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

to Parliament for Fiscal Year 2013

Report of NIHERST
for Fiscal Year 2013

NIHERST

NATIONAL INSTITUTE
OF HIGHER EDUCATION
RESEARCH SCIENCE AND TECHNOLOGY

INCORPORATED BY ACT OF PARLIAMENT ACT NO. 20 OF 1984

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Promotional material for key science popularisation events and activities

Copies of published surveys and educational publications and DVDs

FOREWORD

The 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. Procurement Procedures
7. Public and Community Relations.

FY 2013 marked the midway point of implementation of the Strategic Action Plan 2011 – 2015 that was developed by the NIHERST Board in 2010/2011. The plan aims to reposition the organisation towards becoming a world-class Science and Technology (S&T) institute, by strengthening its core competencies in areas like science education and popularisation, policy development, and research and intelligence gathering, and expanding into new areas which either are not being addressed by other S&T-focussed institutions in the national infrastructure, or complement and reinforce their efforts in similar areas.

The vision to build NIHERST Science City is central to achieving all the objectives of the plan. NIHERST crossed a major milestone in 2012 with the approval by Cabinet for the establishment of its Science City on a 52-acre parcel of land in Indian Trail, Couva. Through the groundbreaking work the institute has undertaken over the past three decades, it has developed the institutional capacity – the core programmes, in-house skills and experience - necessary to support the establishment of a science city, which by global standards is the apex of science centres. The first phase of this initiative will come on stream in 2015.

NIHERST Science City will be a state-of-the-art cluster of facilities that will enable the institute to expand its current educational offerings and the promotion of "citizen science" through a new national science centre. The city will also allow NIHERST to extend into new areas for capacity building, including labs for indigenous and high tech research and development, and serving as a hub for sharing knowledge with business and industry on global technological advancements, to support local innovation and entrepreneurship. There will be nothing like Science City in the rest of region, so Trinidad and Tobago will once again, be pushing the frontiers of development in science and technology in the Caribbean.

Financial and human resource constraints have forced the institute to concentrate its efforts on the following three objectives of the plan, further details of which are presented under Policy and Development Initiatives:

- Fostering a National Culture of Science, Technology and Innovation. This covers activities under NIHERST's pioneering science popularisation programmes, spearheaded by the National Science Centre, as well as the annual national awards schemes and competitions which the institute stages.

- Research and Intelligence Gathering. The main activities in this area are: the ongoing surveys undertaken and related publications issued by the S&T Statistical Research Department; the work of the Policy Research and Intelligence Gathering Department on formulating a national science and technology policy; and supporting strategic foresight activities to boost development and innovation in priority sectors; and

- Building Strategic Alliances. The focus in this area enables NIHERST to tap into the resources and expertise in global centres of excellence to accelerate progress in STI in areas of importance for national development. In some local and regional collaborative initiatives, NIHERST shares its own expertise to support capacity building in other countries.

In FY 2013, NIHERST made significant progress in researching and drafting the National Science and Technology Policy that it has been spearheading. The policy will be a critical tool for instituting a coherent structure to manage and develop the national S&T effort as well as guide and accelerate the process of diversification and building a more knowledge-driven society harnessing research, development and innovation. Another key achievement in the area of policy development in 2013 was the hosting of the International Conference on Science, Technology and Innovation for Economic Diversification (INSCITED). This was the first fruit of NIHERST's collaboration with the National Institute of Science, Technology and Development Studies (NISTADS) in India following the signing of an MOU in January 2012. The conference served to stoke the national discourse on STI development, with input from global experts, which has fed into the draft policy.

In line with the aim of developing a world class STI institute, work began on restructuring with respect to staffing and development of its human resources. In 2011, the Board of Governors had approved a proposed organisational structure for the institute and approved the plan to have a consultant advise on the restructuring of the organization and also to conduct a job evaluation and compensation survey. This plan was approved by the line Minister in July 2013.

Public and Community Relations broadly outlines the approaches the institute took to promote greater public access to, and engagement in, the programmes reported on under Policy and Development Initiatives. This section also lists the key international agencies and local public and private sector organisations that partnered with NIHERST during the period.

The financial statements contained in this report are not audited.

Materials submitted with this report include copies of publications referred to in the report as well as clippings and flyers that give additional details on key programmes.

Section 1: Vision, Mission, Philosophy and Strategic Objectives

In 2010, NIHERST'S role as a valuable institution in the country's landscape in science and technology was affirmed, and the NIHERST board proceeded to shape a Strategic Action Plan 2011 – 2015, aligned with the Government of Trinidad and Tobago's policy framework and the seven interconnected pillars for sustainable development. (See Appendix 1 for a copy of the Action Plan.) The pillars of particular relevance to NIHERST are development pillar 1: People Centred Development, and development pillar 5: Creating a More Diversified, Knowledge-Intensive Economy. The plan was completed in January 2011 and was limited by the information available at that point in time.

The following operational goals and expected outcomes were outlined in the plan:

Operational Goal 1: Research and Intelligence Gathering in Support of Economic Diversification

The studies undertaken will guide Trinidad and Tobago on the best way the country can utilise STI to rapidly improve its global ranking in competitiveness and create a sustainable knowledge-based economy. They will also promote the use of renewable energy and other technological advances to create sustainable wealth generation and employment for citizens and a consequent reduction in poverty. The five growth poles would become best practice examples of sustainable communities in the Caribbean. The National STI Policy would become a model for other small island developing countries. The development of a National Knowledge Network for sharing and disseminating knowledge within and among research and academic institutions, Government and other stakeholders is another long-term outcome that this focus area can influence.

Operational Goal 2: Promoting Innovation and Commercialisation of Technology in Priority Areas

It is expected that the creation of a fund for the commercialisation of technology and the undertaking of R&D and technical studies, based on international best practice for managing risks, will make for greater success of commercial ventures and will contribute towards Trinidad and Tobago becoming a knowledge-based economy. Priority will be given to the creation of enterprises that are sustainable and innovation-driven, align to the development of the identified growth poles, and contribute to poverty eradication in the country.

Operational Goal 3: Building Collaborative Global Relationships

The institutions that NIHERST collaborates with will contribute financial, human, information and infrastructural resources to assist Trinidad and Tobago in developing a competitive, knowledge-based economy. The relationships will also promote NIHERST's and Trinidad and Tobago's international image and international standing in STI and global competitiveness.

Operational Goal 4: Positioning NIHERST as a World Class STI Institute

It is expected that the operational efficiency and effectiveness of NIHERST will be improved and the institute's brand name will gain greater recognition at home and abroad as a leading institution in STI.

Operational Goal 5: Fostering a Culture of Science, Innovation and Creativity

The development of a culture of science, innovation and creativity will lead to improved performance of primary and secondary schoolchildren in science subjects. It will also increase the innovation activities of existing enterprises, the number of patents approved for local citizens, and the number of technology-based start-ups by young entrepreneurs.

Objectives

These operational goals are built on NIHERST's identified strengths and provide the areas of strategic focus for the organisation in the context of its mandate, its capabilities and its role in the matrix of related institutions, as well as in the dynamic and evolving global environment.

The objectives of these operational goals/specific areas of strategic focus for NIHERST can be summarised as follows:

1) Research and Intelligence Gathering In Support of Economic Diversification

- To provide policy support and advocacy to its line ministry in developing a national STI policy;
- To undertake STI policy studies in support of economic diversification - e.g. innovation and foresighting studies in priority areas;
- To undertake international benchmarking and comparative studies on Research & Development (R&D)/STI, competiveness and innovation in selected countries, regions, sectors and areas; and
- To develop a strong capability for knowledge management to support the knowledge-based economy and an effective National System of Innovation.

2) Promoting Innovation and Commercialisation of Technology in Priority Areas

- To establish a technology commercialisation fund (public-private partnerships including venture capital and angel investments) to help finance start-up enterprises in priority areas and niches identified in studies by NIHERST, including its foresighting "best bets"; and

- To establish a contestable fund for increasing national R&D in identified niches and priority areas.

3) Building Collaborative Global Relationships

- To build international relationships with world-class STI institutions; and
- To establish and maintain linkages with specialised regional and international research, science and technology institutions, and initiate and implement joint STI projects of relevance to the rapid creation of a sustainable knowledge-based economy.

4) Positioning NIHERST as a World Class STI Institute

- To restructure NIHERST in line with the Strategic Plan;
- To develop a plan for the physical consolidation of offices; and
- To develop a strategy to brand NIHERST as a world class STI institute.

5) Fostering a culture of Science, Innovation and Creativity

- To construct a world-class National Science Centre;
- To engage all citizens in the experiential learning of science;
- To provide hands-on experience for developing capabilities in technological innovation and entrepreneurship; and
- To recognise excellence in STI.

The Strategic Action Plan is built around the Objectives derived from the Operational Goals. For each objective, we identify measures, targets, strategic initiatives, timeframes, resources required and accountabilities. Appendix 1 refers.

Section 2: Organisational Structure

a) Organisational Profile

Over the years, NIHERST has developed distinctive competencies in the three key focus areas in science and technology: science popularisation, applied research on STI to inform policies, and external collaboration to advance the development and application of STI both nationally and regionally. The following gives a broad picture of the organisation's competencies in these.

1. Fostering a culture of science, technology and innovation through its outreach programmes in science popularisation and science communication, particularly through the National Science Centre (NSC). NSC is the only facility of its kind in the Caribbean and contains 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 of the centre seek to support classroom science learning using 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, the institute has also pioneered programmes and activities that develop young minds to be creative, inventive and even entrepreneurial using science and technology, which is a key component in the shaping of a cohesive national innovation system. The department focuses on: (a) the staging of the biennial Prime Minister's Awards for Scientific Ingenuity (formerly the Prime Minister's Awards for Innovation and Invention); (b) the conduct of 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 run in partnership with the Heroes Foundation, as well as its annual Robotics, Cre8tivity and Young Inventors camps for children 5-17 years); (c) the staging of exhibitions and outreach activities that build awareness of innovation and invention; and (d) giving assistance to local inventors for protecting creative ideas, developing prototypes and attending international invention expositions.

2. Demonstrating a strong focus on research and intelligence gathering in the fields of science, technology and innovation (STI). This is exemplified by NIHERST's pioneering efforts in the undertaking of foresighting and innovation studies from 2005 to the present. A specialised capacity to collect and analyse data and information on STI indicators has proven invaluable to NIHERST's role in the provision of policy advice and prescriptions to the Ministry. Created in 1997, NIHERST's S&T Statistics Department compiles data to inform S&T policy formulation and planning. The institute has played a key role in STI planning and the preparation of three draft national policies on S&T over the period 1997-2013.

3. Building linkages with regional and international organisations and managing collaborative projects in research, science and technology sponsored by external agencies. The International Projects Department manages collaborative projects with external agencies such as the Organization of American States (OAS), the UN, and the CTA ACP. The unit also supports the operations of the Caribbean Council for Science and Technology (CCST) and the Global Water Partnership-Caribbean (GWP-C) whose secretariats are hosted by NIHERST.
4.

Services/Products

The following summarises the services and products that NIHERST provides to the national community:

1. Science popularisation

National Science Centre	Tue-Fri 9:00 a.m.-4:00 p.m. Under 5 years: Free, 5-17 years : $10 & 18 years and Over: $20 Hands-on exhibits and activities on: animation, astronomy, energy, the environment, disaster awareness, the human body, music, sports and wellness, robotics and more. Schools can plan special science themed visits.
Sci-TechKnoFest	Mega science and technology festival held biennially on a specific theme. Past festivals have covered: science in everyday living, connectivity, energy, the environment, health and wellness, creativity, innovation and sustainability, and inventions. Admission – price varies
Caribbean Youth Science Forum (CYSF)	Annual, week-long programme of lectures, workshops, field trips, design challenges and more for regional lower sixth form science students. Local participants - TT$900; Regional - US$160
Community Science Weeks	Rural and underserved communities come alive with science, technology and innovation. The content is driven by community needs. Free admission
Robotics, Creativity & Design	The Robotics and Creative Design Labs – workshops, road shows and themed visits at the National Science Centre
Vacation Camps	A variety of STI themed camps ranging from 1 to 3 weeks Various venues in Trinidad and Tobago July/August vacation period for children 5-17 years Price varies from TT$100 plus per week
Clubs	Science Club Free to join SciEng Club Free to join Robotics Club TT$100 to join

Community Centred Design and Innovation (COMDESI)	Forms 3 and 4 students acquire a working knowledge of the innovation process and engage local communities in developing innovative solutions to real life community problems. 8 secondary schools annually Hosted for free
Science Road Shows	Target primary science education, particularly in schools in underserved areas, and help to bring to life concepts being taught at that level Hosted for free
Workshops for Secondary Students	Focus on difficult areas of the CSEC examinations in physics, biology, chemistry and math Hosted for free
Educational Resource Materials	Print and DVD resources including online downloads Some examples: - Caribbean Women in Science and their Careers - 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)
National Awards and Competitions	- Awards for Excellence in Science and Technology - Prime Minister's Awards for Scientific Ingenuity - Science Music Video Competition

2. Research and intelligence gathering

S&T Statistical Department	Conducts surveys on science, technology and innovation (STI) and analyses the collated data to inform policy formulation and planning. Publications available at TT$50.00 or US$12.00 See: http://www.niherst.gov.tt/research/research-statistics.html Examples - Survey on the Public Perception of Science 2012 - Survey of Science in Secondary Schools 2011
Policy Research and Development Department	International benchmarking and comparative studies on STI, policy support and advocacy in developing a national STI policy

3. Special projects and collaborative relationships

Collaborating Agency	Project
Caribbean Council for Science & Technology (CCST), CTA ACP-EU, CARDI, UWI and the Trinidad & Tobago Film Company	Caribbean Science and Agriculture Film and Video Competition and Caribbean Tales Film Festival
NASA	NASA International Internship Program tenable at NASA Ames Research Centre
U.S. Embassy in Port of Spain	National Youth Science Camp, West Virginia, U.S.A.
Toco Foundation	Eco-Solutions: Environmental Solutions for Sustainable Communities
Caribbean Council for Science & Technology (CCST)	Hosting of its Secretariat
Global Water Partnership-Caribbean (GWP-C)	Hosting of its Secretariat

With the construction of Science City in Couva, which will accommodate the headquarters of NIHERST and a state-of-the-art, permanent national science centre (to replace the rented facility at D'Abadie), the institute will be expanding in exciting new directions, to better serve, educate and engage the national community and citizens of all ages. New offerings will include internship, research and investigation opportunities for students at all levels.

Business locations

During the reporting period, NIHERST staff were housed at three (3) locations as follows:

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.

b) Corporate Structure

NIHERST is governed by a Board of Governors whose term of office is for a period of three years. The NIHERST Act allows for 14 members, excluding the NIHERST president who is a member ex officio. During the reporting period, the Board had 10 members (excluding the president) as follows:

Prof. Prakash Persad –Chair
Mr. Brian Juanette – Deputy Chair

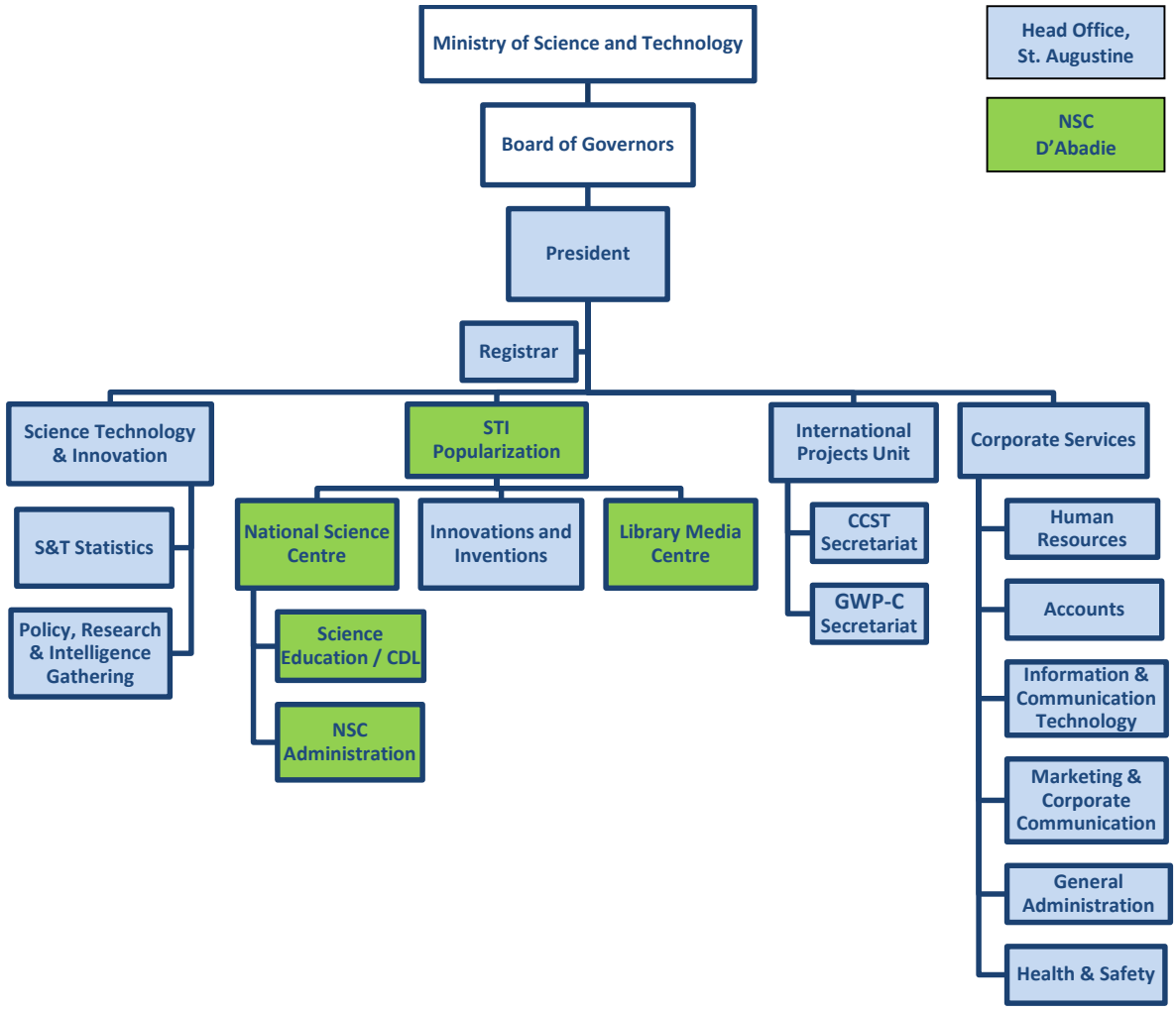
Mr. Ralph Campbell – Member
Mr. Cecil Caruth – Member
Mr. Raphael Esdelle – Member
Ms. Parbatee Helen Maharaj – Member
Dr. Rawatee Maharaj-Sharma – Member
Ms. Denice Ramdhan – Member
Mrs. Karen Rosemin – Member
Mr. Andre Thompson – Member

There were two standing committees - Human Resource & Industrial Relations and Finance & Audit - that considered matters in their respective areas and provided recommendations to the full Board.

The executive team leadership team comprised a cadre of senior officers who had helped to build the institute from its inception as well as a new generation of leaders. The team comprised:

President – Mrs. Maureen Manchouck
Vice President of Science and Technology – vacant (since 1991)
Registrar & Head of International Projects – Ms. Joycelyn Lee Young
Senior Human Resources Officer – Mrs. Giselle Dinzey
Senior Accountant – Mr. Nazir Mohammed
Senior Statistician – Mr. Daniel Deen
Science Education Advisor - Ms. Althea Maund
Senior Policy Analyst – Ms. Julie David
Systems Analyst II – Mrs. Kathy-Ann Joseph Creese
Administrative Officer IV (NSC) – Mrs. Kalawati Sookhram
Administrative Officer IV (General Administration) – Mrs. Lorraine Rollock.

The institute's corporate structure by function, as at September 2013, comprised the key operational areas and departments/units outlined in the chart below.



The departments perform the following functions:

- Science, Technology & Innovation (STI). The two departments falling under this area are responsible for STI statistical research, and STI policy research and intelligence gathering. The overall head is the Vice President of Science & Technology, a position that is unfilled. However heading the S&T Statistical Department and the Policy Research and Intelligence Department are the Senior Statistician and Senior Policy Analyst respectively. They both report to the President. The policy department has a cadre of three officers and the statistical department four officers, who are supplemented by field officers, consultants and other contracted personnel as needed.

- STI Popularisation. This is the largest operational arm of NIHERST and comprises the National Science Centre (NSC) at D'Abadie, which is responsible for supporting science

education in the classroom and conducting out of school programmes to inspire and nurture minds in science and technology. There are three key departments under NSC: (a) the Science Education Department, which is led by a Science Education Advisor; (b) Media Library Centre, which houses a special collection of resources in S&T Policy and Science Education, and which is headed by a Senior Librarian; and (c) Administration and Facilities, which is led by the Administrative Officer IV. Complementing NSC's work is the Innovation Department, which undertakes initiatives to seed a culture of creativity, inventiveness and entrepreneurship ("technopreneurship"). The department is headed by a Senior Programme Officer and operates the Creative Design and Robotics Laboratories at NSC. The Innovation Department and NSC have a cadre of 14 and 60 officers respectively.

- International Projects. This department manages the regional and international projects in which NIHERST is engaged, as well as special collaborative projects with other national entities. The unit is headed by the Registrar and has a staff of five officers.

- Corporate Services. Under this operational area falls the key corporate services of: (a) human resource management (recruitment, pension and benefits, staff development and training, and industrial relations), which is directed by the Senior Human Resource Officer who supervises seven officers; (b) accounts, which has responsibility for budgeting, finance and accounts, and is headed by the Senior Accountant who supervises five officers); (c) ICT (hardware and software support, database management, etc.) which is directed by the Systems Analyst 11, who supervises four officers; and (d) general administration (property and facilities management, security, etc.), which is headed by the Administrative Officer IV, who supervises a staff of 12 officers. The Systems Analyst II reports to the Registrar but all other heads report to the President.

- Registrar. This officer performs the function of Secretary to the NIHERST Board of Governors and such other duties as assigned by the Board, as per Section 9 of the act establishing the institute. The Registrar is responsible for preparing and securing the minutes of meetings of the Board, copying the same to the line Minister, as well as being the custodian of the seal of the institute.

c) Delegated Levels of Authority

The Board has not delegated any of its functions to the President. The President, as the head of the organisation, oversees all operations and, in the absence of the Vice President for S&T, the President's authority for oversight falls 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 President and, in her absence, the

Registrar can approve expenditure up to $75,000.00 for specified operational goods and services. Any other expenditure exceeding these levels up to $450,000 would require final approval from the President as recommended by the Management Tenders Committee. See Appendix 2 for the procurement policy.

d) Legislative and Regulatory Framework

NIHERST was established via Act of Parliament No. 20 of 1984 (Chapter 39:58 of Laws of Trinidad and Tobago). A copy is attached hereto in Appendix 3. The Act places the institute under a ministerial portfolio for policy and other direction. Ministerial control is defined in more detail below.

The Act sets out in Section 12 the functions of the institute, which are to:

a) provide and promote scientific and technological services in the country;
b) promote and develop an indigenous capability in science and technology relevant to the developmental needs of the country;
c) assist national bodies and/or organisations in securing technology appropriate to their needs;
d) promote and operate facilities for higher and continuing education and in particular to -
    i. undertake, promote and facilitate scientific and technological research and development and the provision of scientific and technological services;
    ii. provide, promote and facilitate the provision of continuing education and specialised training at the post-secondary level;
    iii. develop and collect information on scientific and technological development, to evaluate technologies used in or to be imported into the country and to facilitate the dissemination and application of new technologies;
    iv. assist persons and organisations in securing access to technology appropriate to their needs;
    v. designate where it considers it appropriate certain training institutions as approved bodies for the purpose of providing specialised and continuing education;
e) discharge such other related functions as the Minister may assign to it from time to time; and
f) do all things necessary, incidental or ancillary to the efficient discharge of its functions.

Function at *d)* above was repealed by Act No. 77 of 2000 establishing COSTAATT.

The Act gives NIHERST the powers, with the approval of the Minister, to:

a) establish divisions or departments, research centres and such other facilities as it considers necessary for the discharge of its functions;

b) undertake activities in the fields of research, science, technology, specialised education, continuing education and related matters, and the provision of scientific and technological services;
c) designate certain training institutions as approved bodies for the purpose of providing specialised training and continuing education;
d) establish and administer examination councils and award certificates, diplomas and other evidence of competence;
e) charge fees for services; receive grants, bequests, donations and gifts; be a beneficiary under covenants; and establish and administer trusts for the purpose of discharging its functions;
f) employ officers necessary for the discharge of its functions at such remuneration and on such other terms and conditions of employment as it thinks fit;
g) give certificates of distinction to institutions or persons making outstanding contribution in its fields of concern;
h) liaise with external programmes in research, science and technology and the provision of scientific and technological services; provide representation on behalf of the Government on same; and advise the Minister on co-operation with other countries on scientific and technological activities; and
i) invite and accept the co-operation for the purpose of devising, funding and operating programmes related to its activities.

The Minister exercises control over policy direction, finances and the appointment of the President of the institute, apart from the exercise of the above-mentioned powers. Specifically, the line Minister has the power to:

a) advise the President of the Republic of Trinidad and Tobago on the appointment of the President of the institute inclusive of remuneration, terms and conditions of employment, as well as the termination of such appointment;
b) establish on its own behalf or jointly with other persons approved by the Minister research centres and such other facilities as it considers necessary for the discharge of its functions;
c) determine the remuneration and allowances payable to persons appointed to committees set up by the Board and who are not Board members per se;
d) direct the Board on policy matters and on the discharge of its functions or the exercise of its powers; and
e) give approval for:
    - the payment of the annual salary of officers or employees in excess of $50,000, or such greater sum as the Minister may by Ordinance determine;
    - the build up of reserves and their investment in securities;
    - the borrowing of money in excess of $100,000 to discharge its functions;
    - varying by Order the amount that may be borrowed; and
    - the pledging of the institute's assets as security for any loan.

Finances

With respect to finances, NIHERST is governed by Guarantee of Loans (Statutory Authorities) Act regarding loans, as per Section 20 of the NIHERST Act. Other governing regulations are as follows:

a. The Financial Regulations – 1965
b. The Financial Instructions – 1965
c. Exchequer and Audit Ordinance
d. Call Circular issued by the Ministry of Finance for the relevant year in which the Budget is due.

Human Resource Management

NIHERST adheres to the following acts and governing regulations:

a. Industrial Relations Act 23 of 1972, Chapter 88:01
b. Maternity Protection Act, 1988
c. Minimum Wages Act 35 of 1976, Chapter 88:04
d. Equal Opportunity Act, 2000
e. Occupational Safety & Health Act, 2004
f. Workmen's Compensation Act 24 of 1960, Chapter 88:05
g. Retrenchment and Severance Benefits Act 32 of 1985
h. NIHERST-PSA Collective Agreement (January 1, 2005 to December 31, 2007)
i. NIHERST-PSA Memoranda of Agreement for cost items for the period January 1, 2008 to December 31, 2010 dated August 19, 2011, August 16, 2012, and August 23, 2013.

e) Reporting Functions

The Act requires the Board to take policy directions from the line Minister. This is done via the Chairman, who must apprise the Minister on a regular basis, both on policy and operational matters pertaining to the institute.

The Board gives directions to the President on strategic and institutional policy matters as well as policy directions set by the Minister. The President reports to the Board on the operations of the institute including finance, human resources, and matters of policy. The President also takes instructions and reports to the Permanent Secretary of the ministry on matters referred to the institute by the Permanent Secretary. By law, the President is required to submit an annual report on the activities of the institute within six months of the end of each financial year to the line ministry. Reports on achievements have been submitted as required for inclusion in the ministry's annual report.

In addition to the above, NIHERST also reports on its finances and budget, both annually and monthly, to its line ministry and the Ministry of Finance. It reports monthly, quarterly and annually to these ministries and the Ministry of Planning and Sustainable Development for funds under the

PSIP. Quarterly and annual progress reports are also submitted to the Office of the Prime Minister. Special reports are submitted on request, as needed.

Section 3: Policies and Development Initiatives

a) Policies

NIHERST has been spearheading the formulation of a draft national S&T Policy to focus the investment in S&T in the country, to support Government's development goals and identified thrust as outlined in the Medium Term Planning Framework and other relevant policy documents. It will also steer the institute's strategic direction and work programme. Details of work done on the policy during FY 2013 are given in Section 2.2 below.

From an institutional standpoint, the need to update existing policies and to fill policy gaps in response to a changing work environment was recognised. The fixed asset policy and the transport policy were approved by the NIHERST board in April 2013. Work continued on the preparation of the following new policies and updates: environmental health and safety (new), conflict of interest (new), code of ethics (update), disaster management (general and ICT related) (new), and whistleblower (new).

b) Short, medium and long term plans

During the financial year (FY) 2013, the work undertaken by NIHERST, in accordance with and advancement of its 2011-2015 Strategic Plan, and focussed 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 2013, the work programme focused on refining and expanding core activities, all aimed at strengthening national capacity in science and technology to better support Government's development agenda and, in particular, economic diversification. FY 2013 activities and achievements built on the progress made in the first two years of the plan. Some broke new ground; all enabled the institute to continue its leadership role in national STI development in accordance with its mandate, and to advance the mission and goals of the Ministry of Science and Technology.

c) Performance Objectives and Accomplishments for FYs 2011 and 2012

The wide range of programmes and initiatives undertaken by the various divisions of the organisation fall within the three strategic areas cited above (Section 3, a), and are fulfilled *inter alia* through the continued development of informal and innovative teaching and learning

methodologies; ongoing surveys of key sectors and areas of importance to STI development, and data dissemination to specific stakeholder groups; and the fostering and strengthening of strategic alliances with national, regional and international agencies.

Strategic Goal 1: Fostering a national culture of science, technology and innovation

1.1 Construction of NIHERST Science City

NIHERST will be establishing a unique Trinidad and Tobago Science City model for the 21st century that will involve children, teenagers, young adults and their families directly in the process of science and innovation, by tackling real world issues of climate change, food security, water stress, renewable energy inter alia; engaging leading scientists, and promoting trial-and-error experimentation. The project's objectives are to:

- Grow and excite the next generation of science-confident citizens by providing a fun place for opening young minds to the sciences and for developing a culture of innovation;
- Act as a catalyst for the revival, growth and socio-economic development of the Couva region, preserving significant science and technology aspects of our national heritage and providing a unique tourism attraction to international visitors;
- Form a national hub around which organisations and associations in fields such as environmental awareness, astronomy and health care can widen their appeal to new audiences;
- Provide employment for secondary school and tertiary graduates through internships, part-time and full-time employment, and opportunities for the conduct of experimentation, research and development, and innovation;
- Complement and help to improve science education in the primary and secondary school system and provide training for teachers in self-directed discovery learning; and
- Release rental/leased office facilities, thereby effecting savings.

The first phase will see the construction of a state-of-art, purpose-built National Science Centre, to provide experiential science learning facilities for developing a population and workforce that is scientifically literate, technology savvy, and innovative. This phase will comprise the planning, design and construction of the following facilities:

- Main building consisting of reception area, exhibition halls, laboratories, offices, food court, storage and bathroom facilities
- Maintenance and staff building
- Workshop building

- Amphitheatre
- Planetarium
- Outdoor Science Park comprising various attractions
- Kids area of Playscape and kiddie science houses
- Outdoor food kiosks and washroom facilities
- Car parking facility
- Wastewater treatment facility
- Primary and secondary dams
- Retention ponds
- Landscaped areas along with footpaths, trails and a boardwalk
- Security booth and taxi drop-off area.

The approved funding for preparatory work on this phase was $10,000,000.00. Actual Expenditure in Fiscal Year 2013 was $1,300,152.00 (VAT exclusive).

Contracts were awarded for:

a. Environmental consulting services for attainment of a CEC from the EMA. These services were completed and a preliminary CEC was granted.
b. Land surveying services. The services were completed.
c. Installation of boundary fence. The fencing was not completed due to a shortage in the supply of materials from the sole supplier.
d. Grass cutting services. Services are supplied on a regular basis to prevent tall overgrowth of the grass during the wet season and to avert bush fires during the dry season.

A major setback for the project was the process to secure title to the land and the preparation and negotiation of a single agreement with architects (main consultant) and engineering design consultants (sub-consultants) for design services. NIHERST opted for this approach as it would eliminate delays in data transfer, reduce errors caused by data transfer during the design stage, reduce liability of claims from either party for additional works carried out due to deficiencies in data transfer, and reduce the complexity of communication channels.

1.2 Science Popularisation

Fostering a culture of creativity and innovation propelled by advancements in scientific knowledge and technology is a complex and long-term development task. It requires a multi-pronged approach that more fully engages the general public, students of all ages, and business and educational institutions.

All countries today require their populations to be highly trained in the new and emerging scientific technological disciplines that are now driving growth, prosperity and global competitive power. These include robotics, biotechnology, nanotechnology and the ongoing advancements in ICT. The building of a critical mass of dynamic and creative scientific and engineering professionals rests on early and on-going nurturing of interest in science and technology, and high quality education - both through a modernised formal education system as well as through complementary, timely and frequent informal educational experiences that can inspire students and show science in a real world, relevant context beyond the classroom.

The **National Science Centre (NSC)** has been the main vehicle through which the institute implements its diverse science popularisation programme. Situated in D'Abadie on over 60,000 square feet of land, the centre holds almost 200 exhibits in thematic areas such as animation, astronomy, energy, the environment, disaster awareness, the human body, music, sports and wellness, creativity and innovation, physical disabilities and robotics.

The centre's wide range of on-site and off-site programmes help to raise the scientific and technological awareness, literacy and engagement of the general population, and encourage more young people to pursue studies and careers in science and technology. Exhibits and activities use non-traditional educational approaches designed to make scientific concepts more easily understood and captivating to both children and adults, and to show their relevance and application in everyday life. Many programmes are also directly targeted at developing the creative and innovative capacity of our citizens.

For FY 2013, 18,669 persons visited the centre, for general and themed science visits, with over 13,000 being children, which was an increase on the previous year.

Categories of visitor admissions to NSC 2013:
Adults with groups (free) - 1,040
Children- (5-17) - 10,131
Children under 5 - 3,087
Adults 18 yrs and over - 3,391
Waived admission - 1,020

Visitor feedback
A survey of 298 visitors conducted during the period showed that:

- 99% of respondents found their experience enjoyable;
- 96% found the educational value of the exhibits to be above average (i.e. good or excellent), with the majority leaning towards excellent; and

- 72% had visited the centre before, with 46% of this group of repeat visitors indicating that they had visited the centre more than twice before.

This large pool of repeat visitors strongly demonstrates the institute's success in continually engaging visitors in the activities of the centre, as well as advancing the levels of scientific and technological literacy in the visiting population.

The National Science Centre continues to develop its resources in science and technology for the education and enjoyment of visitors of all ages, and especially creating fresh and exhilarating educational experiences for the younger age groups. In February 2013, the Science Education Department initiated the development of pilot hands-on science kits, to be loaned to primary schools for the teaching of specific strands of the primary science syllabus. The kits contain apparatus and instructions, to make the learning of science more interactive, fun and seamless. During the reporting period, the materials put together were tested and the activities refined, and these hands-on models were utilised in other aspects of the work at the NSC, such as vacation camps and in the teacher resource exhibit.

Also in February, the Centre mounted a week-long exhibition entitled "A Walk Down Memory Lane" to commemorate its 15th anniversary. It showcased exhibit and activities from the "Yapollo" exhibition, which launched NIHERST's science popularisation initiative.

Following are reports on the achievements of specific or flagship programmes and main/ongoing activities.

1.2.1 Sci-TechKnoFest 2013

The major science popularisation activity engaging staff at NSC and NIHERST's Innovation Department in FY 2013 was all the preparation for the staging of the large-scale, biennial science and technology festival, Sci-TechKnoFest (STKF), which was held at the Centre of Excellence in Macoya over the period 1 - 20 October 2013.

STKF is a key platform for fostering citizen awareness and literacy around STI and reducing the barriers to knowledge and understanding. NIHERST showcases cutting-edge concepts in science, technology and innovation in a rich variety of exhibits and activities to appeal to and engage citizens of all ages. Previous festival themes explored science and technology in daily life, connectivity, energy, the environment, health and wellness, and creativity, innovation and sustainability.

The 2013 festival theme was "Celebrating Human Ingenuity", which brought to life the world of science and innovation by telling the story of human creativity and the collective experience of

inventing and innovating, which has defined and advanced civilisations throughout history and which is the key driver of the global economy today.

The festival consisted of in-house exhibits from the National Science Centre; new exhibits and activities created specially for the festival; external exhibits by over 30 public, private and civil society agencies showing the application of STI in their operations; a science theatre; and specially themed exhibit areas catering to specific age groups (early childhood, primary and secondary school levels).

More than 43 secondary and tertiary school students were trained as science explainers, which served to broaden their knowledge and their appreciation of the importance of science to society, and orient them towards further studies and careers in science and technology.

1.2.2 Caribbean Youth Science Forum (CYSF)

The annual week-long Caribbean Youth Science Forum (CYSF) is the leading and longest standing non-formal educational programme for nurturing the next generation of scientists and engineers in the region. It is held in the first week in August and targets lower sixth form science students.

The forum serves as a unique and enriching platform for inspiring and mentoring young people towards advanced studies and careers in STI. It aims to broaden their knowledge; develop their creative thinking and problem-solving skills; foster in them a sense of pride in the region's scientific heritage; and awaken their minds to the potential and possibilities that lie before them through careers in science and technology. Students benefit from a first-rate science education experience which provides the right mix of academic, social and cultural activities for their holistic development, and heightens their sense of identity as the region's future leaders in STI.

The core educational components of CYSF are:

- presentations by, and engagement with, leading local and international speakers for knowledge on new and emerging technologies that are impacting global development, as well as mentoring and career guidance;
- field trips to research institutions and S&T-based companies where students can see "science in action" and potential career paths; and
- group challenges that push students to apply their scientific know-how, and develop their creativity, innovative and problem-solving skills, and ability to work in teams.

In 2013, the forum received 173 students from Antigua, Barbados, Grenada, St Lucia, Jamaica, and Trinidad and Tobago. During the week, students explored issues in the fields such as robotics/mechatronics; mobile communications, forensic science, green and smart building, geology/earth science, organ transplantation, energy, resource efficiency, and agriculture and food

technology. The two Science HardTalk sessions, where the participants posed tough questions to a panel of experts, focussed on issues related to robotics/ mechatronics, and sustainable agriculture and renewable energy. The design challenge required teams to design and build a trebuchet.

The visiting keynote speaker was Dr. Sanjeev Seereeram, a Trinidad-born computer and systems engineer and a recognized expert in intelligent autonomy systems for advanced robotics. Dr. Seereeram, who is Senior Vice President of Research and Development at Scientific Systems Company, Inc. (SSCI) in the USA, has been engaged in research, development, and hands-on systems/software design for US government agencies like NASA and the National Science Foundation. His presentation was entitled: "Robotics: From Science Fiction to Reality." His participation was sponsored by the US Embassy in Port-of-Spain.

1.2.3 Community Science Weeks

Started in 2003, this pioneering outreach initiative, designed to increase the scientific awareness and literacy of all citizens, has benefitted over 50,000 children and adults from 16 communities across Trinidad and Tobago. A core part of NIHERST's science popularisation programme, literally "taking science to the people", science weeks are structured to make knowledge of, and developments in, science and technology more accessible to people in rural areas and communities that are under-served by the National Science Centre. Through stimulating experimentation, demonstrations, workshops and exhibits that aid both teaching and learning, educators and students are able to better grasp scientific concepts, processes and issues, and understand their full impact on society and development. Every science week is "owned" by the particular community - tailored to meet its unique needs and demands. There is a large degree of involvement by community stakeholders in planning the content and execution to ensure the exhibits and activities cover topics and areas of maximum relevance and appeal to community members and the local economies.

In 2013, NIHERST hosted the following four Community Science Weeks, attracting a total of 10,803 school children and residents:

- Siparia Community Science Week held at Penal Government Secondary School: 15-20 October, 2012
- Caroni East Community Science Week held at Cunupia Government Primary School: 28 January - 2 February, 2013
- Toco Community Science Week held at Toco Secondary School: 4-9 March, 2013
- Cumuto/Manzanilla Community Science Week held at Manzanilla Secondary School: 22-27 April, 2013.

The events, enabling visitors to explore science and technology in new and inspiring ways, featured interactive exhibit areas, workshops, science shows, cultural performances, media library activities, an astronomy night for viewings of the night sky through high-powered telescopes, and a career day. Some of the topics covered included: climate change, lifestyle diseases, natural

disasters, robotics, environmental protection, new farming techniques, energy, and rainwater harvesting. These weeks are heartily embraced by educators and leaders in these communities.

Feedback from visitor evaluation surveys for these science weeks showed they were very well received by the community, with visitors of all ages expressing full satisfaction with the content and materials presented.

1.2.4 Robotics

Although creativity and innovation underpin all the work programmes of NIHERST, given its national importance to people-centred development, the institute pays special attention to this through its Robotics and Creative Design Labs (CDL). Robotics, including automation and artificial intelligence, is one of the cornerstones of technological advancement and innovation globally and is an area of that needs to be fostered as Trinidad and Tobago builds its S&T capacity.

Consistent with the approach taken by the NSC, the labs deliver a wide range of very popular activities at vacation camps, workshops, road shows, Community Science Weeks, outreach activities and themed visits, to develop a creative and innovative mindset amongst nationals. This exposes students of all ages to the application of the technology beyond their classroom work, including technology not yet taught within the formal school system.

The robotics activities provide students with the real life application of the programing and IT skills that they would have learned in theory in the classroom setting. Students can see the transition from theory to practice as they use algorithms to program a robot's tasks. Critical thinking skills are honed as persons must think logically as they arrange the robot's tasks in sequential steps. Visitors also get to see robots and robotic applications that allow humans to perform tasks more efficiently or ones that may otherwise too dangerous. Some of these include robotic arms, bomb disposal robots and robotic vacuum cleaners.

For the period January to April 2013, CDL conducted 23 electronics and robotics workshops reaching over 1,300 students in South Trinidad. The 1-day electronics workshops covered topics such as Physics of the Atom, Electricity and Electronics, Power Generation and Distribution. Students also built speakers as part of the electronics project. The 1-day Robotics workshops focused on introductory robotics. The students built their own robots using Lego Mindstorm robotics kits, and were taught how to program them. CDL also conducted two AutoCAD workshops at NSC catering to 12 persons per session.

1.2.5 Vacation camps in Science, Technology, Innovation and Invention

NIHERST offers an expanding range of camps during the July/August vacation period targeting young people between the ages of 5 and 17 to continue and broaden their science learning outside of school with high quality, hands-on experiences of science and cutting edge technologies. The camps' content cuts through the disciplines of ICT, science, engineering and math, and there are four distinct themes in the varied camp offerings: science, technology, creativity and innovation, and engineering. Portions of the content are geared towards enriching the existing curricula, while other parts focus on providing children with science content that they would not normally encounter at school. The science camps focus on scientific principles and concepts while the other camps expose children to the applications of science and the basics of the innovation process and entrepreneurship ("technopreneurship"). Camps also blend science with the arts to provide a holistic experience and fully engage students.

The camps satisfy the interests of all age groups with emphasis placed on boosting creative thinking and problem solving using science and technology. They have been oversubscribed in recent years, with parents requesting longer sessions, so the number and duration of camps have been expanded.

In FY 2013, a total of 588 children took part in the following highly interactive camps.
The two-week long Funology and Explorer camps catering to children and teens in the age categories 5-7 years and 8-12 years respectively. Both camps are run simultaneously on the same dates and at the same locations across Trinidad, viz. Port of Spain, Preysal and San Fernando.

Venues	**Dates**	**Funology Camp Attendance**			**Topics**
		Males	**Females**	**Total**	• Solar Energy • Magnetism • Forces & Motion • Light & Colour • Go Green • Wacky Science
St Francois Girls' College	8 – 19 July	28	32	**60**	
Preysal Secondary School	22– 26 July	21	17	**38**	
UTT San Fernando Campus	5–16 August	38	30	**68**	
				166	

Venues	**Dates**	**Explorer Camp Attendance**			**Topics**
		Males	**Females**	**Total**	• Aerodynamics • Civil Engineering • Electricity • Robotics • Optics • Mechanical Engineering • Chemical Engineering • Wacky Science
St Francois Girls' College	8 – 19 July	39	31	**70**	
Preysal Secondary School	22 – 26 July	18	17	**35**	
UTT San Fernando Campus	5–16 August	34	36	**70** **175** ====	

The Young Inventors and Robomania camps are three weeks long and target teenagers (13-17 years). They are held at the National Science Centre as well as the UTT San Fernando Campus and Debe High School). The Robomania camps covered: an introduction to robotics and programming; frequency and amplitude (obstacles detection); advanced programming; sensors; gears and speed; and principles of design. Participants in Young Inventors learned about aerodynamics, Auto Cad, electrical and electronic engineering, renewable energy and reverse engineering.

Camp Venue	**Dates**	**Male**	**Female**	**Total**
Robomania (NSC)	15th July-2nd August	27	4	31
Young Inventors (NSC)	15th July-2nd August	21	10	31
Robomania (UTT)	12th-30th August	23	7	30
Young Inventors (Debe)	12th-30th August	17	12	29
Total		**88**	**33**	**121**

Computer-based Tech Camps, of varying lengths, have something for each age group and were run back to back at the National Science Centre over the July - August period. The one-week e-

Magination camp for ages 7-11, using Scratch (visual programming software) basic level, enable participants to create and share their own animated stories and interactive games while enforcing important mathematical and computational ideas. The two–week Anim8 camp for ages 13-17 teaches 3D modeling, animation, effects, and rendering. Students also learn to create their own 3D character. The two-week Gamerz World camp for ages 13-17 uses Unity software to enable students to learn the fundamentals of 3D game development and game logic as well as create a working level in a video game. The one-week App Builders camps introduces campers ages 12-17 to app development for Blackberry and Android systems and how to create a simple mobile app. Dot.Com for ages 13-17 teaches students to code in HTML and CSS to create their own websites.

		Camp Attendance		
Camp	**Dates**	**Males**	**Females**	**Total**
e-Magination L1-NSC	8 – 12 July	15	4	**19**
e-Magination L1-NSC	29 July- 2 August	11	3	**14**
e-Magination L2-NSC	8 - 12 July	11	2	**13**
e-Magination L2-NSC	29 July- 2 August	15	4	**19**
Anim8- NSC	15 - 26 July	11	5	**16**
DotCom-NSC	5 -9 August	13	4	**17**
AppBuilders-NSC	12 -16 August	9	6	**15**
GamerzWorld- NSC	19 - 30 August	10	3	**13**
TOTAL				**126**

NIHERST's 2013 Sci-Spy and Eureka camps offered participants a wide range of hands-on, minds-on experiences in various science fields. While both camps share the same topics, Sci Spy camp's content is geared towards using exploratory strategies and techni
ques to introduce campers to topics that they would not normally encounter in their school setting. The Eureka camp is more advanced and offers campers a deeper level of engagement with the content.

Children got to dig for dinosaur fossils, practise innovative agricultural methods, participate in chemistry experiments, undertake crime scene investigation, engage with physics concepts, and learn about and make their own models of various organs. NIHERST also added four outreach camps to their line-up, viz. in Maloney, Warrenville, Diego Martin and St. Joseph. Incorporating topics taught at the NSC camps, the camp instructors brought the experience of science and technology to students who would not normally attend our camps.

Camp Name	Age Group	Venue	Date	Topics	Male	Female	Total
Sci-Spy	7-9	NSC	8 – 26 July 5 - 23 August,	Animals Attack Science vs Magic Rides, Slides, Coasters Surviving the Wild Body Basics Dinosauria Green Thumb Agent NSC	64	48	112
Eureka!	10-12				67	32	99
Maloney Outreach Camp	7-12	Maloney Senior Citizens Centre	29 July – 2 August	Body Basics Dinosauria Green Thumb Agent NSC			30
Warrenville Outreach Camp	7-12	Warrenville Community Centre	5 – 10 August (9 Aug was public holiday)	Animals Attack Science vs Magic Rides, Slides, Coasters Surviving the Wild TECH CAMPS : e-Magination			30
Patna Village Outreach Camp	7-12	Patna Government Primary School	12 – 16 Aug	Body Basics Dinosauria Green Thumb Agent NSC			30
Farm Road Outreach Camp	7-12	St. Joseph Secondary School	19 – 23 August	Animals Attack Science vs Magic Rides, Slides, Coasters Surviving the Wild			30

1.2.6 Clubs

The various clubs run by the NSC provide opportunities for students to expand and deepen their knowledge of scientific concepts as applied to daily life, and foster life-long science learning. All clubs meet twice a month.

- *Science Club*: Offers hands-on science activities for upper primary and secondary students (ages 9 to 17), based on curriculum and non-curriculum science content. The club aims to encourage students to pursue studies in the sciences. As of December 2013, the club enrolled 151 juniors and 171 seniors, a total of 322 persons, an increase in membership from the previous year. Meetings engaged members in a variety of hands–on interactive activities on topics such as botany (leaves), cell biology, balloon rockets, green houses, fun experiments on measurement and the science of sound for juniors; and electrolysis, a design challenge (stationary bridges), idea conception (playground), wind turbines and greenhouses for seniors.

- *Sci-Eng Club*: This club was launched at Debe High in January 2012 for forms 1-5 students who convene twice a month. The 28-member club (15 boys and 13 girls) benefited from the hands-on activities that reinforced concepts in the secondary school science curriculum. Topics covered included: introduction to telecommunications, the science of sport, computer hardware engineering, computer software engineering, electronics, soldering, sustainable energy, paper recycling, aerodynamics, mechanical engineering, simple machines, buoyancy and stability.

- *Robomania Club***:** In 2013**,** the 34 club members worked on various projects, including various designs of stair-climbing robots and a maze solving-robots.

1.2.7 Astronomy Nights

A total of 1541 visitors attended the four Astronomy Nights held at NSC in 2013, which were in March 22nd (293); April 12th (434); June 14th (302) and August 23rd (512). In addition, astronomy viewings held at two Community Science Weeks (Caroni East and Toco) attracted 460 visitors.

1.2.8 Community-Centered Design and Innovation (COMDESI)

Based on the EPIC programme of leading US universities (notably Purdue University), the COMDESI project provides students in Forms 2-4 students with an educational experience in working with communities to devise viable solutions to real world problems. The project is undertaken in collaboration with the Heroes Foundation, which runs a Youth Development Programme in secondary schools. COMDESI participants develop the skills for community engagement, communication, research, problem-solving, critical thinking and reflection, along with report writing and presentation skills. They learn the rudiments of the process of innovation and how to move from a creative idea to a prototype, and receive basic training in AutoCAD,

prototyping, intellectual property, project management, and "technopreneurship", which fosters innovative and entrepreneurial thinking and skills using science and technology.

The project develops in students the aptitude for finding solutions to community needs and problems, by applying the knowledge and skills learnt in the classroom, and through the hands-on experience of problem-solving, design and innovation that the programme provides. This contributes to the more rounded development of the students, helping to prepare them for the world of work, and fostering leadership skills and a culture of civic engagement and volunteerism in the next generation.

At its core is a well-structured nine-month training programme that students attend on Saturdays and during the Easter vacation. They also meet with representatives from the targeted communities to better understand their specific issues and needs, and then use the August vacation to work on their solutions and prototypes.

In October 2012, the 4th COMDESI programme was launched with 60 participating students (an increase from the 40 in the previous cycle). The students were from four schools already partnered with the Heroes Foundation - Bishop's Centenary College, St. Francois Girls' College, Barataria North Secondary and St. George's College - as well as four new schools that expressed an interest in taking part - Bishop Anstey High School East, Trinity College East, St. Augustine Girls' High School and Malabar Secondary School.

NIHERST staff served as mentors and made weekly visits to the various schools to meet with the teams. During these sessions, students were taught about civic and community engagement, teamwork and leadership.

The students then attended a two week camp during the Easter vacation, where expert facilitators, Mrs. Legena Henry, Mrs. Dolly Nicholas, Dr. Ruel Ellis and Mr. Buddie Miller, provided training in creativity, innovation, the invention process, technopreneurship, prototyping, research methodology and training in AutoCAD and technical drawing.

Working as separate school teams, students met with stakeholders from the farming community, Autistic Society of Trinidad and Tobago, All Saint's Gordon Home for the Aged, St. Mary's Children's Home, The Blind Welfare Association and Georgina Beckles Day Nursery, to gain a better understanding of the specific issues and needs of these groups. They continued to work on Saturdays during the term on their innovative ideas to assist these groups. Their solutions addressed autistic children's special play needs; engaging the elderly through game play, the desire of the blind to be able to identify their currency; different challenges faced by the farming community such as efficient use of space in a market, irrigation, flooding and water conservation;

and the need for an automated device to mix baby formula for nurseries and another to regulate hot water usage.

The awards ceremony was pushed back to the FY 2014 to accommodate the hosting of STKF.

1.2.8 External outreach events

NIHERST also makes an impact on the national community by taking part in events hosted by valued partners and the education outreach activities of external agencies. The institute pioneering efforts to popularise science over the decades has been a catalysing force for public and private organisations engaging in the promotion of STEM education.

NSC participated in UWI's Cocoa Festival from 2-3 November 2012 with exhibits that included: a "Choco Science" display board with science facts and myths on cocoa and chocolate and the effects on the body; a "Cocoa Jeopardy" board with five knowledge categories; "The Story of Trinidad Cocoa" interactive storytelling for primary school students; and a puppet show on issues related to the cocoa industry and cocoa farming. 500 visitors engaged in these activities over the two days.

The science centre also observes the annual UN Days such as World Environment, AIDS and Food, and prepares special activities and exhibits to enable visitors to be better informed.

1.3 National awards and competitions

1.3.1 Awards for Excellence in Science and Technology

This NIHERST awards scheme, which had been reinstated and rebranded in 2011, honours nationals working both locally and abroad for their outstanding achievements in STI. The scheme also enables the institute to document, through an ongoing series of publications, the accomplishments of these often unknown and unsung scientists, raising their visibility within the wider community, and presenting them as positive role models for our youth, and aspiring scientists in particular. This is indispensable in developing a culture that values the contribution and legacy of its scientists. The publications are distributed to schools, libraries and diplomatic missions. They are often the only detailed biographical material available on the scientists featured.

In FY 2013, NIHERST prepared for the hosting of its 2nd Awards for Excellence in Science and Technology, to take place in November. Staged in collaboration with the Caribbean Academy of Sciences (CAS), the 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, as well as awards for Junior Scientist and Junior Engineer aimed at persons under the age of 35 with exceptional abilities and achievements.

Between April to June, 2013, 32 nominations were received for the 2013 awards. Judging by an international panel was conducted during July-August. Following a rigorous selection process, 18 scientists, including four in the categories of Junior Scientist/Junior Engineer, were chosen for their world-class contribution to science and technology in Trinidad and Tobago and/or overseas. During the reporting period, NIHERST also completed drafting Volume 3 in its ongoing series of publications, *Trinidad and Tobago Icons in Science and Technology*. This issue featured the life stories and achievements of the 17 winners of the 2012 Awards for Excellence in Science and Technology, and is the 7th publication in the S&T icons series.

1.3.2 Prime Minister's Awards for Scientific Ingenuity

The Prime Minister's Awards for Scientific Ingenuity are offered biennially on the basis of two competitions: the Scientific Creative Solutions Competition and the Scientific Innovation & Invention Competition. The 2013 awards scheme was formally launched November 2012, and promoted up to March 2013, which was the deadline for submission of entries for the first stage of judging. Promotion of the scheme was through the traditional and social media as well as sensitization workshops, road shows at tertiary institutions, flyer distribution and emails notices targeting specific institutions and ministries. Five workshops and five road shows were held in January 2013. The workshops attracted over 300 attendees ranging from secondary and tertiary students, teachers and lecturers, to entrepreneurs, tradesmen and craftsmen. These sessions outlined the rules and regulations of the competition and informed persons on Intellectual Property and Intellectual Property Rights, Science and Ingenuity, The Creative Process, Problem Solving, Innovation and Invention.

NIHERST received and evaluated 254 entries at the close of Stage I, with 120 entries going on to Stage II. At the end of the rigorous judging only 57 entries were able to continue on to the final stage. Winners were selected for all categories in the competition, and will be announced and awarded at the ceremony in 2014.

1.3.3 Science Music Video Competition

The NIHERST Science Music Video Competition was launched in June 2012. Unlike the educational material produced in-house by NIHERST for the public, this competition challenges youths between the ages of 14 and 28 to create music videos of their own that show the central role of STI in development, using the medium and power of the creative arts, and young people as the messengers. The aim is for the resulting productions to be promoted on social media platforms and also played at NIHERST events to communicate scientific information in an attractive and appealing way, and engage a broad range of viewers, and above all, our youth. The competition

succeeded in capturing the attention and imagination of the targeted generation as they accepted the invitation to become "ambassadors" for science and technology.

The 2013 competition was launched in March of that year. FLOW was the sole corporate sponsor, providing $65,000 in cable advertising. Over 125 persons throughout Trinidad and Tobago responded enthusiastically to the call to submit concepts. All entries to the competition were broadly classified under Science, Technology and Innovation (STI), but were focused on the following categories:

- Inventions That Changed the World
- Agriculture
- Biotechnology
- Biodiversity
- Climate Change
- Emergency/Disaster Preparedness
- Energy/Renewable Energy
- Computer/Information Communication Technology
- Natural Hazards
- Robotics/Mechatronics
- Medicine/Health/Wellness
- New Materials
- Use of Indigenous/Waste Material.

To assist entrants in the development of their videos, a 3-day training programme was conducted at five locations in Trinidad and Tobago in north, south and central Trinidad and in Tobago. The intense training was greatly appreciated by all participants who wanted more knowledge and skills development for the chance to win the first prize of $30,000. They learned how to address challenges they could face during shooting and editing and how to trouble shoot and improvise. They also delved into the art of writing lyrics and music production; camera, lighting and audio techniques; script writing styles (telling a story that relates to our country or the world in general; highlighting negatives or positives or both; and choosing to be informative, humorous or using history to impact target audience); and the use of Adobe Photoshop for editing.

The teams also received six weeks of mentorship during which draft scripts were critiqued by science personnel to ensure stronger scientific messages in their music videos. The mentorship encouraged: research/use of factual information as opposed to opinions or hearsay; finding a focal point and a channel of direction for the topic chosen; and making science fun and understandable.

Thirty (30) videos were finally submitted for judging. The table below shows the winners awarded at the awards ceremony held on 10th November, 2012 at the Capital Plaza Hotel (now Radisson Hotel).

Table 1: Prize Winners of 2013 Science Music Video Competition

Prizes	**Title of Music Video**	**Team Lead**	**Category**
1st – TT$30,000	Lesson of the Forest	Oliver Milne	Biodiversity
2nd – TT$20,000	Hurricane Hustle	De Anna Mohan	Disaster Preparedness
3rd – TT$15,000	Rockin	Denith McNicolls	Plate Tectonics
4th – TT$10,000	Renewable Energy	Aaronica Patterson	Renewable Energy
5th – TT$8,000	Global Warming	Shemmy Camps	Climate Change
Special Prize 1 – TT$5,000	Concert for My Fans	Kester Omavi Langevine	Climate Change
Special Prize 2 – TT$5,000	The GMO Stand Off	Moses Mike	Biotechnology
Special Prize 3 – TT$5,000	Mr. Influenza	Terry DeCoteau	Medicine/Health/Wellness
Special Prize 4 – TT$5,000	The Beauty of Sound and Light	Riaz Ali	Basic Science
Special Prize 5 – TT$5,000	S.U.P. (Save Ur Planet)	Titan Lee Hai	Climate Change
Total TT $108,000			

The videos have been aired on YouTube as fillers on television stations, bringing greater visibility to the young artistes, some of whom have gained opportunities to perform nationally or create material for other agencies promoting science in the region.

Strategic Goal 2: Research & Intelligence Gathering

One of the key aims of the strategic plan is to strengthen NIHERST's research and intelligence gathering capability, to better support economic diversification through clear policy direction supported by data and strategic foresight. NIHERST has made significant strides in this area through the following:

- the work undertaken by its S&T Statistical Department which conducts surveys on STI and analyses the collated data to inform policy formulation and planning;
- the work of its Policy Research and Intelligence Development, established in the last quarter of 2011, to undertake international benchmarking and comparative studies on STI and to provide policy support and advocacy in developing a national STI policy; and
- the institute's pioneering efforts in foresight studies and supporting activities to seed new high-value added products and businesses and strengthen business development in key sectors and niches.

2.1 S&T Statistical Research

NIHERST has the only dedicated regional capability for collecting S&T statistics for the benefit of policy analysts, researchers, educators, entrepreneurs and decision-makers and also contributing to international and hemispheric databases. Since 1996, the unit has been responsible for issuing over 25 sector-relevant surveys and publications, covering topics or sectors such environmental awareness and practices; public perception of science; innovation in the local manufacturing sector; the food and beverage industry; the performance of students in science and mathematics; and surveys of science and engineering graduates. Data are uploaded onto the S&T Statistical Research page on the NIHERST website. The page received 24,716 hits over the reporting period, which was a 54.4% increase from the previous financial year.

The Statistical Department's 2012/2013 programme of activities included undertaking or completing the following:

1. ***Survey on the Public Perception of Science, 2012***

This study is the second of its kind to be undertaken by NIHERST, replicating the benchmark survey of 2005. The empirical results of this study will therefore measure changes in attitudes towards science over time and also facilitate and inform the development of science policy, communication and popularisation. A report on the results of this study was completed for printing.

2. Survey of Innovation in the ICT Sector, 2012

This study focused on business establishments in the ICT sector of Trinidad and Tobago and provides a profile of these establishments along with indicators on technical product and process, organisation and marketing activities. The results give insights into the developments in the ICT sector and will assist decision-makers in developing policies to create the environment and incentives to foster economic growth. Data analysis was completed and a draft report on the results of this survey was prepared.

3. Survey of Environmental Awareness and Practices, 2013

This survey was launched in the second quarter of 2013. This study is the second of its kind to be conducted by NIHERST, as a similar study was undertaken in 2008. The empirical results will measure changes in attitudes and behaviour towards the environment over time and also facilitate and inform the development of effective environmental management, conservation and communication policies. Data collection and analysis of the results were completed for editing and publication.

4. *The Survey of Science and Technology (S&T) Indicators, 2012*

This annual survey is designed to measure Trinidad and Tobago's investment in S&T and to provide data to the Ibero-American Network on S&T Indicators (RICYT). The major objectives of the enquiry are to develop and maintain a reliable time series of S&T indicators of expenditure and manpower. The sectors surveyed included: higher education, research institutions and public sector establishments. These indicators are available on NIHERST website.

5. Survey of Innovation in the Assembly-type and Related Industries Sector, 2013

This study commenced in the first quarter of 2013. The results of this study will provide insights into the innovation process in the industry in Trinidad and Tobago and assist decision-makers in developing policies to create the environment and incentives to foster economic growth. Data collection was completed for analysis.

2.2 Research and Intelligence Gathering

The work of Policy, Research and Intelligence Department (PRID) on the draft STI policy in the previous fiscal consisted primarily of desk research, compilation of data and secondary source materials, and the drafting of a concept paper and a consultative paper. In 2012-13, PRID's work expanded to include a significant number of stakeholder engagements, via public consultations, and semi-structured interviews with critical stakeholders in the national science, technology and

innovation (STI) system. Thereafter, the department began to formulate a draft policy, and this was the primary activity on PRID's agenda from March to September, 2013.

2.2.1 Consultations on and drafting of the National Science and Technology Policy

Between October 2012 and January 2013, NIHERST in conjunction with the Ministry of Science and Technology (MST) held six stakeholder engagement sessions aimed at soliciting ideas and feedback towards the development of the Draft National Science and Technology Policy. At each session, the objectives and rationale for the policy were briefly presented, and participants were invited to articulate their views and share their opinions on the subject areas to be included in the draft policy.

Of these six sessions, three were workshops with targeted stakeholder groups, and the remaining three were public consultations.

Stakeholder Workshops

- Research, education and training institutions*:* T&T Bureau of Standards, 18 October, 2012
- Business community: T&T Chamber of Industry and Commerce, 19 October, 2012
- Government stakeholders: Ministry of Tertiary Education and Skills Training, 17 November, 2012

Public Consultations

- North Trinidad: T&T Bureau of Standards, 24 October, 2012
- Tobago – Tobago Technology Centre, 31 October, 2012
- South Trinidad: Cara Suites Hotel, 7 January, 2013

Stakeholder Interviews on National Science and Technology Policy

Following the engagement sessions described above, the PRID Team entered into deeper discussions with key stakeholders on the assumption that this level of engagement would precipitate more frank and honest discussions. The objective was to obtain more focused and detailed feedback on stakeholders' most pressing S&T needs as well as the desired public policy interventions.

From January to March 2013, the following one-on-one semi-structured interviews with senior officials from critical institutions in the national innovation system took place were conducted:

- Business Development Company (now ExporTT): 15 January, 2013
- BizBooster, Arthur Lok Jack Graduate School of Business: 17 January, 2013
- Ministry of Labour, Small and Micro Enterprise Development: 17 January, 2013
- Delegation of the European Union in Trinidad and Tobago: 21 January, 2013
- UWI Office of Research, Development and Knowledge Transfer: 22 January, 2013

- UTT School of Postgraduate Studies, Research and Development and UTT Centre for Production Systems: 25 January, 2013
- InvesTT: 30 January, 2013
- UWI Department of Education: 31 January, 2013
- USC Office of Research and Graduate Studies: 21 February, 2013
- Eco-Industrial Development Company of Tobago: 18 March, 2013
- Metal Industries Company, Tobago: 18 March, 2013
- USC School of Science and Technology: 20 March, 2013
- COSTAATT Department of Quality Assurance and Institutional Research: 22 March, 2013

Drafting of the National Science and Technology Policy

Following the stakeholder engagement process, PRID's focus shifted to distilling the information gleaned and incorporating it into the draft Policy. This activity remained the primary focus of the department from March 2013 to September 2013, continuing into fiscal 2013-2014.

The Draft Policy Outline was completed in March 2013. Key chapters of the policy included:

- The National Innovation System of Trinidad And Tobago;
- The Challenges in Building STI Capabilities;
- The Role of Governance in STI;
- Science and Technology in Tobago;
- Policy Prescriptions; and
- Monitoring and Evaluation of the National S&T Policy.

Other activities

In addition to the core activities described above, the department is frequently called upon to make contributions to a variety of projects related to science, technology and innovation, both within the organisation and in collaboration with external partners. The most salient of these assignments are as follows:

National Innovation Policy

PRID provided comments on the draft Discussion Paper for the National Innovation Policy, which was drafted by the Ministry of Planning and Sustainable Development. This is an ongoing process which began in June 2013.

European Union (EU) 11th European Development Fund (EDF) Programme

Department staff has been in discussions with the EU, the EDF Unit at MPSD and other relevant organisations, with respect to NIHERST's role within the 11th EDF Sector Budget Support Programme which specifically targets science, technology and innovation. Such discussions are ongoing, and the Department has provided comments which have been included in the Multiannual

Indicative Programme 2014-2020 Paper for Trinidad and Tobago to accurately reflect the current status of the national STI landscape.

Contribution to the Review of the World Bank Proposed National Broadband Strategy, and SmarTT National ICT Plan 2013-17

Staff of the department reviewed the relevant documents, and represented NIHERST at a meeting to discuss the areas of alignment between the National Broadband Strategy, the National ICT Plan, and TATT's National Broadband Implementation Plan.

Strategic Goal 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/synergistic 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.

In FY 2013, the institute collaborated with the following:

- **Caribbean Council of Science and Technology (CCST) and the Technical Centre for Agricultural and Rural Cooperation – ACP/EU (CTA):**
  - ***The Caribbean Research Innovation and Entrepreneurship Network*** (RIENet) was established in 2010, supported and funded by the CTA and CCST in collaboration with NIHERST. The aim of the network is to build a virtual community of interest that encourages the sharing of experiences, the transfer of "know how" and the provision of role models to encourage a new generation of entrepreneurs and innovators in the region. The network has 505 registered members, with a further 190 registered as 'followers' on RIENet Facebook. In addition to those in the RIENet database, the e-alert continues to be circulated each month to all those who are members of the FAO's Carib-Agri e-mail network in the region and links to the updates are provided to the 1,095 members of the Trinidad and Tobago Entrepreneurship Club (TTEIC) which has a demographic of 25 – 35 years of age; and the www.ttfi.net (TTFI) network (585 members plus 300 on Facebook). This leverages its impact and has increased traffic to the site, as illustrated by the significant increase in the number of hits recorded by the site's statistics monitoring tool. During FY 2013, the number of hits was over 45% up

from FY 2012, and the statistics analysis indicated that some of these hits were coming from around the world, including the USA, the UK, Russia, Germany and Australia.

The network continues to serve as a valuable communications avenue, connecting stakeholders in the research, public, private, and NGO sectors in the region. The articles featured on the website (rienet.net) have been sourced from several Caribbean countries as well as international sources. RIENnet also provides a database of resource persons which can be used to enhance the outcomes of projects and initiatives in the region. A total of 72 articles were uploaded to the website during the twelve months covered by this report i.e. one new item for each of the following six theme areas in each of the twelve months:

- Around the Region
- Champion of the Month
- Research Update
- Success Stories
- Value Propositions
- Foresight & Innovation

The value creation associated with the RIENet during the 2012/13 year can be measured in a number of ways:

- the increased number of visits to the RIENet website and the Facebook page – the former up over 46% on the previous year;
- the featuring of specialist CTA/CCST commissioned research papers compiled by specialist persons and project reports along with links to electronic sources to full presentations and documents; and
- the use of the RIENet database to support a number of specific projects.

One of the primary objectives of the RIENet is to encourage information sharing and collaboration on a regional basis. These examples, coupled with the diversity of source countries associated with the monthly RIENet six theme area updates, demonstrate that these objectives are being delivered upon.

In 2013, NIHERST, in collaboration with CCST, was granted approval from CTA to continue the development of RIENet for another 12 months.

- ***Made in the Caribbean***: This project is coordinated by CCST and implemented by NIHERST, with grant funding from the Perez-Guerrero Trust Fund for Economic and Technical Cooperation among Developing Countries. This activity is part of the Made in the Caribbean Project coordinated by the Caribbean Council for Science and Technology (CCST) and implemented by NIHERST.

The project seeks to help build a foundation of knowledge, skills, attitudes and behaviours conducive to the development of a culture of science, technology, innovation and entrepreneurship in the region. Through the period 10-14th July 2013, two trainers from the NIHERST Innovation Department shared their expertise in Barbados**,** helping to build the innovative and inventive capacity of young people in the island. 16 camp counsellors and educators from primary and secondary schools in the island were trained in workshop sessions to lead 'technopreneurship" for young innovators and inventors between the ages 7 and 17. Technopreneurship fosters innovative and entrepreneurial thinking and skills using science and technology.

Technopreneurship was incorporated into the National Council for Science and Technology (Barbados) camp accommodating over 80 students. The camps tapped the creativity of the children as they learned to design games, musical interfaces and video game controllers using everyday items such as paper, plasticine, water and paper clips. The Barbadian counsellors were thrilled to gain additional teaching methods for engaging students, in a more hands-on way, in learning about science and technology, and imparting the core values of creativity, invention, innovation, leadership and responsibility to the young campers. They found it very rewarding to see the children absorbing knowledge on subjects which just moments earlier they knew nothing about.

- ***Adding Value to Local Foods for Food and Nutrition Security: Myth or Strategic Option:*** This was another joint project between the CTA and the CCST in collaboration with NIHERST. It entailed organising a two and a half day workshop in November 2012 in Jamaica. Discussions were centred on setting a target for achieving increased food availability and some key collaborative and priority setting deficiencies. 36 nutritionists, dieticians, food technologists as well as representatives of marketing boards/agencies, small and medium-scale enterprises, and the research and academic community, comprised the select expert/ interest group who determined targets for the next three years and the mechanisms for achievement as well as the system for tracking and evaluation.

  This project also built upon the productive workshop session held in Jamaica in 2009 which led to the setting up of the Caribbean Research Innovation and Entrepreneurship Network (RIENet). This present initiative leveraged the RIENet and its alliances to act as a catalyst for strengthening value-addition capability and improving the food and nutrition situation in the Caribbean. A strategy paper and three year road map/action plan for increasing food availability in the Caribbean through value addition was the project's major output.

More specifically the project also:

- Reflected on the experiences of the marketing boards, food processing enterprises, nutritionists and dieticians' communities, research and academia and other support agencies in increasing food availability through value addition in the Caribbean.
- Identified the major limitations to growth in agro-processing for food and nutrition security and explore possible options and scenarios.
- Developed a 3 year action plan/roadmap associated with the RIENet, which aims to help achieve empirically measurable progress in increasing food availability through value addition for food and nutrition security.

- **OAS and NISTADS: The International Conference on Science and Technology for Economic Diversification (INSCITED) (see also 2.2.1 above)**

From 5-7 June, 2013, NIHERST collaborated with the Organization of American States (OAS) and CSIR-National Institute of Science Technology & Development Studies (NISTADS), India, to host this first joint conference to promote scientific research collaboration between India, Trinidad & Tobago and other emerging economies facing similar developmental challenges. It served as a platform for interactive learning between India, Trinidad & Tobago, and international experts, policy-makers and researchers in the various areas of higher education and training, labour markets, and science and technology. NIHERST specifically sought to practical policy solutions on the following issues:

- Weak links between science institutions and the private sector
- Outdated or non-existent science and technology policies in most countries
- "Brain drain" associated with scientists, engineers and technicians leaving the region to work in developed nations
- Weak and thinly spread R&D institutions or centres

There were over 100 participants and 17 international speakers from academia, business and industry, and public and private sector S&T and R&D institutions. The main themes addressed were:

- Inclusive Growth and Economic Diversification
- S&T policy for supporting economic diversification and sustainable development
- Human Capital Development in a Globalised Setting
- Leveraging the Diaspora for reverse brain drain
- Emerging patterns of higher education - open and distance learning policies and systems
- Technology and Sustainable Development
- Promoting technology transfer in various sectors and to SMEs

- Developing high technology and ICT-enabled businesses
- Advanced materials and manufacturing.

It was agreed that this would be the first of a series of INSCITED conferences. The conference proceedings will be completed and published in FY 2014.

- **NASA**

  In August 2012, NIHERST signed an agreement with NASA to facilitate local students' access to NASA's International Internship Program (NASA I2, in what is the first such agreement to be signed internationally, piloting the initiative for non-US interns. I2 is one of the most highly comprehensive internship programmes and the ultimate workforce preparatory experience for careers in STEM. Students tackle practical problems that will see real applications in aerospace or on future NASA missions.

  Trinidad and Tobago's top students in science, technology, engineering and mathematics (STEM), at both undergraduate and postgraduate levels, will now have the once-in-a-lifetime chance to participate in NASA I2, which provides a collaborative and integrated environment where they can interact and work alongside US and international peers, both in laboratories and more informal settings. Local interns will be attached in the first instance to the NASA Ames Research Center (ARC) in California, increasing STEM education awareness and helping create international student collaborations.

  Work on promoting the programme and selecting candidates started in December 2013.

- **OAS Working Groups**: NIHERST participated in the Working Groups (WGs) of the Plan of Action of Panama identified for prospective cooperation opportunities in the areas of: Innovation (WG1), Education and Human Resources (WG2), and Technological Development (WG4). As part of these working groups, NIHERST learnt and applied the methodologies of two new studies, viz. the "Survey on Young People's Perception on Science and Technology" and "Business Valuation of Professional Profiles in Engineering" to T&T. With the purpose of training high level human resources in high-quality programs, NIHERST also promoted the CONACYT-Mexico and the OAS scholarships programme to students in Trinidad and Tobago who would like to pursue graduate studies in Mexico. This effort is part of the Memorandum of Understanding signed between the GS/ OAS and the Ministry of Foreign Affairs of Mexico through the Mexican Agency for International Development (AMEXCID).

- **University of Dresden, Innovation and Entrepreneurship Training:** Dr. Sebastian Gurtner and Ronny Reinhardt of the Technische Universität Dresden, Germany lead a training workshop for camp counselors and staff on Innovation and Entrepreneurship. The training took place from the 9-11 April 2013, and covered:

  1. Innovation challenge: creating ideas for a certain market or task using creativity tools, structured evaluation of ideas, rapid prototyping of ideas
  2. Entrepreneurship: create ideas for entrepreneurial projects and realize them within one week.
  3. From an idea to a business model: structure and idea from the core value proposition to a whole business model.

  The training was specially designed to help staff improve NIHERST's training programmes (COMDESI, local and regional Young Inventors camps, etc.) and guide persons submitting entries for the Prime Minister's Awards for Scientific Ingenuity.

- **US Embassy in Port of Spain**: In 2012, NIHERST was invited by the embassy to be its local partner agency in assisting in the selection of Trinidad and Tobago candidates to attend of the annual National Youth Science Camp (NYSC) that takes place in West Virginia. It is open to secondary school students, 16 to 18 years old, from two educational districts which are rotated annually. The two candidates receive a full scholarship. The nearly month-long camp offers opportunities for them to exchange ideas with scientists and other professionals from the academic and corporate worlds. The programme includes: lectures and hands-on research projects presented by scientists from across the US; overnight camping trips into the Monongahela National Forest; and a visit to Washington D.C. Selected delegates must not only demonstrate academic achievement in science, but also show potential for thoughtful scientific leadership. In 2013, 19 candidates from the North Eastern and South Eastern educational districts applied to attend, and Candice Fraser, St. Stephen's College and Huldah Roberts, Toco Secondary School, were selected.

- **The Toco Foundation: Environmental Solutions for Sustainable Communities.** In October 2011, NIHERST embarked on a project to develop more sustainable communities working with the Global Water Partnership-Caribbean and the Toco Foundation. This Environmental Solutions project offers community-based solutions that focus on the issues of sustainable development, disaster preparedness, water conservation through the use of rainwater harvesting techniques, and zero carbon living through the adoption of renewable energy. After consultation with the Barrackpore, Toco and Moruga communities the initial focus was on promoting the

use of rainwater harvesting systems (RWHS) some of which were also combined with solar energy solutions in water-scarce rural communities.

Rainwater harvesting is promoted as a technique to augment existing portable municipal supplies, and as a readily accessible emergency source of water in case of natural disasters like floods, landslide damages and hurricanes, which, may disrupt access to the main municipal water supply. Rainwater harvesting is also seen as one of the means of building climate resilience into the water sector in the Caribbean.

The first installations of the RWHS in July 2012 were at the Rochard Douglas Presbyterian Primary School in Barrackporre, the Cumana SDA Primary School, L'Anse Noire Moravian School, Matelot Community College, Matura High School and Toco Secondary School, in Toco and in Moruga the Fifth Company Anglican School, Fifth Company Baptist School, Cowen Hamilton Secondary School, St. Mary's Government School and Moruga Composite Secondary School.

In 2013, three more schools in Barrackpore benefitted from having the RWHS installed. These schools were the Inverness Presbyterian Primary School, Cunjal Government Primary School and Strange Village Pre School. Phoenix Park Gas Processors Ltd also came on board with the project and has funded the installation of RWHS at three additional schools experiencing water problems to a tune of TT$504,000.00. These schools were Toco Anglican Primary School, Mayo Roman Catholic Primary School and Fishing Pond Presbyterian School. The RWHS at these schools have been outfitted with solar powered water pumps. The way this works is that solar panels are attached to the water pumps. The power from the solar panels will supplement the schools' electricity during normal operations and in the event of a power outage, they will power the water pumps so that the schools will have an uninterrupted supply of water. Thus there will be no need to dismiss classes for the lack of water.

Many schools in Trinidad and Tobago are used as emergency shelters during a disaster incident. If the schools in this project are put into service as emergency shelters, the solar systems and rainwater harvesting system will ensure that these shelters have a supply of water, which is a necessity. As climate change continues to increase the intensity of natural disasters such as drought and flooding, these systems represent cost effective practical steps that small island nations like Trinidad and Tobago can take towards adaptation.

Public education programmes are a key component of this project. Public education was conducted at all schools to teach students about the importance of water

conservation and to help them better understand why the harvesters were being installed at their schools. It was also done to help students appreciate having the RWHS. Since the beginning of this project over 3000 students benefited from this awareness programme.

The rainwater harvesters have proved to be very beneficial to the schools which have experienced water shortages, particularly in the dry season. The additional water supply has helped to decrease the amount of down-time created by the closure of school due to the lack of water. Now the RWHS provide water to flush toilets and wash hands thus improving on school sanitation and eliminating the offensive odour of unflushed toilets. The Rochard Douglas Presbyterian Primary School has estimated that the RWHS has cut its need for truck-borne water by half.

The initiative is also contributing to skills development and entrepreneurship. In each community, a cadre of 10-25 persons was trained to install and maintain the RWHS. Trainees attended entrepreneurship workshops, facilitated by NEDCO and other facilitators to help further develop their skills and knowledge base so that they can ply their new skills within and beyond their communities. The trainees also took part in a follow-up workshop that focused on the costing of RWHS. With training in the installation and costing of the RWHS and in entrepreneurship, the trainees are now better equipped and empowered to go out into other communities to ply their skills and create viable business opportunities for themselves.

This small but exciting project has proved to be very beneficial to many schools and tradespersons. It is hoped that rainwater harvesting will become a sustainable practice that would benefit many more schools, individuals and communities throughout the country. This project was highlighted in international news by IPS-Inter Press Service for World Environment day and in OAS COMCyT success stories in application of STI.

- **Seismology in Schools:** The programme is an adaptation of the successful Seismology in Schools project developed in the UK and adopted by schools around the world. In July 2013 NIHERST partnered with the University of Leicester, Durham University, Imperial College London and the British Geological Survey (BGS) to implement the programme locally. One of the key coordinators of the project in the UK is Trinidad-born, Professor Aftab Khan, Professor Emeritus of Geophysics at the University of Leicester and a highly regarded expert in his field internationally.

  The project is aimed at fostering a deeper understanding and appreciation for geophysics in secondary school students. The programme will introduce practical

seismology activities that show the application of theories and principles taught in the physics, mathematics and geography secondary school curricula. Such activities include the use of seismometers and data recording software to track, monitor and analyse earthquakes around the world.

In August 2013, the Seismic Research Centre came on board the project, followed by the Ministry of Education. With the development of the working team (local and international members), planning of the launch of the programme schedule began.

Section 4: Financial Operations

a) Budget formulation

The institute's budget is prepared based on the activities and programmes aligned to its strategic plan and is formulated in accordance with guidelines in the Call Circular issued by the Ministry of Finance for the relevant year in which the budget is due. The budget is primarily funded by Government by way of subventions, which account for approximately 95% of the total budget. The institute generates the other 5% by way of miscellaneous receipts. The Board approves the budget before it is sent to the line Ministry.

b) Expenditure versus income

Total Income under the Recurrent Budget increased from $29,678,888 in 2011 to $36,603,060 in 2012, to $36,200,000 in 2013 which represents increases of 24% and 22% respectively over the income in 2013.

Revenue from sources other than government's subvention decreased from $1,288,021 of total income in 2011 to $1,063,699 in 2012 (17%) and $979,577 (23%) in 2013. Expenditure grew from $28,593,814 to $35,324,291 in 2012 (123% increase) and $32,561,761 in 2013 (24% increase). Unspent funds amounted to $1,278,769 in 2012. Unspent balances in 2013 totalled $3,638,239, which was due primarily to unspent balances in Contract Employment, Hosting of Conferences and Seminars, Office Equipment and Minor Equipment Purchases.

Income under the PSIP increased from $6,353,000 in 2011 to $8,050,000 in 2012 and $19,300,000 in 2013 which represent corresponding increases of 27% and 204% over the 2013 allocation. Expenditure increased from $5,883,805 in 2011 to $7,172,973 (21% increase) in 2012 and $12,436,441 (1097% increase) in 2013. Bottlenecks pertaining to the allocation of land for the

major project, Construction of the National Science Centre (or Science City), accounted primarily for the institute's inability to fully draw down on the PSIP allocation.

Following is a summary of the expenditure versus income for the reporting period.

Account (Sub-Head/Item/Sub-Item)	2010	2011	2012
A. RECURRENT EXPENDITURE	$	$	$
INCOME			
01 Government Subvention	23490,451	28390,864	36603,060
04 Other Income	900,571	1288,024	1063,699
TOTAL INCOME	24391,022	29678,888	37666,759
EXPENDITURE			
01 Personnel Expenditure:	5368,079	6916,197	6104,061
02 Goods and Services	16526,156	19503,873	26877,644
03 Minor Equipment Purchases	1221,336	690,624	969,681
04 Current Transfers and Subsidies	1274,020	1483,120	1372,905
TOTAL RECURRENT EXPENDITURE	24389,591	28593,814	35324,291
B. DEVELOPMENT PROGRAMME			
INCOME:-- Government Subvention	3400,000	6353,000	8050,000
EXPENDITURE			
Establishment of a National Science Centre	0	0	1300,152
Sci-TechKnoFest	549,479	3123,379	1574,971
Development of a National Innovation System	1433,794	1094,377	2278,314
Research & Development Foresighting	120,046	191,931	404,600
Exhibitions on the Environment	498,125	488,245	680,823
NIHERST- President's Award Scheme for Excellence in Science Teaching, Research & Development	192,108	306,076	534,775
	0	179,057	236,351
Community-Centered Design and Innovation (COMDESI)			
NISTADS / NIHERST Collaboration on S&T Policy Studies	0	0	162,987
Upgrading of the National Science Centre, D'Abadie	0	500,740	0
TOTAL DEVELOPMENT PROGRAMME EXPENDITURE	2793,552	5883,805	7172,973

c) Debt policy

NIHERST does not have a debt policy but consideration is being given to developing one.

d) Investment policy

NIHERST also does not have an investment policy. Consideration is being given to having one development by a consultant.

e) Internal audit functions

There is one junior post on the establishment for an internal auditor. However, due to the unattractive compensation, the post has been vacant for several years and this function has been outsourced as funds permit. A shortlist of assignments has been identified and an expert is currently being sourced.

f) Financial Report 2013

The unaudited Financial Statements for the years ended December 31, 2010 and 2011 were submitted to the Auditor General's Department. The Department has a backlog of audits going back to 2006 to complete for NIHERST. A private auditor (R. Ramdass & Company Ltd) was contracted to undertake the audit of the 2011 and 2012 accounts in order to give the Board comfort on the finances of the institute. This audit is in progress.

Section 5: HUMAN RESOURCE DEVELOPMENT PLAN

a) Organisational establishment

As at the end of the period 1 October 2012 to 30 September, 2013, NIHERST employed 132 persons on a full-time basis (consisting of permanent, long term contract, and short term contract) with a significant number being employed in contract positions aligned to civil service posts and salary ranges in order to maintain internal equity with permanent staff.

The Board of Governors through its Human Resource Committee continued its work with Management with respect to the proposed restructuring of the institute which would equip it to better facilitate the successful implementation of its strategic plan. One initiative undertaken by the institute was the preparation of job descriptions for the positions in the proposed organisational structure. The Terms of Reference (TOR) for a request for proposals (RFP) for the provision of specialist consultancy services for the development of a new organizational structure and compensation system for NIHERST including the conduct of a job evaluation and compensation survey was prepared. In May 2013, the board approved the issue of the RFP for the consultancy and in August 2013, the Minister officially approved the initiation of the procurement process for the consultancy in accordance with the Terms of Reference (TOR).

b) Category of employees

NIHERST's operations are carried out by two major categories of staff, which are permanent and contracted officers. When first conceptualised, the institute's staffing needs were met by officers who met the government standard requirements given the prevailing technologies of the day. Moreover, given its small portfolio at the time, a small number of employees was required. As the institute's workload expanded, there was a need to recruit and maintain a workforce of a greater number in a variety of new directions. This gave rise to the dual categories that exist at present. For the jobs made necessary by changes in technology and new areas of endeavour, a substantial number of contract officers was hired to complement those who held established positions. The job categories also include manipulative, clerical, secretarial, administrative, technical and professional.

NIHERST also hires part-time science demonstrators who assist with explaining science exhibits and concepts to visitors at the National Science Centre. The institute continued to facilitate the MTEST on-the-job training programme with 13 trainees gaining experience at its offices during the review period.

c) Career path systems

Career path systems at NIHERST are similar for most positions. Manipulative staff are the exception here with all employees in these positions generally operating without stratification. Manipulative staff can, however, move into other classes (clerical, etc.) once they show the requisite experience, attitude and qualification. In the other classes, there is stratification and here employees can move to the next grade once they meet the requirements and a position is available. As indicated in 6) above, there are insufficient levels in each job family remaining at NIHERST because a number of positions were transferred to COSTAATT in the year 2000.

d) Performance assessment/management strategies

The institute's employees are assessed annually using the Performance Management System used in the Public Service. The Human Resource Department was in the process of reviewing the performance appraisal form used by the Public Service for contract employees with a view to implementing such a system specifically for NIHERST's contract employees. The new appraisal form will enable the institute to evaluate its contracted officers more thoroughly across technical and soft skill sets.

e) Promotion – selection procedures

The selection procedure for promotion within Article 4: Employment and Promotion in the NIHERST-PSA Collective Agreement was applied for both permanent and contract employees (see Appendix 6). Attention is drawn in particular to the following, which states that:

"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."

f) Employee support services

Given the renewed direction of the organisation as mandated by the line Ministry, the focus of the institute's training thrust was centred on building the capacity of staff in the areas related to its strategic direction and in line with government's goal of developing a diversified, knowledge intensive economy. As a result training was undertaken in this regard where 34 staff benefitted from exposure to workshops in Leadership, Entrepreneurship and Innovation. A workshop entitled Entrepreneurship and Innovation Capabilities delivered by staff of the University of Dresden was the chief among these with 28 staff in attendance. Also the institute undertook training to strengthen its human resource framework in all key areas most notably Industrial Relations. A customised workshop hosted by the Employers Solution Centre entitled Industrial Relations and Disciplinary Procedures was attended by 30 supervisors.

NIHERST continued to promote a more diverse employment landscape when selected employees attended the Women in Leadership Conference 2013. There was also personal development training made available to staff in the form of Personal Wealth Management. This training was attended by 50 staff members. Two hundred (200) employees, most of them workers recruited for

the mega-event Sci-TechKnoFest, attended Basic First Aid awareness training, along with training in Customer Experience Management and Teamwork and Communicating with the Public.

NIHERST has a pension fund plan for its permanent employees established since January 1, 1988. As at September 2013, there were 68 members, 44 from NIHERST and 24 from COSTAATT, 11 pensioners and 8 deferred pensioners.

NIHERST provides a Group Health and Life Insurance Plan for all employees, permanent and contract, if they wish to join. As at September 2013, there were 72 members on the plan, 65 from NIHERST and 7 from COSTAATT.

NIHERST has been contracting the services of Petrotrin EAP Services Limited (PEAPSL) to administer and provide an Employee Assistance Programme (EAP) to all members of staff since December 1, 2004. The services provided include organisational support; assessment, counselling and referral services; management/supervisory training; transition management; prevention services and peer support.

During the period, several Educational Outreach sessions were conducted as shown below.

Date	Location	Session	No of persons
24 Oct 2012	NSC	Creative problem solving	19
25 Oct 2012	POS	Creative problem solving	10
13 Dec 2012	NSC	Difficult conversations	12
2 Feb 2013	St Augustine	Spirit of Carnival	14
27 Mar 2013	St Augustine	Ethics in the workplace	18
29 July 2013	NSC	Ethics in the workplace	7

The staff continued to make use of the services of the EAP through the outreach sessions and also through the counselling sessions provided which ensures strict confidentiality and promotes the wellbeing of staff. The EAP continues to constitute a benefit and also a safety net for staff who see the need to utilise its programmes.

Section 6: Procurement Procedures

The procedures in effect for the period under review followed the NIHERST procurement policy that had been updated in February 2011. Relevant aspects are quoted below:

> "NIHERST shall invite and consider offers and tenders for the supply of articles or services or for the undertaking of works of all kinds necessary for carrying out the functions of the Institute. A minimum of three quotations are required."
>
> "In cases of emergency where the safety of people, property, plant and equipment is in jeopardy or where the continuity of the operations of the Institute or its fiscal health demand that contract(s) be awarded with urgency, the **President** and/or **Board of Governors** may award contracts as determined to avert the danger or to bring the situation under control and minimise the loss or liability. The Chairman of the Management Tenders Committee may also give approval to award contracts in this instance if the contract to be awarded is within the limit of the Committee."
>
> "Whenever the expenditure to be incurred for the acquisition of articles or the undertaking of works or services exceeds $10,000.00, the (Management Tenders) Committee shall invite a minimum of three (3) firms or persons as may be selected by the Committee to make offers for their supply. In the case of articles or services involving expenditure less than TT$10,000.00, Heads of Departments can invite proposals or quotations."
>
> "Alternatively, the Committee may opt to place a notice in the print or other media inviting offers for the supply of the articles or the undertaking of works or services whenever the Committee deems it desirable to do so such as in the case where the Committee is unaware of the vendors who are capable of the job or in the case of expected large tender amounts."
>
> "Public invitations must be invited for the acquisition of articles or the undertaking of works or services of the value of $5,000,000.00 and above. Such invitations should be duly signed by the Chairman of the Management Tenders Committee."
>
> "The Committee may use its discretion in inviting a sole tender in the following cases:
>
> - where the item is made by a sole manufacturer or is available from a sole distributor;
> - when replacement parts and accessories of equipment and machinery of a particular make or model are available from only one source;
> - for standardisation purposes; and
> - where no one else can provide the services or work to the standard and/or timeline required by NIHERST.
>
> The reason for inviting a sole tender must be properly recorded."

The Management Tenders Committee can approve contracts valued at $100,000 or less while the NIHERST President approves contracts up to $450,000. The Board approves contracts in excess of $450,000 with guidance from the Finance & Audit Committee of the Board.

Appendix 4 shows the contracts over $450,000 that were awarded for the period under review using the tendering process. There were seven (7) such contracts, of which one (1) was a sole/single tender and five (5) were selective tenders. One (1) tender, which crossed the $5M amount – the selection of an architectural firm for the design of the Science City – was done in two stages: firstly, an open notice in the newspapers and on the NIHERST website inviting interested firms to prequalify; and secondly, a selective tender based on the responses.

Section 7: Public and Community Relations

a) Client and public access to services/service delivery systems

NIHERST strives to ensure that all members of the national community are aware of and have access to its programmes and the information it disseminates. Advertising and information dissemination are done through mainstream and social media, as well as on the NIHERST website, and promoting to schools is through direct marketing. In many of its science popularisation activities, the Science Centre reaches out to rural and underserved communities, particularly through its Community Science Weeks and road shows, and events hosted by external agencies. The institute also offers free/reduced admission and provides transport, so disadvantaged persons can still attend or participate more easily.

b) Community and stakeholder relations/outreach

(See paragraph above as well as Section 3.)

c) Strategic partnerships (local, regional and international)

Details of all projects undertaken with key regional and international agencies are given in Section 3: Building Strategic Alliances.

Following is a list of the main local, regional and international agencies and organisations that collaborated with NIHERST during the period being reported on, as sponsors on key initiatives and/or exhibitors and facilitators at key events. Several are longstanding partners who have embraced the NIHERST mission and add great value to our programmes and activities for the public.

List of key partners during reporting period

Agricultural Development Bank of Trinidad and Tobago (ADB)
British Geological Survey
Caribbean Council for Science and Technology (CCST)
Council for Competitiveness and Innovation (CCI)
Columbus Communications
Durham University
Embassy of the United States of America
Export-Import Bank of Trinidad and Tobago Ltd. (EXIMBANK)
Global Water Partnership-Caribbean (GWP-C)
Imperial College London
Ministry of Education
Ministry of Science and Technology

Ministry of Trade and Industry
NASA
National Council of Science Museums (NCSM)
National Institute for Science, Technology and Development Studies (NISTADS)
Organization of American States (OAS)
Sagicor
Seismic Research Centre (SRC)
Technical Centre for Agricultural and Rural Cooperation – ACP/EU (CTA)
Telecommunications Authority of Trinidad and Tobago (TATT)
The Heroes Foundation
The National Gas Company of Trinidad and Tobago (NGC)
The University of the West Indies (UWI)
The University of Trinidad and Tobago (UTT)
Tobago House of Assembly (THA)
Toco Foundation
UNESCO
University of Leicester

Community Science Weeks:
Exhibitors and Contributors to Career Day

- Arrive Alive
- BG (Science Bus)
- Central Bank of Trinidad and Tobago
- Cocoa and Coffee Industry Board
- COSTAATT
- Environmental Management Authority (EMA)
- FLOW
- Heavy Equipment Bureau of Trinidad and Tobago
- Institute of Marine Affairs (IMA)
- Lifeguard Association
- Ministry of Food Production
- Ministry of Health
- NADAPP
- National Energy Skills Centre
- NTA
- Office of Disaster Preparedness and Management (ODPM)
- Petrotrin Petting Zoo
- Professional Institute & Training Solutions
- Sugarcane Feeds Centre

- The National Gas Company of Trinidad and Tobago (NGC)
- The Rapport Services
- The Toco Handicraft Group
- The University of the Trinidad and Tobago
- Trinidad &Tobago Coast Guard
- Trinidad and Tobago Police Service
- Trinidad & Tobago Regiment
- T&T College of Therapeutic Massage & Beauty Culture
- TTHTI
- Turtle Conservation Group.