**. This core function is carried out in the main by the NSC with the Innovations Department complementing its work. The NSC plans and executes programmes that support science education in the classroom (formal) and out of school (non-formal), in order to improve citizens' understanding of and engagement in science, to develop their innovative capacity, and to encourage students in their pursuit of science studies and careers. The ***Innovations Department*** plans and conducts initiatives aimed at developing the creative, inventive and entrepreneurial ("technopreneurial") abilities of students, teachers and the members of the general public. Examples of such initiatives are demonstrations, workshops and camps. This department operates the Creative Design Lab (CDL)/FAB LAB at NSC.
- **International Projects.** This department is engaged in the promotion and development of partnerships and working alliances with regional and international agencies, centres of excellence in STI in foreign countries, and national agencies to assist T&T in developing a competitive, knowledge-based economy. Projects are often undertaken utilising staff from other departments in order to achieve a common goal.
- **Corporate Services.** This Division is responsible for the support services of the organization, as represented in Figure 1.

<u>Business locations</u>

During the reporting period, NIHERST continued to be housed at 3 locations:

1. Head Office – 77 Eastern Main Road, St. Augustine
2. Marketing and International Projects – 8 Serpentine Road, St Clair
3. National Science Centre – Cor. Old Piarco Road, D'Abadie.

c) Services/Products

The following summarises the services and products that NIHERST provided to the national community for the year under review:

1. STI popularisation

National Science Centre Visitor Programme	Hands-on exhibits and activities
Caribbean Youth Science Forum (CYSF)	Annual, week-long programme of science-based activities for STEM students of lower sixth form
Robotics & Creativity Design	The Robotics and Creative Design Labs workshops, road shows and themed visits at the National Science Centre
FAB LAB	Workshops and access to equipment for 3D design and 3D printing
Outreach Workshops for Secondary Students	Electricity and Electronics workshops provided hands-on experience in difficult areas of the physics CSEC syllabus. Robotics workshops assisted with the aspects of the IT syllabus that focus on programming.
Vacation Camps	A variety of STI themed camps ranging from 1 to 3 weeks held at various venues in Trinidad and Tobago
Clubs	Science Club (NSC), Robotics Club (NSC) SciEng Club (Debe), Tech Club (NSC; POS)
Community-Centred Design and Innovation (COMDESI)	Forms 3 and 4 students of 8 secondary schools acquired a working knowledge of the Engineering Design Process and engaged local communities in developing innovative solutions to real life community problems.
Outreach through events staged by external public and private agencies	NSC and the Innovations Department were invited to exhibit at events hosted by government agencies, NGOs, schools and private bodies on specific themes relevant to those bodies, to celebrations, and to the needs of society.
Astronomy Programme	Astronomy nights activities educating visitors on the science of Astronomy

Educational Resource Materials	Print and DVD resources including online downloads Some examples: - Caribbean Women in Science and their Careers - Climate Change: Eco-ribbean CD ROM and 3-part video animation on climate change – The Basics, Impacts and Taking Action - Disaster Awareness Series (Floods, Landslides, Forest Fires) - Icons in STI series (5 publications) - Making Maths Easy - Natural Wonders of the Caribbean Parts 1 & 2 - Science for All (Understanding Volcanoes and Oil Spills) - Science Music Videos (different topics)

2. Research and intelligence gathering

STI Statistical Surveys & Publications	Survey publications on science, technology and innovation (STI) including data and analyses to inform policy formulation and planning as follows:. • Survey of Science in Primary Schools 2015 • Survey of Science and Technology Indicators 2015
Research studies	Sectoral Innovation Mapping (SIM) studies including analyses and recommendations to improve innovative capacity and enhance performance of targeted economic strategic sectors. The ICT: Animation industry was targeted in the review period.
Policy support and advice	Policy support and advice to line ministry and other agencies with respect to STI policy.
STI databases	STResearchTT – a national database of S&T researchers and research institutions: http://stresearchtt.niherst.gov.tt/

3. Special projects and collaborative relationships

Special Project	*Collaborating Agency*
Establishment of a National Science Centre - Science City	Ministry of Education
Bi-regional partnership in Science, Technology and Innovation with European Union, Latin America and Caribbean	ERANet-LAC / EU-CELAC
Research grant and fellowship opportunities	International Centre for Genetic Engineering and Biotechnology (**ICGEB**)
NASA International Internship (NASA I^2) Program tenable at NASA Ames Research Center, California, USA	National Aeronautics and Space Administration (**NASA**)
Improving Innovation Capacities in the Caribbean (INVOCAB) project – Teacher Professional Development Workshops, Science Club initiatives, School equipment and manipulatives and Innovation Competition	Scientific Research Council (**SRC**), Jamaica
Seismology in Schools (SIS) programme – hands-on seismological activities	University of Leicester, Durham University, Imperial College London, the British Geological Survey (**BGS)**, the Ministry of Education and the UWI Seismic Research Centre (**SRC**)
National Youth Science Camp, West Virginia, U.S.A. and NASA I2	Embassy of the United States of America, Port of Spain
E-Scientia Exhibit	Institute of Electrical and Electronics Engineers (**IEEE**)
Youth Build – design based solutions to community problems	Shell Trinidad Limited (formerly BG Group) and Sacoda Serv Limited
Made in the Caribbean – building capacity in technopreneurship	Caribbean Council for Science and Technology (**CCST**) and Perez Guerrero Trust Fund
Animal Allied Competition – Robotic missions and student research project on human/animal interactions	FIRST LEGO LEAGUE (**FLL**)

d) Delegated levels of authority

In the absence of a Board of Governors, the Acting President reported directly to the Permanent Secretary of the line Ministry. As the head of the organisation, the Acting President was responsible for oversight of the day-to-day operations of the institute, and in the absence of the VP (S&T) that responsibility was shared with the Registrar.

According to the institute's procurement policy, a department head can approve expenditure up to $25,000.00 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 Acting Registrar, can approve expenditure up to $75,000.00 for specified operational goods and services. A Management Tenders Committee (MTC) oversees the procurement of goods costing in excess of $10,000, and can approve expenditure up to $100,000. Any other expenditure exceeding this amount and up to $450,000 requires final approval from the President as recommended by the MTC.

e) Legislative and regulatory framework

NIHERST was established by an Act of Parliament No. 20 of 1984 (Chapter 39:58 of 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 Act can be accessed at:

http://rgd.legalaffairs.gov.tt/laws2/alphabetical_list/lawspdfs/39.58.pdf; OR www.niherst.gov.tt

Finances

With respect to finances, NIHERST is governed by sub 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.

Human Resource Management

The Human Resources Management department is governed by all relevant GORTT Acts and NIHERST related documents such as the NIHERST-PSA Collective Agreement (January 1, 2008 to December 31, 2010); NIHERST-PSA Memoranda of Agreement (dated 18 September 2015) for cost items for the period 01 January 2011 to 31 December 2013; and the NIHERST Pension Fund Plan Rules and Trust Deed.

f) Reporting functions

In the absence of a Board of Governors in the period under review, the Acting President reported to the Permanent Secretary of the line ministry on institute matters. By law, the Acting 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 to the Ministry of Finance, and quarterly to the Ministry of Planning and Sustainable Development for funds under the PSIP. Special reports were submitted on request.

At the request of the Acting President of the Institute, a departmental quarterly reporting template was developed and implemented in August 2016. All departments were then required to submit quarterly reports to the Acting President.

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

Section 3: Policies and Development Initiatives

a) Policies

NIHERST had been spearheading the formulation of a draft National Science &Technology Policy. During the financial year (FY) 2016 revisions to the policy were completed as directed by the Board of Governors in September 2015. However, progress was impeded by the absence of a Board.

b) Short, medium and long term plans

NIHERST's most recent strategic plan spanned the period 2011-2015. In the last quarter of 2015, Management initiated a brainstorming exercise over the three-month period November 2015 to January 2016, in order to obtain staff inputs to the development of a new draft strategic plan 2016-2020.

With a staff participation rate of 77%, the exercise resulted in the identification of strategic issues for the institute, the generation of ideas on new programmes/projects (as well as ways to improve existing ones) and ideas to improve the organisation's efficiency and effectiveness. In addition to this internal assessment, staff undertook an environmental scan, paying particular attention to the trends and threats in the political, economic, social and technological environments.

In April 2016, a *Final Report on the NIHERST Brainstorming Exercise: November 2015 to January 2016* was compiled and submitted to the Ag President at the April 2016 management team meeting.

In the absence of a Board of Governors, the Ag President established a Programmes/Projects Review Committee with the following objectives: to ensure alignment with the Government's priorities and the Institute's mandate; to inform the Institute's new strategic plan; to determine the impact of the programmes/projects; and to recommend improvements. The first meeting was held in June 2016, 10 meetings were held during the reporting period. Accomplishments included a review of the institute's signature Caribbean Youth Science Forum (**CYSF**) programme and development of a presentation to the Minister of Education. The team also began a review of the vacation camps programme, and the **Science City** and **INVOCAB** projects.

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 the absence of a Board and in light of severe budget cuts, the institute reviewed and refined its core activities, all aimed at strengthening national capacity in science and technology to better support 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 continues its leadership role in national STI development in accordance with its mandate, and to advance the mission and goals of the Ministry of Education.

c) Performance Objectives and Accomplishments

Programmes and initiatives undertaken during the period maintained momentum within the three strategic areas cited in Section 3 b above. Key details are presented below in relation to the each strategic goal.

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

1. Establishment of a National Science Centre - Science City

Cabinet by Minute No. 2060 of July 2013, agreed to establish on 54 acres of land at Indian Trial in Couva, a world class, state-of-the-art, purpose built, 'Science City'. This 'Science City' was to provide experiential science learning facilities for developing a population and workforce that is scientifically literate, technology savvy and innovative, which are critical to the national development of a more diversified and knowledge-intensive economy. A detailed description of the project is at **Appendix 1.**

An in-house project team comprising 3 staff members and led by a Project Implementation Officer continued to manage the project. The team was supported by 2 external advisors, one of whom had extensive experience in the fields of Civil Engineering and Construction Project Management and the other, with expertise in the field of MEP (Mechanical, Electrical and Plumbing) Engineering.

The focus for this period was on the preparation and completion of the NIHERST 'Science City' designs. The completion status of the designs of the facility as at the end of the review period was as follows:

Architectural & Architectural Landscaping Designs	***% Completion***
Briefing/Masterplan	100
Schematic Design	100
Detailed Design	85
Construction Documentation	18

Engineering Designs	***% Completion***
Concept Design	100
Detailed Design	70
Construction Documentation	35

During the year the in-house project team conducted meetings and consultations with key stakeholders to review the architectural and engineering designs for the facility. Those reviews were undertaken to ensure that NIHERST's needs and expectations were fully captured and adequately met, as the designs progressed. As the design developed, cost estimates were prepared by the quantity surveying consultant and the design engineers. A value engineering exercise was conducted to ensure that the most cost effective design solutions were achieved.

It should be noted that further to the access road being built in the previous year, no construction works were undertaken due to the non-appointment of a Board of Governors. Consequently, the required approvals were not granted. Hence, at the close of the financial year on 30 September, 2016, the status of the construction of the facility remained at one percent (1%).

2. National Science Centre's (NSC) Science Popularisation Programme

NSC's Science Popularisation Programmes' major objective was to develop key skills and core competencies of students in STEM. The programme comprised 7 activities as follows:

Activity 1: NSC's Visitor's Programme

In the review period, 20,474 persons participated in this activity. Participants were exposed to over 200 interactive exhibits which featured a variety of topics such as astronomy, animation, energy, climate change, natural hazards, the human body, music, sports and wellness, ICT, robotics, road

safety and water conservation. In the TechKno Theatre, visitors of all ages were also treated to entertaining science shows and demonstrations. In addition, new activities and programmes were developed for younger age groups. These included vacation camps, thematic activities and workshops to support the formal science curriculum.

Activity 2: Caribbean Youth Science Forum (CYSF)

The Caribbean Youth Science Forum (CYSF) is a regional event that presents a unique platform for developing the next generation of S&T professionals. The forum was held from July 31 to August 7, 2016 with activities at the NIHERST/NGC National Science Centre (NSC), The University of the West Indies (UWI), St Augustine Campus and the University of Trinidad and Tobago (UTT), O'Meara Campus. A total of 142 students (predominantly lower sixth form students) attended, with 24 students from the islands of Antigua and Barbuda, Barbados, Grenada and Jamaica, and the remaining 118 students from 25 schools in Trinidad and Tobago.

During the week, students took part in a design challenge and also explored, through lectures, presentations and workshops, issues in various STI fields. Participants had the opportunity to have one-on-one discussions with 29 science professionals inclusive of some of the main lecturers/presenters at the forum. The range of STI-related fields represented at the evening spanned both academia and industry and 60.3% of the participants reported that the 'Socialising with Scientists' session was very useful in helping them to identify new career opportunities in S&T.

CYSF participants were also afforded the opportunity to gain insights into STI in operation in industry and business, as they embarked on field trips to 23 organisations where they were given guided tours and advice on career possibilities. 61.2% of the participants responded that the field trips had provided them with information on new careers; and another 42.1% responded that they had changed their choice of career by the end of the forum.

Based on an evaluation exercise conducted after the event, students were able to better understand the role and application of science, technology and innovation in society; utilised their creative thinking and problem-solving skills; developed skills in leadership, communication, networking and teamwork; and built knowledge of careers in science and technology. Participants benefited from a holistic experience which encompassed academic, social and cultural activities heightening their sense of identity as the region's future leaders in STI.

Details of the activities and outcomes of this event are given in **Appendix 2**.

Activity 3: Creative Design Lab (CDL) Projects – Robomania, E-Scientia and Electricity and Electronics Workshop

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 (**CDL**) including 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. Critical thinking skills were displayed as persons logically arranged the robot's tasks in sequential steps.

Installation and Launch of E-Scientia Exhibit

During the second quarter of the fiscal year the E-Scientia Exhibit, one of only seven of its kind in the world, was donated by the Institute of Electrical and Electronic Engineers (IEEE) and installed at the NSC. The official launch was held on March 2, 2016. This was facilitated by a Memorandum of Cooperation (MoC) between IEEE and NIHERST. This MoC enabled collaboration in the design and undertaking of STEM projects and programmes that are of mutual interest and benefit, focusing on pre-university activities for teachers and students including camps, workshops and competitions, and other alternative avenues for inspiring the next generation of engineers and scientists. It included engaging local stakeholders in the Special Interest Group on Humanitarian Technology (SIGHT), the Engineering Projects in Community Service (EPICS) and the Teacher In-Service Program (TISP) of the IEEE. The IEEE (T&T) also collaborated with NIHERST on its STEM programmes on world-changing technologies – from computing and sustainable energy systems to aerospace, communication and robotics.

The E-Scientia exhibit simulates a large, space-ship 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.

A total of 513 students visited the *E-Scientia* in the review period.

Visits to Creative Design Lab and Robomania

In FY 2016 a total of 1,254 persons, most of whom were secondary school students, visited the Creative Design Lab (CDL) and Robomania. Visitors gained greater appreciation for the importance of CAD (Computer-Aided Design), CAM (Computer-Aided Manufacturing), Electronics and Robotics, and developed practical skills in these technologies.

Electricity and Electronics Workshops

Workshops were held from January to April 2016. CDL conducted electricity and electronics workshops for a total of 15 schools in the north, east, central and south Trinidad. The audience, made up largely of Form 4 and Form 5 students, found that the content was likely to assist them in their examination preparation. The theoretical activities covered topics such as the physics of an atom and electronics and electricity. The practical component afforded students the opportunity to build and gain working knowledge on pencil point light bulbs, flasher circuits and loud speakers.

Robotics workshops

Robomania, the robotics lab, conducted outreach workshops from January to April, 2016 at 15 secondary schools located across Trinidad. A total of 539 students participated in 27 workshops. The workshops introduced students to various aspects of robotics such as their types, uses, features and importance. Robomania also briefly covered topics outlined in the physics syllabus and aligned to robotics such as gears and stability. Students gained hands-on experience in building a basic "taskbot" robot using the Lego Mindstorms EV3 kit. Working in groups, students wrote their own programs for the robot using the EV3 software, after being guided in the use of algorithms for the program.

Activity 4: Vacation camps in Science, Technology, Innovation and Invention

NIHERST continued to offer camps during the Easter vacation as well as, the July/August vacation period. These camps targeted students between the ages of 5 and 17 years, deepening and broadening their STEM learning outside of school with high quality, hands-on experiences and cutting-edge technologies.

Easter Science Camps

Two Easter science camps were offered- Maker and Robotech camps, which targeted students aged 11 – 17 years.

Fourteen (14) students enrolled in the Maker camp. Camp participants learned about Electricity and Electronics, Computer Aided Designing (CAD) and Computer Aided Manufacturing (CAM). Students built and presented prototypes based on the programmes they were taught.

Eighteen students enrolled in the Robotech Camp. Students were introduced to the field of Robotics, and worked in pairs to build and programme robots with intermediate and advanced sensors and remote control, using LEGO Mindstorms EV3 robotics kits, similar to the learnings of the Robomania project.

Science Vacation Camps

During the two-month school vacation period, camps with 13 different themes were offered. A total of 820 students participated in vacation camps. Two new camps were offered during this period. #LittleTech targeted children ages 7 to 11 years old and exposed them to app building, website construction and game design. Clash of Minds targeted ages 13 to 17 years old, and introduced the topic of engineering

Camps were held at Tranquillity Government Primary School, Port of Spain; Preysal High School, Preysal, Couva; University of Trinidad and Tobago (UTT) San Fernando Campus; Debe High School, Debe; and the NSC, D'Abadie. Details of the camps offered are at **Appendix 3**.

Activity 5: Clubs

NIHERST's Innovation and Science Education Departments administered 4 science and technology clubs for students ages 7–16 years old. These clubs aimed to instil in participants the following:

- Improved scientific and technological literacy;
- A positive attitude towards science, technology and innovation;
- Broader and deeper knowledge of scientific concepts (as applied to daily life);
- Reinforced knowledge of concepts taught in the school science curricula;
- A propensity for life-long science learning.

Science Club: Science Club provided academic support to students with respect to problematic science topics encountered in the classroom. Lesson objectives and pedagogical strategies were adapted to suit the developmental and learning needs of the target groups - Juniors (7-9 years old) and Seniors (10-16 years old). 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. In FY 2016, membership fees were introduced at a rate of $150 per participant per term.

At the end of FY 2016, the Science Club had a total of 26 members. Meetings engaged members in a variety of interactive activities in the areas of forensic science, food chemistry, material science, engineering and physics. In addition, lesson plans were developed by the Science Education Department to be used in teaching topics which included the human skin and the human digestive system, magnetism and electromagnetism, natural disasters, habitats and ecosystems, among others.

Sci-Eng Club: The Sci-Eng Club brings together secondary school students, from Form 3 level and above, to work collaboratively on projects and experiments that impart Science and Engineering knowledge in a fun and educational way. The club's activities enabled students to improve their critical thinking, design and creativity skills and fuel their passion for Science and Engineering.

For FY2016, the Sci-Eng Club recorded 30 members and included students from Debe and its environs. Club meetings were held on Saturdays during the academic school terms. Club members gained knowledge through theory and practical activities on a wide range of topics and projects, including:

- Construction of a Van De Graaf Generator, which demonstrated working knowledge of static electricity;
- Construction of model shelters to withstand earthquakes, which tested and demonstrated knowledge of aerodynamics and civil engineering; and
- Assembly of hydraulic arms and gear systems, soldering and the connection of electronic components.

***Robotics Club*:** The robotics club is a STEM club that operates out of the NSC. The club introduces robotics, which combines mechanical and electrical engineering, computer science and other disciplines to teenagers and adults while simplifying the content, so that it is easily understood by the beginner through to intermediate levels. Club members learned how to design and build robots for a range of applications and programme robots using different programming languages.

For FY 2016, 32 members were registered who participated in AUTOCAD workshops, and used online software TinkerCAD to create 3D models in real time. They also learned 2 - 3D printing software packages including Corel Draw Studio and Cut Studio. At some sessions of club meetings, members used Lego Mindstorms EV3 kits for the design, construction and programming of robots. Members were also introduced to the First Lego League (Animal Allies) competition, for which they built a prototype using Lego RCX kits. In addition to building their capabilities in robotics applications, this activity reinforced the importance of journaling and documenting the steps in the prototyping process.

Tech Club*:* Tech Club provides informal support of the IT syllabus. It teaches students creative and computational skills, develops their problem-solving skills and builds their confidence in developing technology to help support some part of their daily lives. Club meetings were held on Saturdays during the academic school year, and children ages 7 – 17 years old participated. Camps focused on app development, website building, graphic design and game development. Club attendance during the year totalled 180 students as follows: Term I – 63 students; Term II – 69 students; Term III – 48.

Activity 6: Astronomy Programme

The Astronomy Programme comprised three activities: Astronomy Night, Astronomy Workshops and an Astronomy Club. The programme focuses on educating visitors on the science of astronomy.

In FY 2016 2 Astronomy Nights were held: one in February 2016 and the other in April 2016. The 2 events attracted a total of 1,482 patrons. Activities included telescope viewings, lectures on topics in astronomy such as constellations, solar system components, satellite technologies and types of telescopes, and a series of science, technology, engineering, art, mathematics (STEAM)-based activities, interactive exhibits, science shows and games.

Activity 7: Community-Centred Design and Innovation (COMDESI)

COMDESI is a collaborative effort between NIHERST and the Heroes Foundation. It is designed to challenge secondary students to remedy a problem or need that exists in a community of their choice, by building a prototype. By engaging in such an exercise, students learned the rudiments of the process of invention. They also received basic training in civic engagement, innovation, invention and prototype development, leadership and report writing/presentation techniques AutoCAD, CAM and Arduino software, intellectual property, project management, and entrepreneurship. These sessions assisted them in the preparation of their solution prototypes.

The details of this activity can be found at **Appendix 4.**

Activity 8: External Outreach

NIHERST also makes an impact on the national community by taking part in events hosted by valued partners and outreach activities of external agencies. Participants are engaged through the promotion of STEM education and also by highlighting specific socio-economic issues relevant to the national community. The organisation'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 in everyday life. It also showcases how the uptake and use of this knowledge improves the quality of life of citizenry. In FY 2016, NIHERST participated in 28 events which benefited 9,416 visitors.

3. National Awards and Competitions

Awards for Excellence in Science and Technology

In 2012 NIHERST launched a re-branded Awards for Excellence in Science and Technology in association with the Ministry of Science and Technology and the Caribbean Academy of Sciences (CAS). This is an important developmental imperative which aims to raise the visibility of our country's most accomplished scientists on the national landscape. These awards recognise and reward nationals, both resident and those in diaspora, for their outstanding achievements across the spectrum of scientific and technological disciplines. Awards are given to persons distinguished in the fields of engineering, natural sciences, medical sciences, applied science and technology, and technological innovation in arts and culture. There are also awards for *Junior Scientist* and *Junior Engineer* for persons under the age of 35 whose achievements have been outstanding. The awards named after some of our local icons are presented to awardees who they are honoured at a gala ceremony which is held biennially. The awards are as follows: -

- *The Emmanuel Ciprian Amoroso Award for Medical Science*
- *The Fenrick De Four Award for Engineering*
- *The Rudranath Capildeo Award for Applied Science and Technology*
- *The Julian Kenny Award for Natural Sciences*
- *The Anthony Williams Award for Technological Innovation in Arts and Culture*
- *The Ranjit Kumar Award for Junior Engineer*
- *The Frank Rampersad Award for Junior Scientist*

The second and most important facet of this award initiative is that it allows for the preservation of our scientific heritage through the recording and documenting of the awardees' lives and

achievements in a publication entitled *Trinidad and Tobago Icons in Science and Technology*. In the fiscal year under review, the writing and editing of the *Trinidad and Tobago Icons in Science and Technology Vol IV* was completed. This volume featured interviews with the 17 awardees of the 2013 Awards for Excellence in Science and Technology. One thousand printed copies of the booklet were distributed at no cost to secondary schools and libraries throughout Trinidad and Tobago. Copies were also made available to the public upon request and on the organisation's website.

Strategic Focus Area 2: Research and Intelligence Gathering

A key strategic goal of NIHERST is 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. In FY 2016, NIHERST continued to make strides in this area through the work of the S&T Statistical, Policy Research and Intelligence, and International Projects Departments.

1. S&T Statistical Research

For FY 2016, studies undertaken by the S&T Statistical Department measured the science, technology and innovative capabilities in domestic industries and supported the development of science education in the country. The department completed 2 surveys:-the *Survey of Science in Primary Schools 2015* and the *Survey of Science and Technology (S&T) Indicators 2015.* Work continued on the *Survey of Mechanical Engineers 2014* which stemmed from the institution's participation in the OAS Working Group 2, while the department commenced the *Survey of Mathematics in Secondary Schools 2016* which is on stream for publication and dissemination in the next fiscal year. Results of all completed surveys are available in both print and electronic formats. Selected details of the above publications are below.

Survey of Science and Technology (S&T) Indicators, 2015

This is an annual survey designed to gather data on the financial and human resources allocated to S&T in Trinidad and Tobago. Stakeholder groups included in the survey are: higher education, government department/ministries and research institutions. The objectives of the survey are to:

- develop and maintain a reliable time series of S&T indicators to assist decision-makers
- provide data to RICYT and UIS to publish on global and regional S&T databases
- provide indicators for comparison with developing and developed economies

- measure the indigenous research effort in terms of manpower and expenditures by sectors
- provide data on the distribution of S&T expenditure by socio-economic activities
- maintain a time series of research personnel by field of activity in S&T.

This data is essential for policy-makers involved in planning and investment in S&T and setting targets in Trinidad and Tobago with the goal of transforming the country into a more scientifically and technologically advanced society.

The survey which commenced in the first quarter of the fiscal year was completed by the third quarter of 2016. The results are used to populate the databases of the Ibero-American Network on S&T Indicators (**RICYT**) and UNESCO Institute of Statistics (**UIS)**. Survey results are on the NIHERST website.

2. *Survey of Mechanical Engineers, 2014*

The *Survey of Mechanical Engineers 2014* is a two-part enquiry of mechanical engineering managers and mechanical engineers in the petroleum and public utilities sectors. The study arose from NIHERST's participation in the Organisation of American States (OAS) Working Group 2 which focuses on Human Resources, Training and Education. The study provides information on the mechanical engineering expertise that is available in the industry, as well as areas in which there is a lack of expertise and where additional expertise may be required in the industry in order to ensure a cadre of mechanical engineers equipped to meet the 21st century needs of the industry to advance economic development. This information is pertinent for academia and institutions so as to ensure that the training being given in the field of mechanical engineering is relevant to the current industry and will also be upgraded to meet the future demands of the industry. The survey is expected to be completed in the second quarter of FY 2017.

3. *Survey of Mathematics in Secondary Schools, 2016*

This survey aims to improve the quality of Mathematics education in Trinidad and Tobago by providing insights into the key factors that contribute to the low level of performance (50% failure rate at CSEC general proficiency). The study therefore focussed on the quality of teaching, available resources, areas of difficulty and students' approach to Mathematics, teachers' qualifications and training needs, adequacy of teaching materials and textbooks, and other areas such as – teaching and understanding; teaching and assessment methods, issues that limit teaching of Mathematics, students' views towards Mathematics, careers in Mathematics and changes in Mathematics education over time.

This survey was the second of its kind to be conducted by NIHERST as a similar study was conducted in 2006. The survey was a two-part enquiry consisting of teachers of Mathematics and of students in Forms 1 to 5 in all government, government-assisted and private secondary schools.

It was undertaken in early 2016, after receiving feedback from the Ministry of Education on the survey instrument as well as approval to conduct the survey from the Ministry of Education and the Tobago House of Assembly (THA). Three hundred copies of the report of the findings will be printed and distributed to all stakeholders in the next fiscal period at an estimated cost of $30,000. This report is expected to inform decision-makers and policy-makers in STEM.

4. Survey of Science in Primary Schools, 2015

This survey which began in FY 2014/2015 was completed in FY 2016. Six hundred and fifty printed copies of the report of the findings of the survey were distributed to all primary schools and stakeholders including divisions of the Ministry of Education and the THA. Electronic copies were also available upon request. The survey was the second of its kind to be conducted by NIHERST, as a similar study was undertaken in 2003. The survey aimed to improve the quality of STEM education and provides both empirical data on the teaching of science in primary schools and essential indicators for comparison with similar studies. It was a two-part enquiry of principals and of teachers in Standards 1-5 in selected government, government-assisted and private primary schools. It is expected that the findings of the survey will be beneficial in evidence-based decision and policy making in STEM education with regard to teacher training and development, teaching resources, assessment methods, and in identifying the difficulties in, and limitations to teaching Science.

5. Participation in OAS Working Groups

NIHERST is a member of the Plan of Action of Panama: Organisation of American States (OAS) Working Groups 1, 2 and 4. The purpose of this Plan of Action is to advance the implementation of ministerial mandates from the Third Meeting of Ministers and High Authorities of the Americas on Science and Technology, held in Panama in November 2011. Four thematic working groups were created and clear actions and cooperation mechanisms were established to ensure their effective and sustained functioning: Working Group 1: Innovation; Working Group 2: Education and Human Resources; Working Group 3: National Quality Infrastructure; Working Group 4: Technological Development.

During FY 2016, staff of the Statistical Unit along with officers from the International Projects, Innovations and Policy Research and Intelligence Departments participated in mandatory quarterly e-meetings of Working Groups 1, 2 and 4. Involvement in these OAS working groups influences the work of the Institute in STEM education and innovation and participation serves to develop partnerships and create synergies with other ministers and government bodies with competence in STI, through ongoing communication and exchange of knowledge, experience, and results that provide reciprocal benefits. Participation also generated specific activities such as workshops, meetings, videoconferences and information repository of programs, projects, activities, best

practices and achievements from the working groups. It also posed areas of new studies which NIHERST could undertake which can be comparable with those of member states.

2. **Policy, Research and Intelligence**

The STI Mapping & Priority Setting Programme

The Sectoral Innovation Mappings (**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 4 phases: Phase 1: Preliminary Research; Phase 2: Primary Research; Phase 3: Analysis; Phase 4: Publication and Communication.

In 2016 steady progress was made on the mapping of the innovation systems. Two SIM exercises were launched (the Animation subsector of the ICT industry and the Energy Services Sector). Significant progress was made on the conduct of primary research and the interview process (Phase 2) for the Software and Web Development Industry. The progress of each of the innovation mapping studies is summarised and presented in **Appendix 5**.

Contribution to the Multiannual Indicative Programme 2014 – 2020

The department assisted the Ministry of Planning in its contributions to the Multiannual Indicative Programme which focused on the topic of innovation. The department provided considerable feedback to the documents prepared for the programme.

3. National Science & Technology Database - STResearchTT

A national database of profiles of S&T researchers/research institutions was established in 2015 and for FY 2016 recorded a total of 43 profiles in the database. In addition to connecting T&T's greatest minds in science and technology the database:

- Provides information for international bodies interested in S&T collaborations with nationals;
- Supports NIHERST's ongoing efforts to recognise and honour premier scientists and researchers in Trinidad and Tobago by identifying candidates for international and local awards;
- Facilitates the sharing of information on international funding opportunities to researchers.

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 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 in FY 2016 follow.

ERANet-LAC/EU-LAC

ERANet-LAC is a Network of the European Union and the Community of Latin-American and Caribbean States (**CELAC**) on Joint Innovation and Research Activities. It aims to strengthen the bi-regional partnership in Science, Technology and Innovation by planning and implementing concrete joint activities.

The Extra-Ordinary EU-CELAC Senior Officials Meeting (SOM) on the Joint Initiative on Research and Innovation (**JIRI**) was held on 14th March 2016. At that meeting, European Union and Latin American and Caribbean officials expressed a strong commitment towards the establishment of relations with **CELAC** as a key region for collaboration and emphasised that existing instruments will allow moving towards a Common Research Area (CRA) between the two regions. Discussion areas were:

- Launch of a Research Infrastructure (RI) working group to support policy coordination and exchange of information on RI;
- The development of EU and CELAC mobility portals, building on the existing Euraxess network and portal;
- H2020 cooperation actions for bi-regional cooperation as a follow-up to commitments in the areas of health (non-communicable chronic diseases), climate action and sustainable urbanisation.
- Launch of an EU-CELAC Policy Advice (PA) mechanism to support CELAC countries in addressing the Sustainable Development Goals through research and innovation (R&I).

ERANet-LAC ended in March 2017. In order to further develop future joint funding and networking initiatives and to support the objectives of the CRA, ERANet-LAC partners have created the EU-CELAC Interest Group which was launched on 15th March 2016 in Brussels, Belgium. This group comprises of funding agencies from CELAC, EU Member States and

Associated Countries wishing to cooperate in bi-regional STI collaboration. The launch event presented the procedures towards the next joint actions, for instance, thematic areas of priority relevant to collaboration with CELAC and to ERA-NETs, which could be considered for future activities. It also allowed for participating funding agencies to decide on the final topic for the launch of the call intended for September 2017, and to suggest and develop joint activities.

International Centre for Genetic Engineering and Biotechnology (ICGEB)

The International Centre for Genetic Engineering and Biotechnology (**ICGEB**) conducts innovative research in life sciences for the benefit of developing countries. It aims to strengthen the research capability of its members through training, internship and funding programmes and advisory services to member states. The Centre employs a comprehensive approach to promoting biotechnology internationally, and is dedicated to advanced research and training in molecular biology and biotechnology, with applications in the fields of public health, energy production, industrial production of high added-value commodities, nutrition, environmental protection/remediation and biosafety.

The Centre was conceived by the United Nations (**UN**) in 1983 in recognition of the importance of biotechnology to economic development and food security, and the need to bridge the growing gap between developed and developing countries in this area of research and development. In 1989, the Centre became operational with the establishment of its research and training laboratory in Trieste, Italy. This was followed by a second facility in New Delhi, India and a third facility in Cape Town, Africa. In the 1980s, NIHERST spearheaded the development of Trinidad and Tobago's capability in biotechnology at The University of the West Indies (**UWI**). With the foresight and support of NIHERST, the Biotechnology Laboratory of The UWI became an affiliate centre of the **ICGEB** from its inception, and NIHERST became its national focal point. In 2003, Trinidad and Tobago became a member of the ICGEB and Cabinet appointed NIHERST as the liaison office. Since becoming a member, Trinidad and Tobago received US$134,733 in benefits with an expenditure of US$65,000 in membership fees.

In FY 2016, Dr. Surendra Surujdeo-Maharaj was appointed the government's representative for Trinidad and Tobago, replacing retired Professor Julian Duncan, former head of the biotechnology research programme at The UWI, St. Augustine. Dr. Surujdeo-Maharaj was the Team Leader and Key Expert in Disease Resistance Training at the Cocoa Research Centre at The UWI, St. Augustine.

In 2016, annual calls for proposals for research grant and fellowship opportunities were distributed. Dr. Varma Rambaran of the University of Trinidad and Tobago (**UTT**) was awarded the ICGEB Smart Fellowship to undertake work on the *"Applications of Functionalised Organometallics as Insulin Mimetics"* from September 2015 to April 2016 at Jawaharlal Centre for Advanced

Scientific Research. Upon his return, Dr. Rambaran conducted public lectures on his work, produced a final report, and has continued to pursue his research in the development of an orally administrable drug for lowering elevated levels of blood glucose in Type 2 diabetes patients. Up until the end of FY 2016, two of the submitted proposals for the Collaborative Research Programme (CRP) - ICGEB Research Grants had passed the first phase on screening and was awaiting approval of funding from a final phase of screening. The project titles were "*Use of the Xenomonitoring/PCR approach to determine the presence of Zika virus in Aedes Aegypti and other mosquito species blood meals*" and "*Genetic contributors to Diabetes Mellitus in Indo-Trindadians*".

NASA International Internship Program (NASA I^2)

In August 2012, NIHERST signed an agreement with NASA to facilitate local students' access to NASA's International Internship Program (**NASA I^2**), in what is the first such agreement to be signed internationally, piloting the initiative for non-US interns. NASA I^2 is one of the most prestigious internship programmes and workforce preparatory experience for STEM careers. It provides a collaborative environment in which interns (university undergraduate level students) or fellows (university graduate students) are able to work alongside international peers. Following the signing of the agreement, the program was opened to Trinidad and Tobago students, and 2014 marked the first year that local interns were attached to the NASA Ames Research Center (**ARC**) in California.

From the inception of the programme until FY 2016, four (4) nationals of Trinidad and Tobago were awarded internships at ARC – Mr. Jason Renwick and Mr. Stefan Hosein in 2014 and who were subsequently re-invited in 2015, and Mr. Inzaman Rahman and Ms. Asher Williams in 2015. Work on promoting the programme and selecting candidates for the 2016 internships started in October 2015. Selection criteria included a minimum GPA of 3.0 or equivalent for institutions with a different marking scheme and Trinidad and Tobago citizenship. Applicants were required to select a research topic from among fields such as Water Recycling, Space Debris Mitigation/Planetary Defense, Space Biology/Metabolism, Small Satellite and Submersible Technologies, Nanotechnology, Machine Learning and Data Mining, Intelligent Systems Division, Code TI and Prognostics and Health Management.

Thirty six applications were received and screened by a panel that employed a rigorous two-stage process. The first stage 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. In the second stage eight 8 applicants were short-listed to be interviewed. Students were assessed on key personal attributes such as maturity, team skills, ambassadorial and leadership qualities, and communication skills. The panel ranked the top 5 applicants for screening by NASA in order of

priority. All information on the finalists was submitted to NASA. However, instead of selecting the top 2 candidates as was done in previous years, NASA was only able to accommodate 1 intern from Trinidad due to the competitive cycle.

Mr Kester Wade, a national studying at Stanford University in California, was awarded the 10 - week summer internship at NASA Ames Research Centre. Upon completion of his internship, Mr. Wade returned to Trinidad where he participated in a number of local morning media programme interviews and 2 public lectures. Those activities highlighted his internship experience and his research in "*Advanced Life Support: Developing a Recycling System to Ensure Access to Potable Water Aboard the International Space Station*". He also submitted a formal report detailing same. All of the above outputs are featured on NIHERST's website.

Improving Innovation Capacities in the Caribbean (INVOCAB)

In February 2014, NIHERST partnered with the Scientific Research Council (SRC) in Jamaica on a three-year project entitled "Improving Innovation Capacities in the Caribbean" (INVOCAB). This EU-funded project is spearheaded by the SRC in Jamaica and NIHERST in Trinidad. Beneficiaries include the Ministry of Education (Jamaica and Trinidad & Tobago), The Ministry of Science, Energy & Technology (Jamaica), The MICO University College (Kingston, Jamaica), the Church's Teachers' College (Mandeville, Jamaica), and participating primary and secondary schools in Jamaica and Trinidad & Tobago.

This project seeks to improve teachers' capacities in science education, as well as to implement an innovation framework in participating schools. It also aims to further integrate Science and Technology into the primary and secondary school curriculum and to help change students' attitudes and dispositions towards science. Sixteen primary and secondary schools 8 primary and 8 secondary) in Trinidad and Tobago and Jamaica collectively, will benefit from planned activities under the project. This initiative is aimed at improving the levels of innovation in the Caribbean by building and strengthening capacities in STI through science education. It acts as an enabler for poverty reduction, growth and socio-economic development of Caribbean countries by:

- improving the competence of teachers in the transfer of knowledge and technical skills of science subjects at the primary and secondary levels;
- improving students' capacity to think critically, problem solve and apply science;
- promoting science to the young by raising awareness; and
- promoting S&T at all levels of society.

In FY 2016, the INVOCAB project in Trinidad accomplished the following:

i. Facilitated 2 professional development workshops to improve the capacity/competence of 59 teachers and technical staff to transfer knowledge and technical skills of science subjects at both primary and secondary levels;
ii. Continued the development of Curriculum Support Manuals to assist teachers with difficult topics in primary level Mathematics and secondary level Physics;
iii. Hosted STEM camps for 109 primary/secondary school students to expose them to inquiry-based STEM pedagogy infused with opportunities to innovatively apply science to solve real world problems;
iv. Established science clubs in 10 participating schools (over 100 students) to teach the innovation process and to challenge students to develop solutions to problems within their schools/communities;
v. Started the Life Skills workshop series for students and teachers to address social problems impacting the academic success of participating students and the professional performance of teachers (55 students, 85 teachers); and
vi. Purchased 250 science kits and models for 6 primary and four 4 secondary schools to support the curricula for primary and secondary Mathematics and the secondary Science subjects of Information Technology (IT), Physics, Biology, Chemistry, Agricultural Science and Integrated Science.

Seismology in Schools (SIS)

Launched in 2014 with the training of two teachers from each of 8 participating schools, the **SIS** programme introduced the science of geophysics to students from Forms 3 to 6. Students received hands-on experience in seismology through the measurement of earthquakes and the analysis of data captured, to determine factors such as magnitude and location. Students are able to see how scientists work and how the principles of physics, mathematics and geography as taught in the curricula can come alive in real world situations. The programme is an adaptation of the successful Seismology in Schools project developed in the UK and adopted by schools around the world. NIHERST partners on this initiative with the Ministry of Education and the UWI Seismic Research Centre (**SRC**), 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 (BGS).

The programme aims to foster a deeper understanding and appreciation for geophysics through the introduction of practical seismology activities in secondary schools, which complement the theory present on the curriculum, with the greater vision of creating a cadre of professionals in the field and potentially contributing to sustainable economic growth and development.

In the period under review, 7 schools remained active in the SIS programme. These were Arima North Secondary, Lakshmi Girls' Hindu School, Couva Government School, ASJA Girls' College (San Fernando), St Stephen's College, Iere High School and Signal Hill High School. The project progressed as follows:-

• The relocation of the seismometer from Queen's Royal College to NIHERST #8 Serpentine Road, St Clair location, which facilitated monitoring and promoting of seismic activity to online fora, and which resulted in an increase in the use of subscribers to the NIHERST facebook page.

• Two workbooks that link hands-on seismology activities to the curricula of geography, physics and mathematics were designed for ease of use in the classroom.

• Planning for and content development of the first annual SIS school workshop and competition.

The SIS programme required periodic visits to the schools, providing assistance with troubleshooting of the software and related IT issues, and promoting enthusiasm among students. Various infrastructural issues with the IT network and Internet required updating. This is a work-in-progress through collaborative efforts with the Ministry of Education's Information Communication Technology Division (ICTD). School workshops and competitions are being planned for the start of FY 2016/2017 in order to promote continued motivation for student participation.

National Youth Science Camp (NYSC)

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, 16 to 18 years old, from two educational districts which are rotated annually. Two candidates are selected and receive a full scholarship. This is a 4-week intensive residential science education programme for young scientists. Students from around the world are challenged academically by exciting lecturers and hands-on studies, and have voluntary opportunities to participate in an outdoor adventure programme, gain new and deep appreciation for the great outdoors and establish friendships that last a lifetime.

This camp honours, rewards, and encourages excellence in science. It creates an environment where young scientists of diverse backgrounds and interests may reap maximum benefits from interactions with each other and with visiting scientists. It strives to broaden, inspire, and encourage a sense of thoughtful scientific leadership among future scientists, engineers, mathematicians, and health care professionals.

In 2016 two students (one from Bishops Tobago and the other from Queen's Royal College) received a full scholarship to exchange ideas with scientists and other professionals from the academic and corporate worlds. These students engaged in hands-on small-group learning experiences, a provocative lecture series, and an outdoor adventure program. 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. The atmosphere at the NYSC was engaging and supportive.

E-Scientia Exhibits

The E-Scientia Exhibit at the NSC was the first outcome of a Memorandum of Cooperation between IEEE and NIHERST. Details of the E-Scientia Exhibit are at Section 3, Activity 3.

Youth Build

The Youth Build project was a Shell Trinidad Limited sponsored project. It provided support for 250 students of the East, Port of Spain and South Trinidad to improve and broaden their knowledge of STEM concepts. It also promoted the use of design-based learning approaches to STEM instruction and focused on encouraging students to find solutions to design problems that impact their local communities. Students were afforded the opportunity to engage in creative thinking, problem solving, innovation and invention, prototyping, project management, civic engagement and social responsibility. NIHERST signed an agreement with Sacoda Serv Limited to execute the Youth Build project.

In FY 2016, from November 2015 to July 2016, a total of fifteen (15) Saturday workshop sessions were conducted with students at 4 secondary schools - Trinity College (Maraval), St Benedict's College (La Romain), Cowen Hamilton Secondary School (Moruga) and San Fernando Central Secondary School. Working in groups, students conceptualized projects using Arduino technology to create solutions in their communities. Over 200 students participated in the design of 23 projects. Selected projects developed by students were: -

- Easy Shopping: design of a smart trolley for the elderly;
- Project Hybrid Hippie: a smart hydroponics system;
- Even Distribution: a smart water regulation system for use during the dry season ;
- Arduimow: portable remote controlled lawnmower for residential use;
- Colour Detector: a system to assist persons with colour blindness in detecting colour; and
- Water Recycling System: catchment of excess water (rain and/or flood) to supply a hydroponics system and/or for potable water

Made in the Caribbean

The Made in the Caribbean Project was launched in Barbados in 2013 through grant funding from the Perez-Guerrero Trust Fund for Economic and Technical Cooperation among Developing Countries. The project seeks to further develop a foundation of knowledge, skills, attitudes and behaviours of youth, conducive to the development of a culture of science, technology, innovation and entrepreneurship in the region, via application of the creative thinking processes to develop innovative solutions to problems encountered in life and in communities. The objectives of the project are:

- To develop capacity in the teaching of creativity and innovation by means of providing curriculum, resource materials and basic training to a cadre of trainers/facilitators in Tobago.
- To enable students to develop skills in communication and teamwork, and to grapple with and work together to find solutions to pressing issues in their local communities.

The project focused on the concept of "Technopreneurship". This concept calls attention to and stresses the dynamic interrelationship of the following elements: Science and Technology, New Products and Product Ideas (i.e. innovation/invention), Creativity and Entrepreneurship (i.e. business of innovation). It comprised two core components: workshops (train the trainer session) and camps for students hosted by the trained persons.

During FY 2016, the Tobago installation of the project was executed. The theme for the workshops and camps was 3D Printing. Participants were introduced to the concepts of innovation and invention and 3D printing, and provided with the tools to set up their own mini makerspace. A makerspace is essentially a community operated workspace where people with common interest, often in computers, machining, technology, science, digital art or electronic art, can meet socialise and collaborate. Such "open spaces" are the products of global movements that promote "open data" and "open source". These movements push for a more globally collaborative and sharing network of thinkers who creatively find a way to solve any and all problems.

Four sessions were held in Tobago – 2 workshops and 2 camps from 10th to 12th & 25th to 26th June, 2016, respectively. The 12 facilitators trained in the workshops came from two organizations - *Sankofa Consultants Ltd* and *I AM Legacy International* - which specialize in carrying out STEM-based programmes, as well as providing assistance to support and promote entrepreneurs within Trinidad and Tobago. Those persons then hosted a pilot two-day 3D printing camp for a total of 30 students. On completion of the workshops and camps, the 3D printers and printing materials used were left with the facilitators to continue conducting similar camps for more students.

This project was intended to assist in promoting youth innovation and invention on a regional scale. It is also expected that it will encourage national governments, non-governmental organizations and other institutions to provide much needed investment in the popularisation of science and innovation. Although it will take some time before the Caribbean region is to be known for its "knowledge" industries or research centres, stimulating young people to innovate and think creatively, will ensure that they see the world in non-conventional ways that will spur their entrepreneurial spirit and by extension the innovative capabilities of the region.

Rainwater Harvesting

In July 2015, NIHERST signed a Memorandum of Understanding (MOU) with Habitat for Humanity (Trinidad and Tobago) to collaborate on bringing rainwater harvesting systems and training to families in Moriah, Tobago. NIHERST is responsible for the provision of training in rainwater harvesting system installation and maintenance for members of the Moriah community and the provision of training materials and manual. In 2016, in collaboration with the Global Water Partnership (GWP), NIHERST conducted 5 site visits to potential areas for the installation of rainwater harvesting systems.

Deep Sea Wonders of the Caribbean

A collaborative project was begun with Dr Judith Gobin, Lecturer, UWI on Deep Sea Biodiversity Public Education, the outputs of which will be a 5-part video series and captioned photo book on the *Deep Sea Wonders of the Caribbean*. This stemmed out of a research expedition over Caribbean waters, during which Dr Gobin was able to acquire footage and photos on the deep sea biodiversity of Trinidad and Grenada. A draft Memorandum of Agreement between the main parties was prepared and a project proposal was developed to solicit endorsements and support from regional partners, and grant funding from both regional and international organisations.

New Collaborative Projects

FIRST® LEGO® *League (FFL) Trinidad and Tobago*

In October 2015, subsequent to collaborating with the US Embassy and LEGO®Group, NIHERST agreed to become the operational partner responsible for the operation and coordination of the national championship pilot competition of the FIRST®LEGO® League (FLL) in Trinidad and Tobago. *FIRST*® (For Inspiration and Recognition of Science and Technology), a Manchester based non-profit charity which designs accessible, innovative programmes to inspire students in engineering and technology as well as to develop their capabilities in self-confidence,

communication and leadership, joined forces with LEGO® Group (a company committed to caring for the environment and the society that children will inherit and to inspire and develop builders of tomorrow) to create FIRST® LEGO® League (FLL). The First LEGO® League (FLL) has a presence in 80 countries. Trinidad and Tobago is the first in the English-speaking Caribbean to have such a programme and in April 2016, British Gas T&T (Shell) confirmed its commitment to sponsor the NIHERST pilot run of FLL from April 2016 to April 2017.

FIRST® LEGO® League (FLL) is one of four (4) STEM learning programs from FIRST® which immerses children in real world science and technology challenges. Teams of children are challenged to design their own solution to current scientific problems, then build and program a robot using LEGO® MINDSTORMS to complete a mission and then compete on a table-top playing field. Teams of up to 10 students in the 9 to 16 age group from schools across Trinidad and Tobago were identified and formed and under the guidance of coaches and mentors. These teams will participate in the 2016 – 2017 FLL Animal Allies Challenge in which they will be required to conduct real-world research on a project that aims to improve interactions between people and animals and to build a robot that provides a solution to the problem. The winner of the national competition to be held in the next fiscal year, will go on to represent Trinidad and Tobago at the World Festival which will be held in the United States.

In preparation for the launch of the FLL competition to be held in the first quarter of 2016-2017, 2 NIHERST representatives attended two mandatory training sessions in the United States – one in in April 2016 in St Louis, Missouri and the other in June 2016 in New Hampshire, New England. The registration of schools for the competition began in September 2016. Plans for the official launch were undertaken during the period in review. This programme is expected to expand and build on students' knowledge of science, foster creative thinking and problem solving skills, and develop their competencies in the management and execution of a community project.

Section 4: Financial Operations

a) Budget Formulation

NIHERST prepares annual budgets using the zero-based budgeting approach. It incorporates full participation from all members of the management team. All managers are requested to prepare their work plan for the current year identifying the projects they wish to undertake as well as costs associated with the work of their department. Costs are allocated to the activities from which departmental budgets are derived. These departmental budgets are then incorporated into the final budget for the year under Recurrent Expenditure and Capital Expenditure/Public Sector Investment Programme (PSIP).

Once the budget has been formulated it is approved by the President. It is then sent to the Finance Committee for approval and then to the Board of Governors for final approval before being sent to the Line Ministry. During the fiscal year under review, there was no appointed Board and therefore final approval was given by the Line Ministry.

Other Sources of Revenue

In addition to subvention, NIHERST derives income from registration fees and admission fees from some of its activities, such as the annual hosting of both vacation camps and the CYSF as well as children's birthday parties, all of which are held at the NSC. The income derived is referred to as *Other Income*.

Financial Performance – Expenditure versus Revenue

The following reports are based on unaudited figures for the year ended 30 September 2016. The results show the actual income and expenditure against the allocation and the respective variances.

Table I below summarises the 2 revenue categories for the year in review. *Other income* includes income from vacation camp fees, sale of novelties and admission fees to the National Science Centre.

Table I: NIHERST Revenue FY 2016

Revenue Category	Allocation/Budgeted (TT$)	Actual Revenue (TT$)	Variance (TT$)
Recurrent Subvention	44,994,710	36,613,368	(8,381,342)
Other Income	1,310,000	1,252,180	(57,820)
TOTAL	**46,304,710**	**37,865,548**	**(8,439,162)**

Expenditure (Recurrent)

Table II below summarises the four (4) expenditure categories for the year in review.

Table II: NIHERST Expenditure FY 2016

Expenditure Category	Allocation (TT$)	Actual Expenditure (TT$)	Variance (TT$)
Personnel Expenditure	11,891,950	8,731,246	3,160,704
Goods and Services	29,956,720	20,869,710	9,087,010
Minor Equipment	851,540	672,707	178,833
Current Transfers & Subsidies	3,604,500	2,255,905	1,348,595
TOTAL	**46,304,710**	**32,529,568**	**13,775,142**

In March 2016, Government proposed a 7% reduction of our original budget of $49,790,010 to $46,304,710. Releases were not as expected and this impacted in our expenditure patterns that has resulted in the variances above.

Public Sector Investment Programme (PSIP)

The Development Programme is reflected in **Table III** below for the year ended 30 September 2016.

Table III: NIHERST PSIP Allocation and Expenditure FY 2016

Sub-Head/Description	Allocation (TT$)	Actual Expenditure (TT$)	Variance (TT$)
027 – Establishment of a National Science Centre	30,000,000	1,290,000	28,710,000
028 – Expansion and Upgrade of No. 8 Serpentine Road	300,000	0	300,000
029 –Document Handling	300,000	235,000	65,000
030 – TEACH ME	300,000	300,000	0
031 – STI Mapping & Priority Setting	300,000	150,000	150,000
TOTAL	**31,200.000**	**1975,000**	**29225,000**

In the absence of a Board of Governors, NIHERST was unable to proceed with the Establishment of a National Science Centre Project and therefore expenditure incurred was mainly for salaries and minor works to the site.

Internal Audit Function

NIHERST does not have an internal audit department. However, the services of an external auditor are employed on an annual basis to review the internal controls on the selected areas of operations and the report is submitted to the Board for their review. During FY 2016, an external auditor was contracted and completed reviews of the cash control and payroll functions. The reports will be submitted to the Board of Governors when appointed.

Financial Report FY 2015

Unaudited financial statements for FY 2016 are presented in **Appendix 6.**

Section 5: Human Resource Development Plan

a) Organisational establishment

There were 54 positions on the permanent establishment. The structure of this permanent establishment and ascribed jobs have not been updated since the organisation's inception in 1984 for several reasons. This has posed several human resource challenges including obsolescence of posts, lack of relevant posts, inadequate numbers of posts, unattractive compensation packages, and lack of career progression and advancement opportunities which have had negative impacts on employee engagement, performance and recruitment. The permanent establishment therefore could not support the strategic focus of the organisation. This has therefore over the years resulted in the hiring of required personnel on contract to fill the gaps. In light of the above, plans for the restructuring of the organization were underway as described below.

Organisational Restructuring Exercise

In October 2013, the NIHERST Board of Governors had approved the contracting of an HR consultancy firm for the development of a new organisational structure and compensation system for NIHERST, including the undertaking of a job evaluation and compensation survey.

In the previous fiscal year, work had temporarily ceased on the project as the recognized majority union, the Public Services Association of Trinidad and Tobago (PSA) held talks with NIHERST on the way forward with the union as an equal partner at the table to ensure the interests of the employees were served and protected. NIHERST and the PSA had eventually agreed on the way forward and that the Job Evaluation Committee comprise 50% employer representatives and 50% union representatives.

In November 2015, the first quarter of the fiscal year the Consultant conducted 3 days of training in the *Hay Guide Chart Profile method of Job Evaluation* for 25 staff members. Following this training, during the period 1 December 2015 to 22 February 2016, the Job Evaluation Committee conducted evaluations of 66 discrete non-management jobs of both permanent and contract workers. By May 2016, the Consultant had conducted and completed 17 job evaluations for both permanent and contract management jobs and 3 non-management jobs. The *Draft Final Report – Organisation Transformation Study – the Restructuring of NIHERST* was completed and delivered to NIHERST in July 2016. In the absence of a Board of Governors, Senior Management reviewed this report with the consultant and agreed on changes. The *Final Report on Job Evaluation Exercise for Non-management Jobs* was also delivered to the Union for comments. The non-appointment of a Board of Governors since the resignation of the previous Board in September 2015, will delay the approval of the final report and therefore the submission of recommendations to Government.

b) Category of employees

Operations at NIHERST are carried out by four categories of staff, viz. permanent, contracted, short-term and part-time staff. As at the end of the reporting period, NIHERST employed 100 persons on a full-time basis comprising 36 permanent employees, 58 on contract, and 6 short-term employees, and 10 part-time staff. Most of the latter group were science demonstrators who were required to assist with the explaining of science exhibits and concepts to visitors to the National Science Centre.

NIHERST also has a vacation employee programme which hires students who wish to acquire job experience. In 2016, 77 camp counsellors and 8 office interns were recruited.

The institute continued to facilitate the Government's on-the-job training programme with 33 trainees gaining experience at its offices during the period under review.

Additionally, from its inception NIHERST has facilitated returning national scholars with employment to fulfil post scholarship requirements. For the period under review, NIHERST accommodated 1 Associate Professional.

c) Career path systems (with regards to building the cadre of professionals, training given to support succession planning,

As indicated in a) above, the positions on the permanent establishment have not been updated since inception in 1984 for a number of reasons. Further, there are insufficient levels in each job family on account of a number of positions which were transferred to COSTAATT at its establishment in the year 2000. This therefore poses several challenges including inadequate numbers of posts, and lack of career progression and advancement opportunities.

d) Performance assessment/management strategies

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

e) Promotion – Selection Procedures

The selection procedure for promotion in the *NIHERST-PSA Collective Agreement* (Article 4: Employment and Promotion) was applied to both permanent and contract employees (**see Appendix 7**).

In addition, selection methods used included interviews, work sampling which is a job-specific ability test, and employment references. 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 than the position which the panel is set up to consider. Panels sometimes included external persons with relevant expertise if such did not reside internally.

f) Staff Development and Training

NIHERST's training and development programme enhances individual, departmental and organisational effectiveness by encouraging long term professional development of its employees who will strategically contribute to the objectives of the organisation. The programme includes 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.

With Government's approval of a National Monitoring and Evaluation (M&E) Policy of Trinidad and Tobago in February 2015 and NIHERST's focus on review and improvement of its programmes to ensure maximum impact, a major area of training and development was M&E. Two Senior Research Officers pursued an online distance learning course in M&E and a short course in Quantitative Data Analysis at a local university. Further, 28 managers and project/programme coordinators from across all departments, received 6 days of training in an *Introduction to Monitoring and Evaluation* from the National Transformation Unit of the Ministry of Planning and Development. The main objective of the training was to build staff's knowledge and skills in the utilisation of M&E tools and techniques to measure project, programme and policy performance. One of the methods used to achieve this was a practical assignment in which officers were required to apply the learnings to a new or existing intervention. Teams generally demonstrated very good application of the knowledge gained and seemingly an above average level of skill proficiency.

Otherwise, NIHERST continued to strategically focus on the development of core competencies of individual employees/team members to contribute to the overall efficiency of operations. Thirty-four employees (approximately 34% of the staff) received such training. Efforts were focussed on maintaining up-to-date technical and soft skills, legal and regulatory compliance, and increasing employee productivity within the organization.

A summary of selected specific objectives which were attained from completed training follows:

- Knowledge sharing of project management framework
- Increased knowledge and skills within HR department to manage and improve issues of absenteeism, time, attendance and leave systems and to advise managers on the same
- Enhanced knowledge and skills in quantitative data analysis
- Improved first aid knowledge and skills among staff across all departments
- Increased ability of Procurement department to apply best practices and increase efficiency
- Increased capacity to monitor and evaluate projects
- Improved skills in events management
- Increased knowledge and understanding of the Occupational Safety and Health Act of Trinidad and Tobago
- Increased knowledge and understanding of various aspects of Risk Assessment.

Details of the training programmes are contained in **Appendix 8.**

In the review period, financial constraints and insufficient funding resulted in the cancellation/ postponement of several planned training and development initiatives.

Group pension, health and insurance plans

NIHERST has a pension fund plan for its permanent employees established effective January 1, 1988. The NIHERST Colleges became part of COSTAATT with effect from November 6, 2000 consequent to proclamation of the COSTAATT Act. As a result, the Plan provides benefits for both NIHERST employees and former NIHERST employees who transferred to COSTAATT. COSTAATT remits contributions on behalf of its employees.

An Actuarial valuation was completed as at November 1, 2015.

As at 30 September 2016, there were 54 active members 37 from NIHERST and 17 from COSTAATT, 23 pensioners and 8 deferred pensioners participating in the Pension Plan and the Pension Fund. NIHERST and COSTAATT contributed at the rate of 17.7% of basic salary and the members contributed at the rate of 6% of basic salary. The value of the Plan's assets at the end of the Plan's financial October 31, 2015 was $53.2M. The Plan continued to perform fairly well, notwithstanding economic conditions.

NIHERST provides a Group Health and Life Insurance Plan for all full-time employees, permanent and contract, if they wish to join. As at September 30, 2016, there were 57 members on the plan, with 3 members being retirees. The Life Insurance and Accidental Death & Dismemberment (LADD) benefit attached to this plan was $200,000.00 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.

Employee Assistance Programme (EAP)

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

- management consultations
- access to the 24 hour hotline
- quarterly and annual reports, EAP promotional items
- counselling and referral service – 8 sessions per issue per annum
- Management/Supervisory training
- Ongoing consultations with peer support volunteers.

The staff continued to make use of the services of the Employee Assistance Programme through the counselling sessions which ensures strict confidentiality and promotes the wellbeing of staff. Reports submitted by PEAPSL indicated an increase in the number of new cases for counselling sessions. The EAP continues to provide a valuable benefit and safety net for employees needing its services.

Section 6: Information Governance

Records and Information Management

The Records and Information Management department continued to adopt a strategic approach to managing the organisation's information and content. This approach involved developing the organisation's capability in knowledge and information management to support Trinidad and Tobago's knowledge-based economy and the organisation's alignment to Ministerial Goal 1-6: to effectively govern and administrate the education system. Further, in order to function in the knowledge economy, the organisation 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.

In the period under review, implementation of the information governance framework encompassed various activities which were undertaken in the context of the Document Handling project, also referred to as the Electronic (electronic and paper) Document and Records Management System (EDRMS). This project was conceptualized as a PSIP project and continued to receive PSIP funding in the period under review. The following activities were undertaken.

a) Records Management

A records inventory of paper and electronic documents/records/information begun in the previous year was completed in FY2016. Records profiles for all 17 departments of the organization were developed. 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 Office 365 (O365) software became available to NIHERST under the Microsoft Education Agreement in September/October 2015. This afforded the organisation the opportunity to utilise SharePoint as the platform for its document management solution. The platform was deployed and consolidation and migration of departmental documents residing on the server commenced. The implementation of document libraries on O365 commenced on a phased basis. Parallel activities involved working with Heads of departments and records stewards to re-organize departmental shared drives in a more consistent and standardized manner, adhering to internationally acceptable standards and guidelines. As at September 30, 2016 - 6 departments were working in the cloud and were early adopters. Information sharing, co-authoring, and an integration point with several enterprise information sources have also been facilitated by the platform. General O365 training was provided to the management team, the O365 core team and 16 departmental records stewards, the latter of whom were identified by their Heads of Department and who received certifications as electronic records management practitioners.

b) Compliance - Policies, procedures, guidelines

The organisation continued to develop 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. The following draft policy documents were revised and are pending approval by a new Board of Governors: *NIHERST Records and Information Management (RIM) Policy 2017;* and *NIHERST Records Retention and Disposition Policy 2017. Draft Records Retention and Disposition Schedules* were developed for three critical departments – Finance (Accounts), Human Resources and Procurement – based on existing regulations and legislation, as well as on NIHERST policy. Guidelines for e-folders were revised and procedures for sending/requesting records to/from off-site records storage were implemented.

c) Storage and Archiving

Almost one thousand (1000) files from the HR, Finance (Accounts), and Procurement departments were assessed, recorded and sent to an off-site records centre storage location. Consolidation of storage space and files allowed for storage cost savings as well as efficiencies in access to files.

d) Risk Management

For the most part, risk management activities focused on minimizing the risk of inappropriate and unauthorized information usage of departmental and project site records and documents and as such The ICT department continued to implement appropriate controls to protect the organization's information according to its sensitivity, importance and risk profile.

The archiving of files to an official records centre storage facility, reduced the impact of a risk on the ability of the organization to satisfy its obligations to its employees, customers, partners, and regulators. The records department continued to work with all relevant departments to ensure that the organization and management of records facilitated compliance with regulatory and contractual requirements regarding records/information availability, quality, integrity and privacy.

f) Successes/Challenges to Implementation

Effective implementation of the Document Handling project continued to be resourced by two 2 RIM core staff and supported by an in-house O365 Core team and the Records Stewards team. The department registered qualitative and quantitative improvements in the organization’s commitment to the principle of “good information governance” in the areas of slow but steady improved accountability, transparency, compliance, communication and collaboration in document management, and other record-keeping principles. Improvement in the management of the organization's information assets, records, information and knowledge management systems were evident. Over 25 in-house training sessions to monitor and audit file structures, file organization

and file-naming conventions in-keeping with industry standards were conducted by the Records Management department. Beneficiaries included 5 project teams, 15 record stewards across 15 departments and 4 individual departments. Eleven O365 core implementation team members were also trained in Records Management and e-Discovery in Share Point.

Existing challenges continued regarding the future state of organizational awareness/behaviour, records stewardship, risk management, records/information lifecycle management, security and privacy, information quality, monitoring and auditing and e-discovery. A clearly defined and approved RIM policy is required if monitoring of information governance practices against agreed baselines is to be unambiguous 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" were key change management issues for the work of the department.

Notwithstanding the need for financial and human resource documents to be digitized with significant cost and storage benefits, no further attempts were made to develop a full-blown digitization project due to major financial and human resource constraints.

Section 7: Procurement

Procurement is a support function which contributes to the effectiveness and efficiency of the organisation. Through its procurement procedures and with the guidance of the Ministry of Finance *Standard Procurement Procedures*, the management expressly states its intention and commitment to:

a. Adhere to proper procurement principles.
b. Develop, maintain and continuously improve its Procurement Processes to satisfy internal and external customer requirements.
c. Operate in accordance with the provisions outlined in the *By-Laws of the Trinidad & Tobago* (inclusive of the Public Procurement and Disposal of Public Property Act) as they relate to the procurement function.

NIHERST recognizes 3 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.

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

In keeping with the organization's commitment to continuous improvement of its business processes, an internal audit and review of the procurement system was undertaken by an external consultant. Improvements were implemented as follows:

- A centralised Procurement Unit was established to improve efficiencies.
- Work commenced on the establishment of a prequalification database. Approximately 500 application packages were received and evaluated.
- Procurement Procedures were reviewed, updated and aligned with the Procurement Act and the Public Procurement and Disposal of Public Property Act. These will need to be reviewed further and submitted to a Board for consideration, once installed. Subsequently, a draft NIHERST Procurement Policy was developed and is currently awaiting the Board's approval.

Section 8: Public, Community and Stakeholder Relations

Client and public access to services/service delivery systems

All members of the national community are aware of and have access to NIHERST information and programmes. All advertisements, flyers, videos or other promotional material directed readers to NIHERST's website and social media accounts for access to the full range of offerings. Addresses and telephone numbers were also included for those without internet access.
The institute utilized traditional and new media to advertise and disseminate information as follows:

- Marketing via e-mail, newspaper, television and radio advertisements and interviews;
- NIHERST's website and social media networks – Facebook, YouTube, Twitter and Instagram
- Inclusion in local stakeholders' listings for various sectors e.g. tourism, entertainment, and education
- Direct marketing to schools and community members of target areas, and relevant stakeholders;
- Science popularisation activities where NIHERST, in particular the Science Centre, reaches out to rural and underserved communities, particularly this year through events hosted by external agencies.

Please refer to Section 3: Building Strategic Alliances of this report for Community and stakeholder relations/outreach activities and details of all projects undertaken with key regional and international agencies. A list of agencies and organisations that collaborated with NIHERST as sponsors on key initiatives and/or exhibitors and facilitators at key events is at **Appendix 9.**

In FY 2016, NIHERST decreased its expenditure on traditional media, in particular newspaper and radio advertisements due to budget constraints. Consequently, social media, television interviews, direct marketing to schools, increased participation in invitational outreach activities, in-person flyer distribution and information sessions were utilized to maintain an awareness of the institute, its programmes, and STI related international commemorative days. As a testimony to this, NIHERST's organic (i.e. not occurring through paid means) audience on social media grew to 921 new Facebook followers, 38 new Twitter followers and 351 new Instagram followers. Engagement and interaction with the public through those means was deepened as evidenced by a 4.6/5 rating on Facebook and increased reviews. The following are some noteworthy comments:

Firstly when I spoke to the coordinator, she was very warm, friendly and able to accede to our charity foundation's request of accommodating us on a Saturday which is only reserved for

birthday parties. The members of the Rapid-fire Kidz Foundation were able to take four orphanages for this educational, fun-filled field trip. The demonstrators were very professional, knowledgeable and did an excellent job interacting with kids. They also were able to provide meals for purchase and treated the kids to helium balloons. Overall an excellent experience will definitely revisit for other activities and recommend to parents or teachers. -Catherina Tracy (April 2016)

Really nice staff, very professional. We loved the Easter camp. -Kristin Williams (May 2016)

My son and nephew, both 8 years old attended their Sci-Spy camp and they absolutely loved the experience. The tutors were very pleasant and lovely to interact with. Thank you very much! Worth it! -Tarelle Julien (July 2016)

Great job with the Sci Spy and Eureka camps, my son loved it! -Rez Elle (August 2016)

APPENDICES

APPENDIX 1

OVERVIEW OF THE ESTABLISMENT OF A NATIONAL SCIENCE CENTRE

The Science City will be an indoor/outdoor STEM (science, technology, engineering and mathematics) focused learning facility that will change the model of engagement with visitors, appeal to broader audiences and become an important element of the country's educational infrastructure. The facility will include exhibits in the following areas:

- Earth to Universe: Natural Hazards, Climate Change, Physics Space Science
- Energy: Non-renewable and renewable energy, formation of fossils, oil formation and soil types, oil exploration, collection and separation
- Body Works: Human Anatomy, Disease and Medicine, Neuroscience, Nutrition and Fitness
- The Final Frontier (Astronomy): Astronomical Apparatus, Planetarium
- Early Childhood Science: Jr. Scientist (Life, Earth, Physical, Space Science), Sensory Development, Literacy & Numeracy through Science
- State of the Art Labs & Resource Rooms: Interactive workshop/lecture room, General Science Laboratory, Creative Design Lab/Fab Lab, Robomania Robotics Lab, Digital Learning Lab, Science Theatre, STEM Library and Resource Centre
- Outdoor Exhibits (Phase 1): Wind Tunnel, Rope Challenge Course, Heritage Garden, Crop maze, Hydroponics and Aeroponics, Demonstration Area, Crop Maze, Engineering Wetland Exhibit, Physics-themed mini golf course, Micro Hydropower exhibit, RC boat racing, Amphitheatre.

The project's objectives are:

- To foster a greater appreciation of Science and Technology and its link to sustainable development
- To promote scientific and technological literacy by presenting principles in a manner that are both easy to understand and appealing to all age groups
- To support formal science education at the primary and secondary levels and to encourage the pursuit of careers in the scientific and technological fields
- To target socio economic groups that have traditionally been under-represented; and
- To promote networking in science and technology education at the national and regional levels

It is expected that Science City will have a great impact on students' educational socialization in S&T thereby creating a more highly educated young population in S&T and have far reaching

social impact by generating interest among family members and individuals in the communities which will make Science City a go-to place, similar to Epcot Center.

The initial part of the project will be done in two (2) phases. On completion of Phase 1, NIHERST staff will be relocated from their current location of National Science Centre in Maloney.

Phase 1 will comprise:

- Main Building with exhibition halls, laboratories, kiddie learning and play areas, a theatre, offices, storage facilities, bathroom facilities and a food court
- Outdoor science park featuring educational and fun attractions with a focus on cutting-edge areas of science and technology including a hydropower building and a planetarium.
- Visitor amenities for the outdoor science park including bathroom facilities and an additional food court.
- Amphitheatre
- Lake and Boardwalk
- Workshop
- Staff and Maintenance Building
- Main Entry Building
- Wastewater Treatment Plant, Dam and Spillway.

Phase 2 will comprise an iconic, green science centre featuring state-of-the-art interactive exhibits, NIHERST Headquarters building, and an additional workshop building.

The Science City will create significant employment opportunities as there is a large complement of skilled, semi-skilled and unskilled staff required for its operations, ranging from PhD qualifications to management level staff, landscapers and janitors. As the surrounding area of Indian Trail community is presently a rural community, the facility will lead to the development of many downstream industries in the area, which will uplift the community as a whole and also increase the value of properties located in this area.

APPENDIX 2

CARIBBEAN YOUTH SCIENCE FORUM (CYSF)

The forum was held from July 31 to August 7, 2016 with activities at the various venues of NIHERST/NGC National Science Centre (NSC), The University of the West Indies (UWI), St Augustine Campus and the University of Trinidad and Tobago (UTT), O'Meara Campus. A total of 142 students attended with 24 students from the islands of Antigua and Barbuda, Barbados, and Grenada and Jamaica, and the remaining 118 students from 25 schools in Trinidad and Tobago.

During the week, students explored, through lectures/presentations and workshops, issues in the fields of cardiology, science and society, human genetics, technology, nuclear medicine, innovation, bioenergy, renewable energy, neurology, disaster management and mobile app development.

This year's distinguished visiting keynote speaker was Dr Colin 'Topper' Carew, Director and Founder of a new Innovation and Inclusion Initiative at the MIT Media Lab, Massachusetts, USA who has extensive expertise and experience in many fields, including architecture, environmental design, film production, technological innovation, communications and journalism, The hallmark of his work is the developing and leveraging of technology, innovative methods and the arts to encourage innovation and invention and to foster urban and community development, particularly for underserved populations. Dr Topper's CYSF presentations focussed on "The Caribbean as a World Class Epicentre of Technology and Innovation" and gave an overview of the emerging technologies and how the Caribbean could employ these technologies to provide leadership in areas such as water and food security, ocean science and plant medicine. His participation was sponsored by the US Embassy in Port of Spain.

Other lectures and presentations at the forum were delivered by Professor Dilip Dan, specialist in bariatric, laparoscopic and metabolic surgery, and head of the Department of Clinical Surgical Sciences, Faculty of Medicine, UWI, Dr Lana Boodhoo, consultant cardiologist and electrophysiologist; Dr Rawatee Maharaj-Sharma, lecturer of Science Education, School of Education, UWI, Ms Patricia Singh, clinical medical physicist, Dr Ejae John, associate professor of process engineering at UTT, Mr Dwight Pollonais, structural engineer at UTT and chairman of Prudecon Ltd, Dr Alana Belcon, geographical information system specialist, Ministry of National Security, Dr Rajini Haraksingh, lecturer in Biotechnology, UWI, Dr Indra Haraksingh, lecturer in the Department of Physics, UWI, Mr Jeevan Persad, product designer and CEO of FaSoVe and Mr L Anthony Watkins, human resource consultant and Chairman of ODYSSEY CONSULTinc. 28.9% of the participants said they were motivated and inspired by the lectures and 51.2% of the participants influenced their career selection based on the lectures presentations.

The participants had the opportunity to have one-on-one discussions with 29 science professionals which included some of the main lecturers/presenters at the forum. The range of STI-related fields represented at the evening spanned both academia and industry and 60.3% of the participants reported that the Socialising with Scientists session was very useful in helping them to identify new career opportunities in S&T. This event was held at the UTT Graduation Pavilion.

Participants of the Caribbean Youth Science Forum were also afforded the opportunity to gain insights into STI in operation in industry and business as they embarked on field trips to 23 organisations where they were given guided tours and advice on career possibilities. 61.2% of the participants said through the field trips they had gained information on new careers.

The students were also required to take part in a design challenge in which teams problem solve and innovate under a specified disaster/emergency scenario. The scenario posed to the participants was that as survivors of a pandemic, confined to stay in a mall for safe shelter with depleting water supplies, they were required to design from recyclable materials an easily portable system to purify water and to develop a kit for testing and monitoring the water quality to indicate its effectiveness. Teams were required to create a design journal on which they were assessed along with the team presentation. Another activity entitled "Science Seekers" was an outdoor activity which taught participants to use scientific knowledge and skills to survive in the wild. Under the guidance of a team of highly trained members from the Trinidad and Tobago Defence Force, the activity required extensive group interaction and cooperative learning, which served to hone skills in leadership, communication, team work, critical and creative thinking, and problem solving.

Feedback received from the participants showed that 42.1% of them had changed their choice of career by the end of the forum.

APPENDIX 3
JULY/AUGUST SCIENCE VACATION CAMPS

Camp	Age Group	Venue	Date
Funology	5-7	Tranquillity Govt Primary Preysal High School UTT – San Fernando	11 – 22 July 25 July – 5 August 15 – 26 August
Explorer	8-12	Tranquillity Govt Primary Preysal High School UTT – San Fernando	11 – 22 July 25 July – 5 August 15 – 26 August
Robotics	13-17	National Science Centre Preysal High School UTT – San Fernando	11 – 22 July 25 July – 5 August 15 – 26 August
Young Inventors	13-17	Preysal High School Debe High School	25 July – 5 August 15 – 26 August
Clash of Minds	13-17	National Science Centre	8 – 12 August
eMagination Level 1	7-11	National Science Centre National Science Centre UTT - San Fernando	11 – 15 July 25 – 29 July 22 – 26 August
eMagination Level 2	7-11	National Science Centre National Science Centre	18 – 22 July 2 – 5 August
#LittleTech	7-11	National Science Centre National Science Centre	25 – 29 July 8 – 12 August
Computer Constructors	13-17	National Science Centre	15 – 19 August
GrafX	13-17	National Science Centre UTT – San Fernando	8 – 12 August 15 – 19 August
Dot Com	13-17	National Science Centre	2 – 5 August
App Builders	13-17	National Science Centre	8 – 12 August
Gamerz World	13-17	National Science Centre	22 – 26 August

APPENDIX 4

COMMMUNITY-CENTRED DESIGN AND INNOVATION (COMDESI)

Based on the EPIC programme of leading US universities (notably Purdue University), the COMDESI project provides students with an educational experience that exposes them to the practical application of STEM through community engagement by challenging them to identify a problem or need that exists in their chosen community and to invent a solution and then produce the prototype. This project which is administered by NIHERST's Innovation Department in collaboration with the Heroes Foundation, (which runs a Youth Development Programme in secondary schools) fosters the development of the participants' skills for leadership, teamwork, communication, research, problem-solving, critical thinking and introspection, as well as report writing and presentation skills. COMDESI participants also gain knowledge on the importance of community involvement which is necessary for building an effective citizenry. In addition, they learn the rudiments of the process of invention and innovation and how to navigate through the stages from the development of a creative idea to the production of a prototype. Participants receive basic training in ICT, simulation, AutoCAD, CAM and Arduino software, prototyping, intellectual property, project management, and entrepreneurship.

In FY2016 students from seven (5) secondary schools - Bishop's Anstey High School, Port of Spain, North Gate College, Trinity College (Moka), Parvati Girls' Hindu College and Woodbrook Secondary School - signed up for the programme. Bishop's Anstey High School, Port of Spain and Parvati Girls' Hindu College both entered two (2) teams in the competition. Owing to difficulties experienced by some of the schools, only the two teams representing Bishop's Anstey High School, Port of Spain, and Parvati Girls' Hindu College, completed the requisite two stages of the competition - training and prototype submission - to complete the programme to the final stage of judging while the other schools were only able to successfully complete the training component.

The students were required to attend meetings with their designated NIHERST facilitator/mentor for training and mentoring sessions which were held on their school compound. This included training in civic engagement, teamwork and leadership, innovation, invention and prototype development, leadership and report writing/presentation techniques. These sessions were designed to assist them in the preparation for their final project. The students also attended a five (5) day workshop during the Easter vacation where they gained in-depth knowledge on the COMDESI programme and topics of entrepreneurship, sustainability and ICT. They also engaged in brainstorming and problem solving sessions and received training and practice in interview skills, report writing and presentation, and a workshop was held to introduce them to computer-aided design (CAD) and computer-aided manufacturing (CAM) using AutoCAD software, and Arduino.

Working in teams, the participants were given the challenge to observe a problem in a community of their choice with a view to formulating an action plan for finding a solution and then building and testing a prototype. They were required to conduct interviews to solicit their opinions on the same. From their observations and interviews, they were required to journal important details to aid in the design and building of the prototype. They then crafted and built their innovative ideas on weekdays and Saturdays during the school term.

The projects/solutions submitted were judged by a panel of three (3) judges which comprised two (2) engineers and one (1) inventor. At the award ceremony, which was held on September 16, 2016 at the National Science Centre, all participants received certificates of participation and Bishop Anstey High School Group 2 was adjudged as the overall winner. The teams were also awarded special prizes for community engagement, Jugaad use (jugaad is a word taken from a Hindi term which captures the meaning of finding a low-cost solution to any problem in an intelligent way) and best prototype. The details of the winners are as follows:

Award	**School**	**Team Members**	**Project Title & Description**
Overall winners	Bishop Anstey High School – Group 2	Kirsha Brereton Emprese Thornhill Arielle Aarons Leighanne Roberts Tamia Lawrence	Let's Make Art: Mobile art studio made from low-cost materials
Special Prize: Community Engagement	Bishop Anstey High School – Group 1	Maia Salandy Kamryn Campbell Journee Cunningham Carissa Humphrey Arissa Romany	Preschool play area: A play-centre for pre-schoolers which allows learning of spelling through physical activity i.e. kinaesthetic learning
Special Prize: Jugaad Use	Parvati Girls' Hindu College – Group 1	Celia Lall Sonia Mahadeo Rohini Mangru Annamica Rooplal Vishana Tikah	A school-based grow box to provide cafeteria with healthier and low-cost produce
Special Prize: Best prototype	Parvati Girls' Hindu College – Group 2	Marissa Boodram Shenelle Dass Abigail Williams Priya Rambaran Steffy Wilson	A teaching-aid for Forms 1-3 students writing the NCSE exam tailored to facilitate learning through doing/visual/tactile methods.

APPENDIX 5

THE STI MAPPING & PRIORITY SETTING PROGRAMME

The advanced stage on the progress of each of the innovation mapping studies is summarised and presented in the table below.

Strategic Priority Sector	**Phase 1** Preliminary Research[1]	**Phase 2** Primary Research[2]	**Phase 3** Analysis[3]	**Phase 4** Publication and Communication[4]
Animation	Completed	Completed	Visual mapping of the sectoral innovation system completed Feedback Report completed Draft Innovation Mapping Report completed (Internal) Lessons Learnt Report underway	Launch of the findings of the Sectoral Innovation Mapping Study of the Animation Industry of Trinidad and Tobago was held on 29, July, 2016. Publications are to be finalised for printing & distribution
Software & Web Development	Completed	Conducted twenty-four (24) interviews for FY in review		

[1] Preliminary Research - comprised of literature review, compilation of stakeholder database, background research (sector history and status) and presentation of preliminary research to NIHERST Executive Management

[2] Primary Research – the preparation of questionnaires, conduct of stakeholder interviews & preparation of interview transcripts

[3] Analysis – compilation and verification of data, construction of visual mapping of the sectoral innovation system, preparation of the Feedback Report, preparation of the Innovation Mapping Report & preparation of Lessons Learnt Report

[4] Publication & Communication – Presentation of Draft Results to NIHERST Executive, Launch of Innovation Mapping Report and printing and publication of Reports

Innovation Mapping Exercises

Energy Services Sector (ESS)	Completed	Completed	Visual mapping of the Sectoral innovation system completed Feedback Report Completed Draft Innovation Mapping Report completed (Internal) Lessons Learnt Report underway	Launch of the Findings of the Sectoral Innovation Mapping of the ESS was held on 19, September, 2016. Publications are to be finalised for printing & distribution

APPENDIX 6

NATIONAL INSTITUTE OF HIGHER EDUCATION

(RESEARCH, SCIENCE & TECHNOLOGY)

UNAUDITED

ANNUAL FINANCIAL STATEMENTS

FOR THE YEAR ENDED

DECEMBER 31, 2016

NATIONAL INSTITUTE OF HIGHER EDUCATION (Research, Science & Technology)
STATEMENT OF FINANCIAL POSITION AS AT DECEMBER 31, 2015

	NOTES	2016	2015
			$
FIXED ASSETS	3	2881,783	3167,816
CURRENT ASSETS			
Fixed Deposit		2526,525	2450,913
Interest Receivable		7,939	10,366
VAT Receivable		1903,566	2767,045
Debtors		2960,836	3528,827
Prepayments		427,884	349,763
Suspense		145,612	740,525
Cash at Bank		45797,522	51906,503
Cash in Hand		15,422	12,513
		53785,306	61766,455
LESS CURRENT LIABILITIES			
Accrued Expenses		8330,955	7838,137
Creditors		5,357	805,279
Deferred Income	4	40103,568	49086,265
VAT Payable		239,279	127,622
		48679,159	57857,303
NET CURRENT ASSETS		5106,147	3909,152
TOTAL ASSETS LESS TOTAL LIABILITIES		7987,930	7076,968
FINANCED BY:			
Reserve Balance at Beginning of the year		7076968	5818,933
(Deficit)/Surplus for year		910,962	1258,035
		7987,930	7076,968

Director Director

The accompanying notes on pages 64 to 70 form an integral part of these Financial Statements.

NATIONAL INSTITUTE OF HIGHER EDUCATION (Research, Science & Technology)
STATEMENT OF COMPREHENSIVE INCOME
FOR THE YEAR ENDED DECEMBER 31, 2016

		2016	2015
		$	$
INCOME			
Government Grants		28765,530	39462,650
Interest Income		4,638	5,220
Miscellaneous Receipts		1202,305	1318,507
		29972,473	40786,377
EXPENDITURE			
Personnel Expenditure		5798,566	8517,022
Goods and Services	5	20208,550	26524,422
Pension & Gratuities		1792,495	2479,126
Health Plan Contributions		157,429	169,949
Board Fees		0	539,518
Minor Equipment Purchases		409,219	335,768
Depreciation Charge:			
Equipment and Machinery		259,883	536,147
Furniture and Fittings		292,851	26,882
Motor Vehicles		97,628	130,168
Exhibits		44,890	269,340
		29061,511	39528,342
Surplus (Deficit) for year		910,962	1258,035

The accompanying notes on pages 64 - 70 form an integral part of these Financial Statements.

NATIONAL INSTITUTE OF HIGHER EDUCATION
(RESEARCH, SCIENCE AND TECHNOLOGY)
STATEMENT OF CASH FLOWS FOR THE YEAR ENDED DECEMBER 31,2015

	2016 $	2015 $
OPERATING ACTIVITIES		
(Deficit)/Surplus	910,962	1258,038
Adjustments:		
Disposal of Assets		
Depreciation	695,252	962,537
Decrease in Deferred income	(8982,697)	42,643
Sub Total	(7376,483)	2263,215
Increase in Accrued Expenses	492,818	4045,559
Increase in Creditors	(799,922)	324,832
Sub Total	(307,104)	4370,391
Decrease in Vat Receivable	667,672	(1651,407)
Decrease in Receivables - Interest	2,427	(3,744)
Decrease in Debtors	567,991	(3217,878)
Increase in Prepayments	78,121	2276,613
Decrease in Suspense	(888,153)	4,264
Sub Total	1911,124	(2592,152)
CASH PROVIDED BY OPERATING ACTIVITIES	**(5772,463)**	**4041,454**
INVESTING ACTIVITIES		
Purchase of Fixed Assets	(409,219)	(334,768)
Increase in Fixed Deposit	75,612	(10,366)
CASH PROVIDED USED IN INVESTING ACTIVITIES	**(333,607)**	**(324,400)**
FINANCING ACTIVITIES		
Loans	0	0
Repayment of loans for year	0	0
CASH PROVIDED USED IN FINANCING ACTIVITIES		**0**
Net Increase/(Decrease) in Cash/Cash Equivalents	(6106,071)	3717,053
Prior Year Adjustments		
Cash and Cash Equivalents at the beginning of the year	51919,015	48201,962
CASH AND CASH EQUIVALENTS AT END OF YEAR	**45812,944**	**51919,015**
CASH AND CASH EQUIVALENTS/ REPRESENTED BY		
Cash at Bank	45797,522	51906,503
Cash in Hand	15,422	12,512
	45812,944	**51919,015**

NATIONAL INSTITUTE OF HIGHER EDUCATION

(Research, Science & Technology)

NOTES TO THE FINANCIAL STATEMENTS FOR

THE YEAR ENDED DECEMBER 31, 2016

1. PRINCIPAL BUSINESS ACTIVITIES

The National Institute of Higher Education (Research, Science and Technology) (NIHERST) is a Statutory Authority incorporated by Act of Parliament No. 20 which was assented to on June 28, 1984. The principal objectives of the Institute are as follows:

a. To provide and promote scientific and technological services in society;
b. To promote and develop an indigenous capability in science and technology relevant to the developmental needs of the society;
c. To assist national bodies and/or organisations in securing technology appropriate to their needs.

2. SIGNIFICANT ACCOUNTING POLICIES

The significant accounting policies adopted in the preparation of these financial statements are stated below:

a. Basis of Preparation

These financial statements are prepared in accordance with International Financial Reporting Standards (IFRSs), and are stated in Trinidad and Tobago Dollars. These financial statements have been prepared on a historical basis.

b. Adoption of new and revised IFRSs and (IFRICs)

During the current year, the institute adopted new, amended and revised International Financial Reporting Interpretations (IFRICs) which are relevant to its operations and are

effective for accounting periods commencing on or before January 1, 2013. The adoption of these Standards did not have a material effect on the financial statements, however additional disclosures were required.

c. Property, Plant and Equipment

It is the Institute's policy to account for property, plant and equipment at cost. Depreciation is provided on the straight-line basis at the rates estimated to write-off the assets over their expected useful lives.

Current rates of depreciation are:

Equipment	- 33⅓%
Furniture and Fittings	- 10%
Motor Vehicle	- 25%
Exhibits	- 25%

d. Cash and Cash Equivalents

For the purpose of the statement of cash flows, cash and cash equivalents comprise of bank balances.

e. Investments

Held-to-Maturity investments are carried amortised cost.

f. Grants Funding

Grants are recognised at their fair value where there is a reasonable assurance that the grants will be received and the Institute will comply with all attached conditions.

Grants relating to revenue are recognised in the Statement of Comprehensive Income over the period necessary to match them with the expenditure for the year, which they are intended to compensate.

Grants relating to the purchase of property, plant and equipment are deferred in liabilities and are credited to the Statement of Comprehensive Income on a straight line basis over the expected lives of the related assets.

g. Receivables

Receivables are carried at original invoice amount less provision for impairment of these receivables. A provision for impairment of receivables is established when there is objective evidence that the Institute will not be able to collect all amounts due according to the original terms of the receivables. The amount of the provision is the difference between the carrying amount and the recoverable amount.

h. Payables

Payables are carried at cost which is the fair value of the consideration to be paid in the future for services rendered.

i Use of Estimates

The preparation of financial statements in conformity with International Financial Reporting Standards require management to make estimates and assumptions that affect the reported amount of assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reported period. Actual results could differ from these estimates.

j. Financial Instruments

Financial instruments carried on the Statement of Financial Position include cash and bank balances, receivables, investments and are stated st their approximate fair values determined in accordance with the individual policy statements associated with each item.

k. Revenue Recognition

Revenue is recognised to the extent that it is probable that the economic benefits will flow to the Institute and the revenue can be reliably measured. Revenue is recognised upon performance of services and customer acceptance. Interest and investment income are recognised as they accrue unless collectability is in doubt.

l. Impairment of Assets

Non-financial assets

The Institute assess at each reporting date whether there is an indication that an asset may be impaired. If any such indication exists, or when annual impairment testing for an asset is required, the Institute makes an estimate of the assets recoverable amount. An asset recoverable amount is the higher of an asset's fair value less costs to sell and value in use and is determined for an individual asset, unless the assets does not generate cash inflows that are largely independent of those from other assets or groups of assets. When the carrying amount of an asset exceeds its recoverable amount, the asset is considered impaired and is written down to its recoverable amount. In assessing value in use, the estimated future cash flows are discounted to their present value.

m. Employee Benefits

The Institute's full time employees are covered by The National Institute of Higher Education,Research, Science and Technology (NIHERST) Pension Plan, a Defined Benefit Plan. The pension accounting costs for the plan is assessed using the projected unit actuarial method. Under this method the cost of providing pensions is charges to the Statement of Comprehensive Income so as to spread the regular costs over the service lives of the employees in accordance with the advice of the qualified actuary who carries out a full valuation on the plan every three years.

n. Provisions

Provisions are recorded when the Institute has a present legal or constructive obligation as a result of past events, it is probable that an outflow of resources will be required to settle the obligation and a reliable estimate of the amount can be made.

3. FIXED ASSETS SCHEDULE 2016

	Equipment	Furniture & Fittings	Motor Vehicles	Exhibits	TOTAL
COST:	$	$	$	$	$
B/F 2015 At beginning of the year	12987,320	2025,981	1100,844	12819,480	28933,625
Acquisitions 2016	284,471	124,748	0	0	409,219
Disposals/Adjustments	0	0	0	0	0
	13271,791	2150,729	1100,844	12819,480	29342,844
Accumulated Depreciation:					
B/F 2015 At beginning of the year	11436,229	979,324	710,336	12639,920	25765,809
Disposals/Adjustments	0	0	0	0	0
2016 Charge	259,883	292,851	97,628	44,890	695,252
	11696,112	1272,175	807,964	12684,810	26461,061
NET BOOK VALUE AT 2016 DECEMBER 31	1575,679	878,554	292,880	134,670	2881,783
NET BOOK VALUE AT 2015 DECEMBER 31	1551,091	1046,657	390,508	179,560	3167,816

NATIONAL INSTITUTE OF HIGHER EDUCATION
(Research, Science & Technology)
NOTES TO THE FINANCIAL STATEMENTS FOR THE YEAR ENDED DECEMBER 31, 2016

4. DEFERRED INCOME	**2016**	**2015**
I) Cash Donations		
Balance as at January 1, 2016	49086,265	49043,622
Increases for the year 2016*		42,643
Decreases for the year 2016**	8982697	
Sub-Total	40103,568	49086,265
II) Non Cash Donations		
Balance as at January 1, 2014		
Less Decreases for the year 2014		0
Increases for the year 2014*		0
Less Depreciation for the year 2013		0
Sub-Total		0
Total Deferred Income	40103,568	49086,265

5. GOODS AND SERVICES	**2016**	**2015**
	$	$
Travelling	856,852	946,844
Uniforms	44,530	23,670
Electricity	561,690	618,385
Telephone	464,192	612,776
Water and Sewerage	8,121	9,083
Rent/Lease-Office Accommodation	4787,154	4593,617
Rent/Lease-Vehicles & Equipment	203,564	192,917
Office Stationery and Supplies	102,894	394,258
Books and Periodicals	3,241	69,102
Materials and Supplies	52,862	1451,264
Maintenance of Vehicles	71,779	73,089
Repairs and Maintenance-Equipment	133,135	216,497
Contract Employment	6167,372	7206,891
Training	148,873	181,887
Official Entertainment	-	-
Repairs & Maintenance-Buildings	284,239	292,353
Short Term Employment	1387,264	1770,159
Fees	692,768	398,883
Official Overseas Travel	3,516	65,452
Other Contracted Services	410,199	655,307
Janitorial Services	188,815	204,300
Security Services	587,105	937,932
Insurance	238,341	292,824

	2016	2015
	$	$
Promotions, Publicity & Printing	569,179	1082,570
Hosting of Conferences & Seminars	2219,997	4207,415
Employee Assistant Programme	18,852	26,947
Total Goods and Services	**20,208,550**	**26,526,437**

APPENDIX 7

ARTICLE 4: EMPLOYMENT AND PROMOTION

(1) Appointment to the permanent establishment shall be conditional on -

(a) passing a medical examination conducted by a specified medical practitioner; and

(b) satisfactory completion of a probationary period of twelve (12) months.

(2) During the probationary period either party may terminate the employment at any time with seven (7) days' notice.

(3) The period of probation may be extended where NIHERST considers this desirable but in no case shall the total period of probation exceed eighteen (18) months.

(4) The appointment of an employee on probation may be confirmed before the expiry of the probationary period.

(5) The Institute will inform the Union of all persons who are confirmed in their appointments to the permanent establishment.

(6) It shall be the policy of the Institute to fill all vacant positions by promotion from within NIHERST, therefore, when promotional opportunities arise vacancies will first be advertised within the Institute.

(7) If no suitable candidate is found among the employees the post will be advertised through the news media.

(8) In determining suitability for promotion merit shall be the main criterion. However where two (2) or more employees are equally suitable seniority shall be the deciding factor.

(9) On promotion an employee shall receive an increase in salary not less than the value of an increment in his former salary scale.

(10) NIHERST will supply the Association with a copy of the job specification for each category of position on its permanent establishment as designated by the job titles in the Schedule of Salaries attached to this Agreement. Copies of these specifications will also be available for scrutiny by employees.

(11) Each employee shall be given a list of his/her specific duties.

(12) Both parties agree to meet to develop a system of performance appraisal."

APPENDIX 8

STAFF TRAINING AND DEVELOPMENT

DEPARTMENT	TRAINING INSTITUTION	TRAINING PROGRAMME	TRAINING PERIOD	NO OF PERSONS TRAINED
International Projects	School of Business and computer Science Ltd	Project Management Professional (PMP)	September 6-November 8, 2015	3
Human Resource	Employers Solution Centre	Culture Shock: Exploring New Strategies Towards a reduction of Absenteeism in the workplace	October 29 &30, 2015	1
Monitoring and Evaluation	University of the South Caribbean	Quantitative Data Analysis	November 11-13, 2015	2
All Departments	Corporate Health Environmental and Safety Solutions Limited	Basic First Ai d	November 27, 2015	16
Procurement	Arthur Lok Jack Graduate School of Business	Principles of Contract Law	December 7-9, 2015	2
Procurement	The Caribbean Procurement Institute	The Procurement Efficiency Lab Workshop	March 18, 2016	1
Innovation	FIRST LEGO League	FIRST LEGO League's World Festivals, St. Louis, Missouri	April 27, 2016 to April 30, 2016	2
Office of the President	Capacity Africa Training Institute	Online and Distance Learning Certificate Course in Monitoring and Evaluation	May 1, 2016 to July 1, 2016	1
International Projects	School of Business and Computer science Ltd (SBCS)	Project Management Professional (PMP) Certification - EXAMINATION	November 2016	3
General Administration - NSC	Arthur Lok Jack Graduate School of Business	Professional Certificate in Events Management	Sep 2016-Sep 2018	1
All Departments	Ministry of Public Administration	Designing and Building a Results-Based Monitoring and Evaluation System	September 6 to 8 & 14 to 15, 2016	28
HR, HSE, CDL, Gen Admin-NSC	Corporate Health Environmental and Safety Solutions Limited (CHESS)	Understanding the OSH Act	September 27th 2016	5
HR, HSE, Facilities	Corporate Health Environmental and Safety Solutions Limited (CHESS)	Risk Assessment	September 30th 2016	3

APPENDIX 9

NIHERST's Key Partners

Atlantic LNG
British Geological Survey (BGS)
Caribbean Academy of Sciences (CAS)
Caribbean Council for Science and Technology (CCST)
Durham University
Embassy of the United States in Port of Spain
European Union (EU)
Fab Foundation
FIRST®LEGO®LEAGUE
Global Water Partnership-Caribbean (GWP-C)
Habitat for Humanity
Heroes Foundation
Imperial College London
Institute of Electrical and Electronics Engineers (IEEE) – Global
Institute of Electrical and Electronics Engineers – Trinidad and Tobago Section
Intellectual Property Office (IPO)
International Centre for Genetic Engineering and Biotechnology (ICGEB)
LEGO Education
Seismic Research Centre (SRC)
Massachusetts Institute of Technology (MIT)
Ministry of Education - Curriculum Division and Information Communication Division
NASA
NASA Ames Research Center (ARC)
Organization of American States (OAS)
Sacoda Serv Limited
Scientific Research Council (SRC), Jamaica
Seismic Research Centre
Shell Trinidad Limited
Technische Universität Dresden (TUD), Germany
The National Gas Company of Trinidad and Tobago (NGC)
The University of Trinidad and Tobago (UTT)
The University of the West Indies (UWI)
Tobago House of Assembly (THA)
UNESCO
University of Leicester