

FINAL REPORT

Structuring an Institutional Model for the Caribbean Industrial & Technological Services Ltd. (CITSL)

Preferred Option: Value-added Chain Model

**Prepared by
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March 30th, 2009

(Revised April 1st, 2009)

**(Note; this report on the Preferred Option along with the Options Report in the
Appendix 1 constitute the Final Report for this project)**

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1.0 Introduction

Three new options for the structure of CITSL have been proposed (see Options Report in Appendix 1). CARIRI management has chosen the Value-Added Chain Model has the most appropriate at this time. To quote CARIRI's CEO, *'Our reasons for choosing the Value-added Chain Model are based on an appreciation of the fact that, for start-up purposes, it would ideally facilitate the type of integration and synergies which would help to optimize resource allocation, thereby promoting greater operational efficiency. Additionally, as pointed out in your Report (see Appendix 1), the Model can be further modified at a later stage to the Engineering/Technology Thrust Model'*. (e-mail, March 4, 2009)

The following sections provide further elaboration of this model.

2.0 The Value-added Chain Model

As presented in the Options Report (Appendix 1) this model has two branches below the CEO; Finance, Administrative and Business Services and Programs. Each branch is to be managed by a Senior Manager reporting to the CEO of CITSL.

The Office of the CEO will have the following responsibilities as well as those usually associated with managing an organization;

- international liaison (e.g.-IDRC, WAITRO, OAS, IDB)
- government liaison
- corporate communications
- new business and marketing
- project support services (e.g.-transportation)
- research management team (to create cohesion among functions; proposals preparation)
- safety and quality of the organization as required by legislation

Finance, Administrative and Business Services include the following services in two sub-branches;

Business Services

- events planning
- market surveys
- tendering
- financial/business proposals
- industrial linkages
- intellectual property management
- program management (e.g.-incubator)
- technology commercialization (i.e.- bringing a new idea to market)
- technology transfer (i.e.- bringing technology to an existing firm)
- engineering design for large projects
- patent mining

- data mining
- forecasting
- technology intelligence (related to the time value of information)
- technology sourcing and evaluation
- Instrument Centre

Finance and Administrative Services

- human resources (industrial relations)
- internal finance
- information, communications technology (ICT) for internal needs
- support services (e.g.- secretarial; maintenance)
- project management (e.g.- multidisciplinary projects)

Programs are the 10 programs outlined in Appendix 2 of the Options Report (Appendix 1). However, in this model, each program also includes R&T and Consulting elements as well as testing. The whole value-added chain is present within the structure of each program. The IMA component could be added as a program or elements incorporated into other programs.

This model has the following advantages;

- clear reporting;
- an integrated approach leading to better synergy and transfer of tacit knowledge among the elements in each program;
- project teams comprised of personnel from testing, R&T and Consulting are easily assembled. These teams can be augmented with personnel from UTT as need be;
- fits well with the profit centre concept, in that transfer pricing is minimized;
- employees see clearly the total array of elements within a program which can lead to more mobility and advancement within a program;
- builds on the existing capabilities within CARIRI, hence minimal adjustments needed within the new structure.

3.0 An Evolutionary Approach

It is proposed that CITSL will begin its operations with the transfer of modules (i.e.-self-contained components of existing programs having specific technological foci) from CARIRI. By putting strong existing modules into CITSL, it is expected that branding of the new entity will occur early on.

The transferred modules will grow and/or change into programs over time. A program can either be made up of individual modules or be a scaled-up module. A program manager will head each program. This individual should have to have entrepreneurial and consulting skills, a business orientation as well as marketing and project management skills. CARIRI staff will be on assignment to CITSL in the transition period (i.e.-CARIRI staff costs will be charged to CITSL).

CARIRI programs are currently being evaluated to determine which modules are to be transferred to CITSL. This evolutionary approach optimizes resource allocation and operational efficiency.

As well, new businesses (e.g.-incubator) will be added.

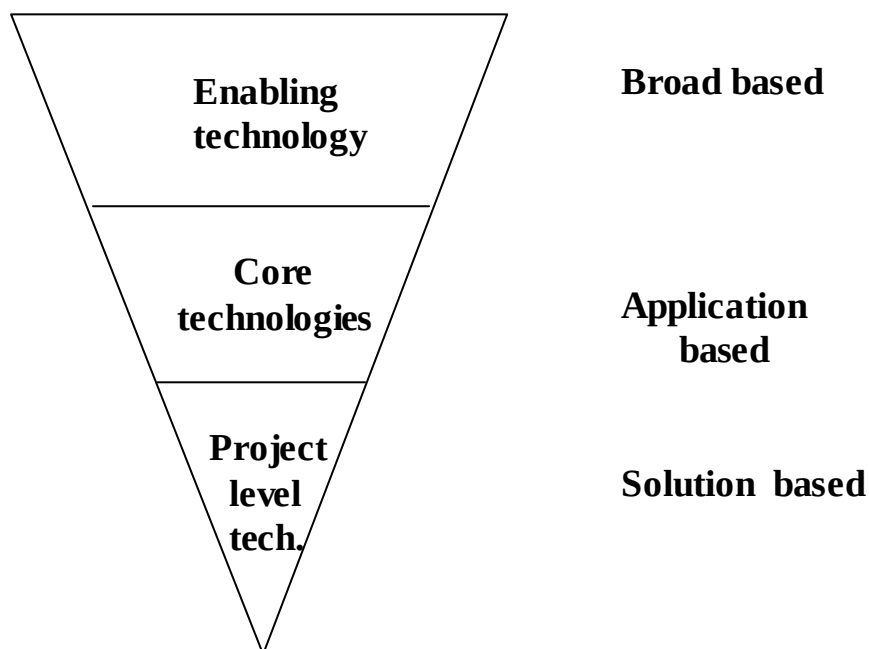
The option remains open to move to one of the other proposed models at some point in the future, if the business environment becomes conducive to such a change. In fact, a modular approach has advantages in that some modules could have specific elements that would facilitate the evolution to another proposed model. For example, if development and pilot plant elements were gathered in one module, this would facilitate the transition to the Engineering/Technology Thrust Model.

4.0 Some Advantages of a Modular Approach

4.1 Building Core Technological Capabilities

The technological focus of a module is more specific than at the program level and less specific than at the project level. A module supports the R&T approach of accessing broad-based technologies that can serve more than one project. These technologies are called *enabling technologies* and can be found in areas such as information technology, biotechnology and advanced/smart materials. Classes of technologies can be accessed and adapted to fit the needs of a module. In this way specific core technological capabilities related to application areas can be developed; these in turn can be used in projects. This culling process can be seen as a funnel as shown in Exhibit 4-1.

Exhibit 4-1: Culling Technologies



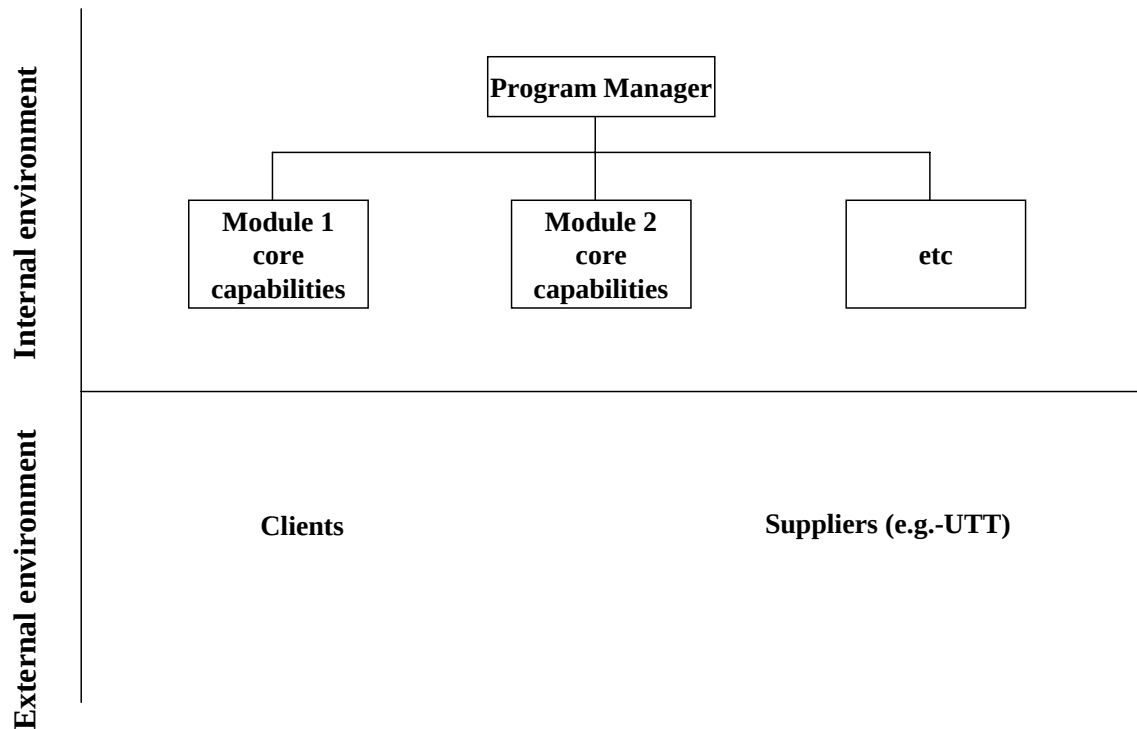
Examples of enabling technologies in information communications technology (ICT) are listed below;

Caller-Identification (ANI)

DVD-ROM/RAM
Cellular Phone Data Transmission
Computer Based Training (CBT)
Data Base Management Systems
Data Warehousing
Document Imaging
Electronic Data Interchange (EDI)
Electronic Mail
Expert Systems
FAX and Optical Card Reader (OCR)
Full Text Retrieval
Geographic Information Systems (GIS)
Groupware
High-Bandwidth Networks
Interactive Voice Response (IVR)
Internet/Intranet
Knowledge Management
Memory Cards
Mobile Digital Terminals
Multimedia
Palm/Belt Computers
Public Kiosks
Satellite Data Transmission
Streaming Media
Video Conferencing
Voice Response/Recognition
Wireless LANs
Workgroup Computing

Having core technological capabilities makes it easier to interact with other technology suppliers such as UTT. As well, marketing CITSL expertise to potential clients is made easier since relevant core technological capabilities can be vaunted. This is shown schematically in Exhibit 4-2.

Exhibit 4-2: Core Capabilities and Modules



4.2 Size and Function

A modular approach lends itself to controlling the size of a module for operational efficiency. Some functions, especially those with broader responsibilities, may require larger modules than others with more specialized responsibilities.

4.3 Rapid Adaptation to the Environment

Modules can be scaled up or down and integrated with other modules as need be, depending on a changing environment. Reconfiguration of research activities is made easier.

4.4 Clearer Mandate

A module can be seen as having a clearer mandate than a program. This could present a marketing advantage; clients may appreciate a more specific focus related to their needs.

Having an array of modules with clear mandates would indicate both technological scope and depth to potential clients.

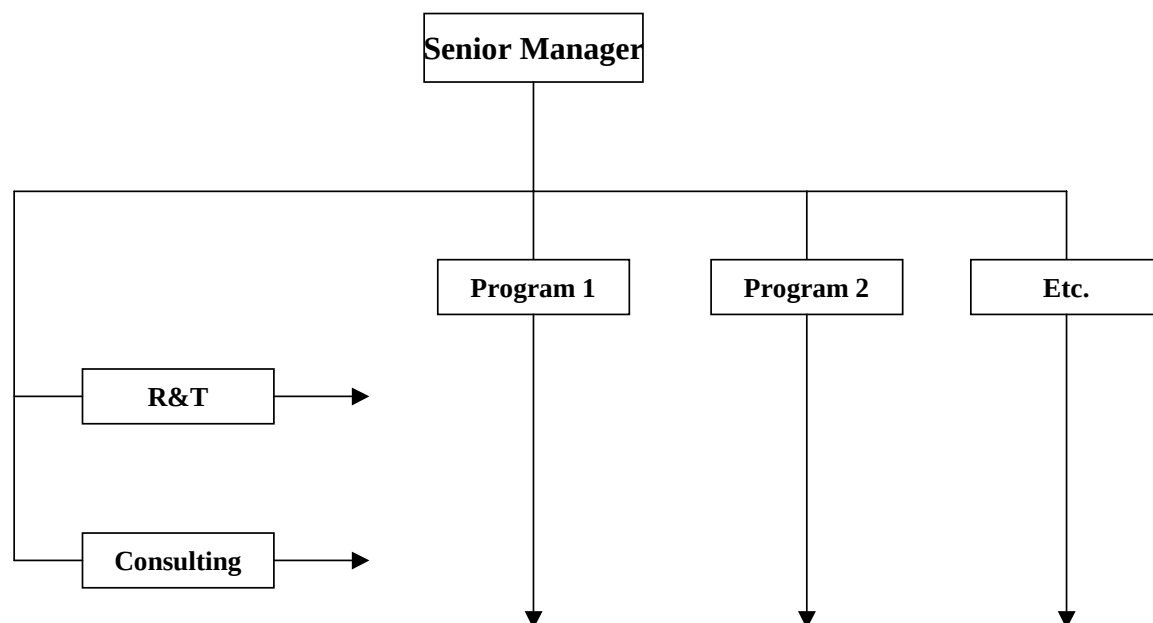
5.0 Transitional Considerations

5.1 Getting Up to Speed with R&T and Consulting

R&T and Consulting are new elements to be added to each program. It may take some time to integrate these elements even if the Program Manager is familiar with these concepts, since he/she will have other responsibilities as well, not to mention the pressures associated with launching a start-up.

One way of accelerating this integration is to hire skilled individuals with the explicit responsibility for R&T and Consulting respectively for a short period (say 1-2 months) to ensure that these elements are properly integrated into each program and module. These individuals could come from either local or foreign research and technology organizations. WAITRO, for example, could be used to tap into foreign research and technology organizations for the expertise needed.

Exhibit 5-1: Integrating R&T and Consulting



The individual responsible for R&T would need to have skills in data mining, technology intelligence and intellectual property rights, while the individual responsible for Consulting would have to have expertise in technical consulting.

5.2 Early Branding

As noted above transferring a few modules to CITSL early on would contribute to branding the firm. As well, ideas mentioned by stakeholders included joint projects with UTT Centres, UTT student internships within CITSL, ICT intervention in small and medium size firms, and the establishment of a virtual incubator as an early step towards establishing a physical incubator.

6.0 Conclusion

The Value-added Chain Model has been chosen since it is perceived to be the one that offers the best optimization of resource allocation and operational efficiency.

The transfer of capabilities from CARIRI to CITSL will be done using a modular approach. Some advantages of using such an approach are presented.

7.0 Recommendations

Given the apparent advantages of a modular approach, this approach to structuring the programs of CITSL should be kept beyond the transitional phase to determine if these advantages warrant keeping modules on a permanent basis.

Since R&T and Consulting are new elements of programs, consideration should be given to hiring outside expertise for a short period of time to ensure that these elements are well integrated into the fabric of the programs as early as possible.

The implementation of specific projects should be given priority to ensure early branding of CITSL.

It is recommended that the CEO of CITSL discuss the CITSL model with senior officials in organizations in Canada having a similar mandate. These include the Alberta Research Council, the Saskatchewan Research Council, the Centre de recherche industrielle du Québec and the Research and Productivity Council of New Brunswick. The aim of these discussions would be to obtain views on the pros and cons of the CITSL model from people operating in similar circumstances.

Appendix 1; Options Report

**Structuring an Institutional Model for the
Caribbean Industrial & Technological Services Ltd. (CITSL)**

Institutional Options

**Prepared by
Dr. Roger Voyer**

February 9th, 2009

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1) Introduction

The purpose of this report is to present some possible options for the structure of the Caribbean Industrial & Technological Services Ltd. (CITSL) for discussion purposes. This is the first step in the study leading to a recommendation on a preferred option as per the terms of reference for this exercise (see Appendix 1).

The origin of this study was a Cabinet decision regarding the establishment of an Industrial Services Company incorporating key functional and application areas of CARIRI, the Institute of Marine Affairs (IMA), and the Metal Industries Company (MIC), among other institutions. The formation of this company, CITSL, was approved by the Board of Governors of the University of Trinidad and Tobago (UTT). CARIRI will form the nucleus of the CITSL, which will be a subsidiary of UTT.

2) CARIRI, the core capability

CARIRI was established in 1970 via an Act of Parliament providing for the incorporation of the Caribbean Industrial Research Institute under the laws of Trinidad & Tobago. The Institute was established with assistance from the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organisation (UNIDO). The Institute is wholly owned by the Government of Trinidad and Tobago. The role of CARIRI as defined by the Act is as follows:

- a) to provide technical and industrial services to public and private industrial enterprises
- b) to collect and disseminate technical information, including applicable standards, specifications and quality control procedures
- c) to undertake chemical analytic work particularly in connection with quality control testing in food industries and other local industries
- d) to provide physical (measurements) and materials testing services
- e) to provide engineering services, including assistance with establishing production lines, prototype designs, and maintenance and repair problems
- f) to undertake economic and technical feasibility studies, including market surveys, with a view to identifying bankable projects
- g) to provide environmental monitoring, control and developmental activities
- h) to advise the Government on the formulation of specifications, the promulgation and application of industrial processes and practices, and the preparation of industrial standard

- i) to engage in industrial research programmes related to the needs of Trinidad and Tobago and of the Caribbean region.

The Institute's mission is: *"To advance the economic and social development of Trinidad and Tobago and other countries in the Caribbean Region by providing technical and technological support, creating and transferring technology to the producers of goods and services and maintaining a positive work environment that encourages employee commitment to the financial viability and success of the organization"*.

The Institute operates from two (2) locations - University of the West Indies (UWI) Campus, St Augustine and Trincity West Industrial Estate, Macoya. The key focus areas are :

- Food / Biotechnology
- Analytical Chemistry / Microbiology
- Petroleum / Energy-based
- Industrial Materials
- Environmental Management
- Calibration / Maintenance

The Institute has a core staff of approximately 152 persons (July 2008), which includes highly trained and experienced professionals and technicians in diverse disciplines.

The Institute's physical resources include modern and well-equipped laboratory facilities in the areas of: microbiology, analytical chemistry, petroleum and industrial materials.

To enhance its physical and human resource capability, the Institute has developed strategic links with several local, regional and international organizations. These include the University of the West Indies, Trinidad & Tobago Bureau of Standards, Institute for Applied Science and Technology (Guyana), Alberta Research Council (Canada), UMA Engineering (Canada) and Productivity Standards Bureau (Singapore). CARIRI is also a member of the World Association of Industrial and Technological Research Organizations (WAITRO) and its CEO is the first Vice-President of that organization.

The Institute operates under internationally recognized quality management systems. The Institute has for over ten (10) years been ISO 9001 certified. For almost the same period, the Institute has been accredited by the United Kingdom Accreditation Service (UKAS) to ISO 17025. This dual international Quality Management System makes CARIRI unique in the region and assures that clients are provided with the highest quality of service. While maintaining these systems, the Institute assists other organizations seeking to implement similar systems. The Institute has also been pioneering the ISO 22000:2005 Food Safety Management System.

Clients include major local, regional and international organizations. The Institute has worked with micro, small, medium and large organizations. Locally, the Institute provides services to the various Government ministries, key companies in the energy industry, the construction sector, the food processing and hospitality industry, Government agencies, the light manufacturing industry, heavy industries, including the petro-chemical industries and a range of private sector enterprises. Regionally, CARIRI has provided services to the Caribbean Development Bank, Inter-American Institute for Co-operation on Agriculture, University of Suriname and various Governments and private sector organizations throughout the region. International clients include the United Nations, the Organisation of American States, and UMA Engineering.

CARIRI's cost recovery peaked at 60% in 2004. It is about 45% today.

As to the other two organizations mentioned in the Cabinet decision, it has been decided that MIC will not merge into CITSL and only the applied research activities of IMA will be part of CITSL. These activities could become a distinct CITSL program or integrated into one or more of the existing programs. The basic research activities of IMA will be part of the UTT's Centre for Marine Research.

3) CITSL, the new entity

CITSL was launched on March 27th, 2007, as a limited liability company and subsidiary of UTT. This was following the Cabinet decision of May 6th, 2004, to integrate CARIRI and other institutions within UTT.

CITSL now has a Board in place and has received seed funding to begin its operations. CITSL has started to plan the transition, that is the transfer of CARIRI capabilities as well as the creation of new capabilities. CITSL and CARIRI will run in parallel until Cabinet decides to terminate the latter.

CITSL is planning its activities within the context of the following objectives;

- To support the UTT's overall strategic objectives, including:
 - Facilitating the University's research thrust and contributing to the expansion of the country's R&D/Technology Development agenda
 - Promoting an entrepreneurial culture within the University
 - Facilitating entrepreneurship development and the creation of new businesses arising from access to business incubation/commercialization infrastructure
- To promote the continued growth and development of the manufacturing and services sectors, both locally and regionally, providing technology-based support services that would enable companies to achieve sustainable competitive advantage.
- To assist in the building of technological capability and capacity, and thus enable companies to innovate and utilize technology in order to enhance competitiveness.
- To provide catalytic support to enable Industry, Government and Research and Development Institutions to work in partnership with each other.
- To devise and implement technology-based solutions to issues that pertain to areas that are strategic to the national interest.
- To bring a rationalized/streamlined approach to the work of the regulatory agencies by the provision of analytical support services necessary to facilitate compliance in the local and foreign markets.

As shown in Exhibit 3-1 CITSL these objectives can be grouped into three categories along the private to public sector support axis

Exhibit 3-1;Spectrum of Objectives for CITSL



The first category deals with support to the private sector and UTT, while the second supports capability-building activities in both the private and public sectors (e.g.-UTT). The third deals with activities of public interest. The public interest activities are driven in part by the regulatory requirements of legislation in areas such as health and environment.

CITSL has a broad mandate serving both the private and public interests. However, it is clear that it has a ‘market pull’ mandate rather than a ‘technology push’ mandate. The testing focus puts CARIRI/CITSL close to the marketplace.

4) Situation analysis

The launch of CITSL is occurring at a time of great economic uncertainty that has happened extremely rapidly both globally and nationally. In Trinidad and Tobago, the national budget has been based on a high price for petroleum, a price that has not been maintained and has decreased precipitously. In the October 2008 Budget, the price of oil was pegged at \$70 US per barrel; in the January 2009 Budget revision the price of oil was pegged at \$45 US per barrel. This is creating much uncertainty as to the funding of government programs and employment.

For CITSL the following major concerns have arisen;

- Employees of CARIRI who have been considering leaving with a payout package in light of the formation of CITSL are rethinking that option fearing that the payout package may not be sufficient to carry them over the longer term. This may affect hiring new people and hamper cultural change in the short term;

- It remains uncertain when Cabinet will decide to terminate the activities of CARIRI so that some of them can be transferred to CITSL;
- The level of funding of CITSL also remains uncertain.

However, planning for a fully established CITSL continues in parallel with the on going activities of CARIRI. At some point CITSL will set up its headquarters in a new location.

The economic downturn is considered by some as an opportunity to diversify industrial activities away from petroleum extraction.

5) Possible Institutional Models for CITSL

Discussions with stakeholders in Trinidad and Tobago have highlighted expectations and opportunities related to CITSL. Through these discussions and review of documents, three new institutional models, different from the present CARIRI structure, have emerged.

The basic criteria used for structuring these models were;

- The objectives of CITSL have to be met;
- The activities have to complement those of UTT (i.e.- the focus should be on developmental research and technology acquisition and adaptation as opposed to basic research. Collaborations with UTT Centres should be entered into where there are complementarities of capabilities and objectives;
- The thrust should be to capture value-added functions beyond testing. These functions include consulting, research related to the acquisition and adaptation of technology (R&T) and even the implementation of consulting recommendations possibly in partnership with others. At the moment about 10% of the budget goes towards funding investigative work under the R&T function.
- The functions and programs should operate as profit centres. This will create a new business culture within CITSL, one that will focus on generating new revenues by extending the reach of testing programs. Initially, change management will be front and centre in bringing about this new business culture. It must be remembered that CARIRI has a well-established traditional culture that will take some time to change.
- All models are functional, in that employees are grouped hierarchically, managed through clear lines of authority, reporting ultimately to one person, the CEO.

However, the possibility of bringing together cross-functional project teams exists in all models.

Each model has the same Board, Office of the CEO and Finance, Administrative and Business Services function. These are described below.

5.1) The CITSL Board

The Board is chaired by K. Julien, President of UTT. It has the following members;

- D. McGaw, Provost UTT
- O. Flax, Senior Vice-President, Human Resources, UTT
- W. Fitzwilliam, Vice President, Business Development, e-Teck
- A. Jupiter, CEO, National Energy Corporation
- I. Welsh, CEO, PCS Nitrogen
- N. Hubert, Senior Analyst, Ministry of Trade
- L. Warner, Tobago House of Assembly
- L. Ali Shah, CEO, CITSL

5.2) The Office of the CEO

The Office of the CEO will have the following responsibilities as well as those usually associated with managing an organization;

- international liaison (e.g.-IDRC, WAITRO, OAS, IDB)
- government liaison
- corporate communications
- new business and marketing
- project support services (e.g.-transportation)
- research management team (to create cohesion among functions; proposals preparation)
- safety and quality of the organization as required by legislation

5.3) Finance, Administrative and Business Services

Finance, Administrative and Business Services include the following services in two sub-branches;

Business Services

- events planning
- market surveys
- tendering
- financial/business proposals
- industrial linkages

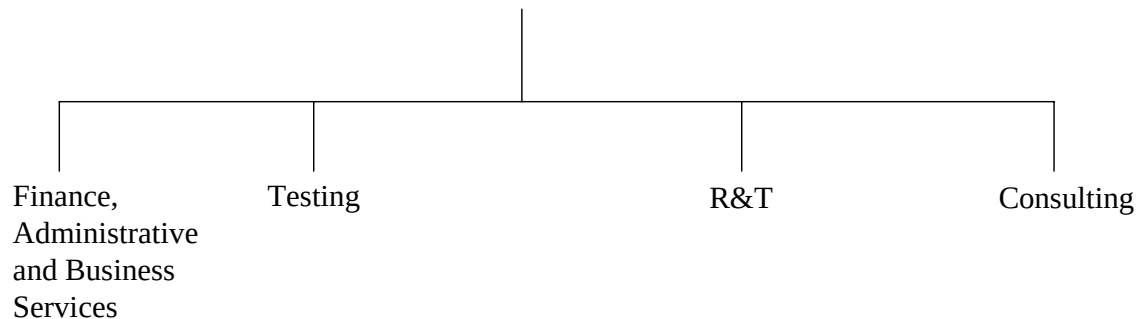
- intellectual property management
- program management (e.g.-incubator, except for model described in 5.5)
- technology commercialization (i.e.- bringing a new idea to market)
- technology transfer (i.e.- bringing technology to an existing firm)
- engineering design for large projects
- patent mining
- data mining
- forecasting
- technology intelligence (related to the time value of information)
- technology sourcing and evaluation
- Instrument Centre

Finance and Administrative Services

- human resources (industrial relations)
- internal finance
- information, communications technology (ICT) for internal needs
- support services (e.g.- secretarial; maintenance)
- project management (e.g.- multidisciplinary projects)

5.4) The Standard Model

Below the Board and the CEO, this model has four functions;



Finance, Administrative and Business Services (see Section 5.3)

Testing function includes all 10 programs (See Appendix 2).

R&T function includes the research activities related to the adaptation of acquired technology. The acquisition of technology will require capabilities in data mining, patent mining and technology intelligence, capabilities that will be developed within Corporate Services. Collaboration with UTT is possible where complementarities exist. The IMA component could fit here.

Consulting is a value-added function providing information/advice on a fee-for-service basis; it flows from the testing activity in the programs. The extent of the opportunity for

consulting is linked to the receptor capabilities of firms and public institutions. Organizations that have well developed receptor capabilities, that is staff that understand the issues at hand can integrate testing results in their businesses more readily than organizations with limited receptor capabilities. The latter present fertile ground for consulting assignments and even possibly for the implementation of consulting recommendations.

5.4.1 Pros

The Pros of this model include;

- Clearly defined functions;
- Clear reporting;
- Clear on skill sets required in each function;
- Tasks are clear;
- Employees work with others having similar interests within a function;
- Current activities related to testing are separated from the new activities (i.e.- R&T and consulting) tending to minimize cultural differences within the functions;
- Stable structure; promotes administrative and technical continuity.

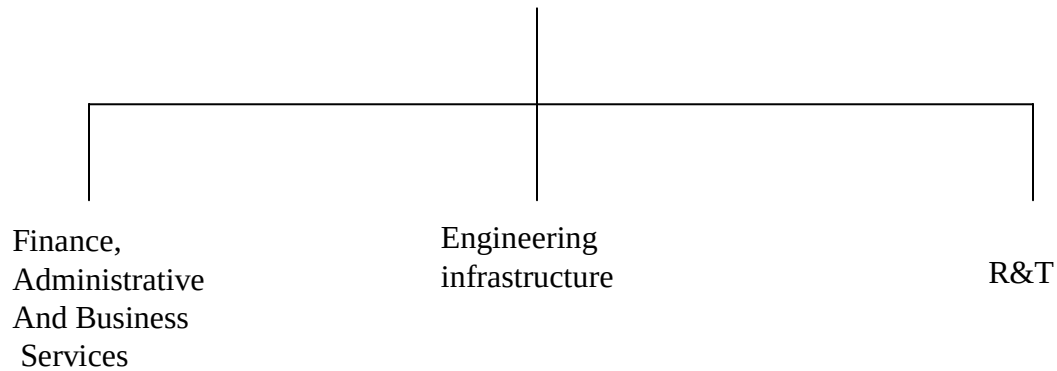
5.4.2 Cons

The cons of this model include;

- Given that each function is a profit centre, there will be a lot of transfer pricing across functions;
- Limitations as to the extent of knowledge transfer across functions;
- Tensions could arise between people in the less glamorous testing function where repetition dominates, and those in the other functions where the works could be perceived as more interesting and creative;
- May be difficult to understand the overall objectives of the organization since people work in compartments.

5.5) The Engineering/Technology Thrust Model

Below the Board and the CEO, this model has three functions;



Finance, Administrative and Business Services (see Section 5.3)

Engineering infrastructure function includes program elements of a developmental nature that could be grouped together. Two program elements that could fit within this function are the current Industrial Materials program, or the two new programs (i.e.- Metallurgy and Civil Engineering), and the food-processing element of the Biotechnology program. These elements can lead to fostering structural and plant design consultancies and pilot plant activities. Developmental opportunities emerging in other programs could be transferred to this function. The incubator could also be within this group. Calibration and maintenance of instruments could be within this group.

R&T function includes the research activities related to the adaptation of acquired technology. In this model all the testing programs, except those mentioned above, would find themselves within this function. However, given that testing will be extended into R&T and Consulting, program activities lend themselves to collaborations with UTT and other institutions. The IMA component could fit here.

5.5.1 Pros

The Pros of this model include;

- Clear functions;
- Clear reporting;
- More integration of functions means less cross-function transfer pricing than in the functional model (Section 5.4)
- A strong developmental thrust could emerge in the Engineering infrastructure function. Projects here could benefit through collaborations with a customer and a UTT group. This approach of structuring projects around a team comprised of a developer, a customer and an academic researcher/group has been used successfully by PRECARN, a Canadian research organization

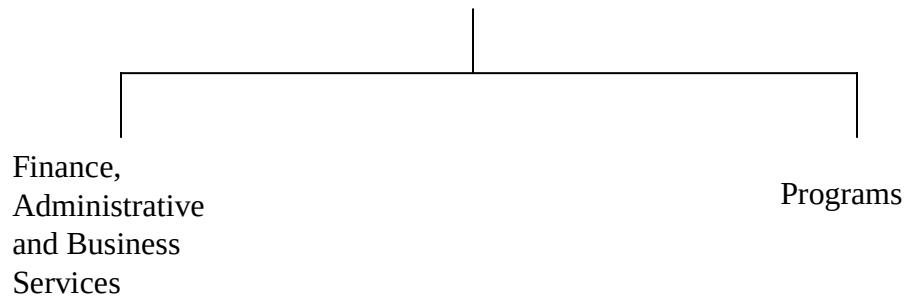
5.5.2 Cons

- Limitations of knowledge transfer across functions;

- May be difficult to understand the overall objectives of the organization;
- Tasks less clear within functions than in previous model (Section 5.4).
- May require a matrix structure so that Consulting can serve all programs, which increases complexity.

5.6) The Value-Added Chain Model

Below the Board and the CEO, this model has two functions;



Finance, Administrative and Business Services (see Section 5.3)

Programs are the 10 programs outlined in Appendix 2. However, in this model, each program also includes R&T and Consulting elements as well as testing. The whole value-added chain is present within the structure of each program. The IMA component could be added as a program.

5.6.1 Pros

The Pros in this model include;

- Clear reporting;
- an integrated approach leads to better synergy and transfer of tacit knowledge among the elements in each program
- project teams comprised of personnel from testing, R&T and Consulting are easily assembled
- fits well with the profit centre concept, in that transfer pricing is minimized
- employees see clearly the total array of elements within a program which can lead to more mobility and advancement within a program

5.6.2 Cons

- it may be more difficult to have clear boundaries between elements within a program;

- heavy management pressures on the senior manager who has overall responsibility for the programs function as the workload increases. This could possibly be overcome by appointing a deputy;
- may necessitate a matrix management approach so that R&T and Consulting elements can support all programs, which would entail transfer pricing across programs ;
- possibly less stable than the other two models since several elements are integrated.

5.7 The Status Quo Model

For the sake of completeness this model should also be considered. The CARIRI structure could be transferred holus-bolus into CITSL. Over time CITSL could evolve towards one of the above models. As well R&T and Consulting aspects could be added, either within Corporate Services or within the traditional functions.

5.7.1 Pros

- ensures continuity
- least cultural stress
- minimal structural change

5.7.2 Cons

- shift to an entrepreneurial culture is delayed
- emphasis on new thrusts, such as development, are submerged

5.8 Comparison of models

The above models represent ‘end point’ models after the transition from CARIRI to CITSL. However, one model could evolve into another as the transition and/or the workload increases over time.

The Value-added chain model, for example, could evolve into one of the other two models as loading increases and it is found that creating new functions would alleviate the pressure on program managers.

The Status Quo and the Standard Model are the most stable; the Value-added Model is possibly the least stable.

The Engineering/Technology Thrust Model has a distinct development focus while the other models do not.

The tightest synergy links among value-added elements are in the Value-added Chain Model.

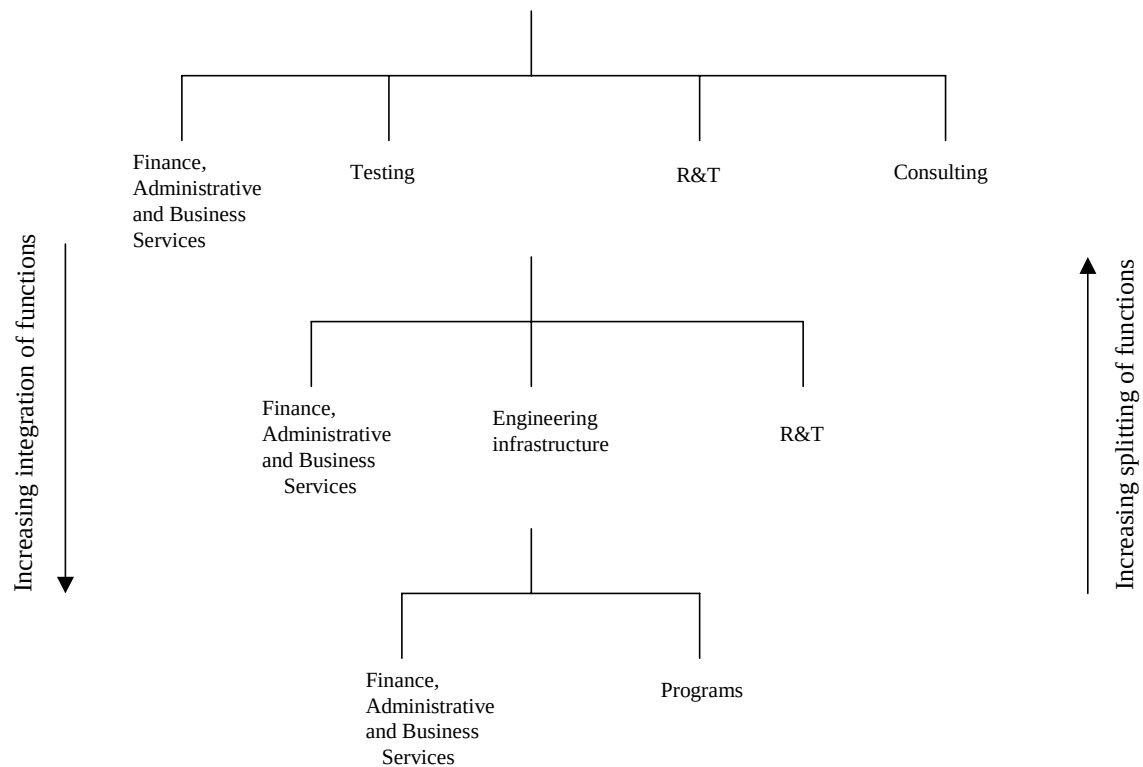
The Standard Model has the most transfer pricing while the Value-Added Chain Model has the least, in principle.

All models could bring together multi-disciplinary project teams. These projects, especially larger ones, could be managed within Corporate Services, while others could possibly be managed within other functions. For example, the Engineering infrastructure function within the Engineering /Technology Thrust Model could be Project Manager for some developmental activities, since a strong developmental focus will exist in that function.

5.8 Summing-up

The new options considered are shown in Exhibit 5-1

Exhibit 5-1: The Three Models in Perspective



Each of the above models has a differing level of integration of functions.

6) Transitional Considerations

6.1 The Shift from UWI to UTT

The CARIRI Act of Incorporation states that four Board Members should come from UWI, one of whom should be the Dean of Engineering. As well, CARIRI is physically located on the UWI campus. Expectations were that this would stimulate technology commercialization from UWI research.

However, due in large part to the slowness of technology commercialization, UWI interest shifted to more basic research. CARIRI was then left alone. So there are no meaningful consequences for UWI of CARIRI becoming a subsidiary of UTT.

The fit with UTT, which has an entrepreneurial thrust, is a much better one for CARIRI in its new incarnation as CITSL, especially in the medium to longer term as relationships and partnerships develop. CITSL can be seen as a link between UTT and industry.

6.2 On-going input from stakeholders

As CITSL takes shape the input and feedback from stakeholders will be helpful. However, a flexible approach is needed to respond to a changing situation. It is proposed that 'think tank' groups be assembled from time to time to focus on issues and opportunities in an evolving transitional process.

The composition of such groups would be knowledgeable people from the international community, the private sector and academia. The secretariat would be provided by CITSL, and the CEO of CITSL would bring the outcomes of the discussions to the attention of the Board.

6.3 CITSL will bring about cultural change

It is expected that most CARIRI programs will be incorporated in the new CITSL structure. Given the entrepreneurial thrust of CITSL, the culture within the organization will undergo a fundamental cultural change.

The principal focus of CARIRI has been on testing. While much of this will continue, it will be done with an eye on downstream work such as related consulting. The opportunity to capture future work coming out of testing and other activities will come to permeate the organization. This means that existing staff members who will be transferred from CARIRI to CITSL with their programs will have to face this new reality.

6.4 An Incubator within CITSL

To incubate is to nurture until independent existence is viable. There are many ways of doing this. For CITSL the approach, in this period of transition, could be to set in place a virtual incubator, that is an incubator without a physical presence, except for one or a few individuals who will assist firms to access the necessary resources to develop. This can range from information on how to obtain financial support, how to structure a business plan as well as to getting needed technology in keeping with the CITSL R&T thrust.

Eventually, CITSL will set up a physical presence to accommodate emerging firms that fit its 'market pull' vocation. It even intends to take equity positions in the more promising firms. There is room in the country for more than one incubator, both virtual and physical as well as application focused ones (e.g.- agriculture) that can be situated at various points in the innovation process. For UTT, its planned incubator in Tamana Park would focus on ideas that emerge from university research (i.e.-technology push) while CITSL would focus its attention on ideas related to its testing activities (i.e.-market pull).

6.5 Early Wins

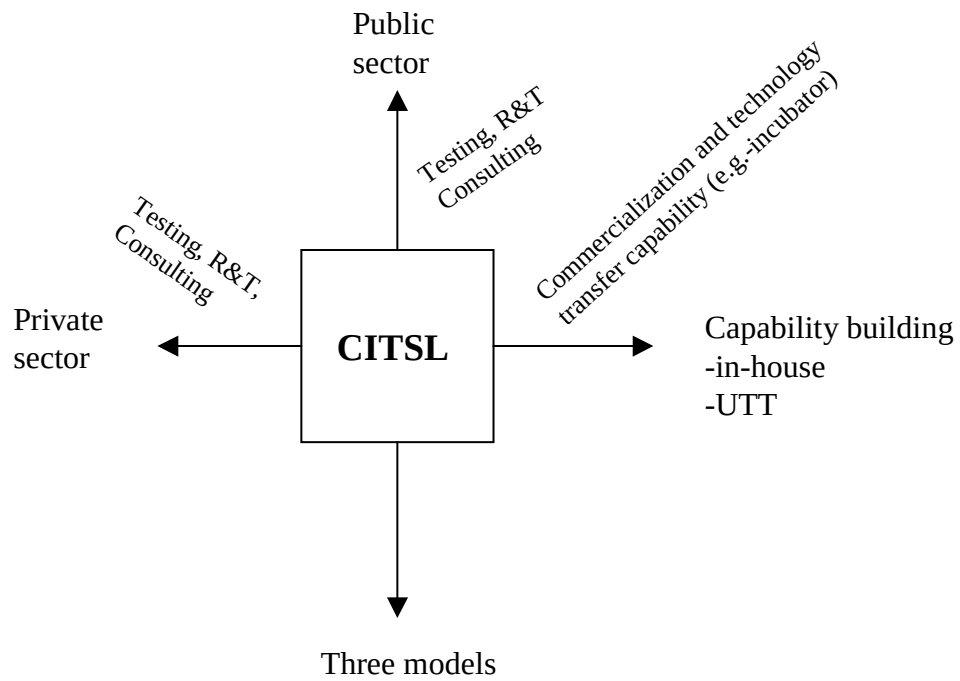
It was felt by some stakeholders that early 'branding' of CITSL will be important. To achieve this, some 'quick wins' will be needed. Ideas mentioned included joint projects with UTT Centres, UTT student internships within CITSL, ICT intervention in small and medium size firms, and the establishment of a virtual incubator.

7.0 Summary

Three new institutional models have been presented. Each has its pros and cons that have to be considered in arriving at an appropriate choice for the future structure of CITSL. The choice needs to be made within the context of which model will best meet the objectives of CITSL, as grouped in the three categories shown in Exhibit 3-1, and as illustrated in Exhibit 7-1 below.

It must be remembered that there is no perfect abstract organization. To quote management guru Peter Drucker, "Every organization has to be designed for a specific task, time and place (or culture)".

Exhibit 7-1: CITSL and its Three Sets of Objectives



Appendix 1; Terms of reference for this study

Pursuant to this contract, the consultant shall assist CARIRI with the design of a suitable institutional model for the Caribbean Industrial and Technological Services Limited (CITSL); and specifically:

- a) analyze different options with regards to the institutional modalities available to support the research and technology transfer services of CITSL. Special care will be put on institutional models to support knowledge brokering activities linking UTT research with private sector and social demands (through instruments such as science parks, incubators, intellectual property management, etc.);
- b) based on CITSL objectives and CARIRI's capabilities assess different options for a successful integration of this institution, as well as the Institute for Marine Affairs (IMA) and the Metal Industries Company (MIC), within the future structure of CITSL;
- c) explore potential impacts and consequences of CARIRI's reform on the University of West Indies which is where CARIRI is currently located;
- d) recommend a participatory mechanism where stakeholders' different opinions and suggestions with regards to the integration of CARIRI, IMA and MIC, within CITSL will be considered; and
- e) submit to the Centre a detailed and satisfactory final report of the work accomplished within items (a) to (d) before the 30th of March 2009. The report should be written in English and delivered in word (.doc) format. Section A9 sets out the Centre's expectations and will form the basis of its determination whether or not the detailed report is satisfactory.

The work under this contract must be performed by March 30, 2009.

Appendix 2; Possible Program Activities for CITSL

1) Environment

- internal air quality
- waste water
- stack analysis
- noise pollution

2) Biotechnology

- agriculture biomass;
 - natural products, nutraceuticals, food processing, cosmetics, Caribbean Food Safety Centre
- microbiological biomass;
 - fermentation, bio-prospecting

3) Industrial Materials

- metallurgy;
 - ferrous
 - non-ferrous (e.g.-aluminium)
- civil engineering
- plastics
- packaging (content)

4) Food Safety

- pesticides
- packaging
- GMP manufacturing practices (ISO)

5) Industrial Chemicals

- organic;
 - natural gas
 - petroleum
- inorganic;
 - coatings

6) Quality Management

- ISO 14,000
- ISO 18,000
- ISO 17025

- Occupational Health and Safety

7) Calibration and Maintenance of Instruments

8) Energy

9) Information and Communications Technology

10) Engineering Design