

PROPOSAL FOR

Inter University Centre for Innovation, Technology Transfer & Industrial Collaboration (CITTIC)



Cochin University of Science and Technology

Confidential

Prepared by
Dr. Ramachandran Thekkedath , Vice Chancellor, CUSAT
& Dr. Sam Thomas, Faculty Member, SMS, CUSAT

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Executive Summary

There seems to be an ever increasing need for university technology to be made available to the industry and permit our industries to remain competitive in the global markets. The successful transfer of new technologies from the research laboratory to the commercial sector has many benefits: the creation of wealth, new jobs and new solutions to society's problems. But the path from the universities to business seems to be a long route.

The leading universities in the world, especially in US, Europe and China have woken up to these realities. Stanford, MIT, Harvard and Cambridge have revamped their Technology transfer offices with a renewed focus on commercialization. In India, IITs have taken the lead role in technology transfer. Transfer of technology from the universities to the industry has been identified as a thrust area by the Central Government. But most of the Indian initiatives are still in nascent stage.

CUSAT, a global centre for generation of new knowledge in frontier areas of learning, can't be moving away from the global trends. The need is felt to set up a centre for innovation and transfer of technology (CITTIC) that is a win-win for all its stakeholders namely CUSAT and its members, industry, smart entrepreneurs, the government Kerala, other government sponsored research institutions / universities and the general public. The Mission of the centre is to lead the efforts to translate the fruits of academic research of the University into products and services for the benefit of the society. The major objectives of the centre are

1. To facilitate the protection and transfer of university created discoveries into new products and services
2. To promote regional economic growth and job creation.
3. To enhance relationship with industry by identifying a range of models for collaboration with the university.
4. To generate new funding support for the university

5. To attract, reward and retain talented faculty and research students through increased income, sponsored research and consulting opportunities.
6. To actively facilitate formation of university-connected start-up companies.
7. To accelerate the successful development of entrepreneurial companies through an array of business support resources and services
8. To Provide a base for technology businesses to set up and grow leveraging on the expertise of CUSAT

CITTIC is proposed as a centre of the University under a centre director reporting to the Vice Chancellor. An advisory committee of eminent domain experts nominated by the vice chancellor will be guiding the operations of the centre. The major blocks under the centre are (a) **TECHNOLOGY TRANSFER OFFICE (TTO)** (b) **TECHNOLOGY BUSINESS INCUBATOR (TBI)** (c) **RESEARCH AND TECHNOLOGY PARK (RTP)**.

TTO has the mandate of taking the technologies developed inside the university to the industry. It is the major interface between research and commercialization. TTO handles invention management (evaluation and patenting of inventions), technology licensing and industry relationship management (sponsored research, spin off companies). **TBI** tries to accelerate the successful development of entrepreneurial companies through an array of business support resources and services (physical infrastructure, business management, financial assistance). It also provides facilities for clinical and field trials and technology proving prototype development. **RTP** provide state of the art housing facilities for a range of companies allowing them to leverage on the expertise available in the campus. These three units compliment each other in the long chain from an idea to a complete production set up.

The centre is proposed to be set up in three phases. Phase 1 will have TTO and TBI set up. Phase 2 proposes to set up the RTP (limited features) and Phase 3 will have the full fledged RTP. The total cost of phase 1 is approximately 11 crores.

1.0 Introduction

India has a wide network of government funded research institutions and universities who produce world class research in many frontier areas of importance to mankind. The output of these research find a place in peer reviewed journals or internal conferences. Though the society benefits from the dissemination of knowledge which happens through this process, many potential benefits of these breakthroughs are likely to end on the page without a company willing to invest in bringing the invention to marketplace

There seems to be an ever increasing need for university technology to be commercialized and permit our industries to remain competitive in the global markets. The successful transfer of new technologies from the research laboratory to the commercial sector has many benefits: the creation of wealth, new jobs and new solutions to society's problems. But the path from the universities to business seems to be a long route.

Technology transfer is the process of sharing of skills, knowledge, technologies, methods of manufacturing, samples of manufacturing and facilities among various institutions to ensure that scientific and technological developments are accessible to a wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials or services.

Cochin University of Science and Technology (CUSAT), set up with a clear focus on research in applied science, technology, management, industry and commerce has to take the lead role in bring the academia and the industry together. The proposal outlines the guidelines for setting up a centre for innovation and transfer of technology within CUSAT to achieve this objective.

2.0 Background Information

The world economy is moving to a knowledge economy increasingly based on science and technology. The importance of research and innovation is paramount to sustain this change. Public sponsored research in universities and public research centers accounts for most of the research and development in India. The industry tends to concentrate on short-term development leaving the fundamental and long term research to the universities. The scenario is same across the globe including the USA and Europe.

Traditionally, universities have been the indirect source of innovation through the publications of research results and through the development of new applications through contract work from Industry. There was no concern over owning and commercializing the intellectual property rights of the research output. There was no need to manage intellectual property rights, since universities did not retain them, and there was correspondingly no need for technology transfer offices. Innovation was entirely left to the responsibility and diligence of private industry. The quality of the researchers was measured by the number and quality of publications.

The scenario in the US universities had a sea change in the 1980s and 1990s with the government strongly encouraging universities to commercialize the technologies they developed. The act permitted the universities to

- Retain and patent inventions sponsored by the Federal Government
- License them to a suitable industrial partners, preferably, small business, who will develop commercial products and pay royalty to the university
- Share the royalty with the inventors (faculty member, department, students etc.)

The impact of the law on the US universities was nothing but dramatic. The leading universities like Stanford, MIT, University of Utah and Harvard revamped their

Technology transfer offices with a renewed focus on commercialization. For example, the Stanford University Technology Transfer Office was founded in 1970. In the first ten years of operation, the average income was only \$0.4 million per annum. In the next ten years (1981 – 1990), it rose to \$4 million per annum. For the FY 2009, the income stands at \$65 Million though 77 licenses. Even in collaborative research with industry, the universities may retain the IP rights in exchange of attractive licensing rights to the industry partner. This Innovation Model has soon found acceptance in Europe. Among the Asian countries, China was quick to adopt the international model for contract research and technology licensing.

The Indian government also has encouraged the premier research institutions in the country to take industry interfacing more seriously. The union government is proposing a comprehensive bill on protecting and making the best use of the technology inventions of the public funded research institutions and universities. IITs have been fairly successful in initiating the collaborative work with the industry. Some universities like Pune University and university of Madras have made initiatives in this regard.

Different universities have approached the long chain technology commercialization in different formats. Some focus mainly on the licensing part (Stanford, MIT); Few are into incubator services (IIT D, Pune University); some provide infrastructure park facilities (University of Arizona, IIT Chennai). CUSAT, as the first mover among Indian universities, will be able to gain maximum advantage by entering into all these activities spreading the entire chain of research, development and commercialization.

3.0 Project Details

3.1 Rationale

CUSAT, a global centre for generation of new knowledge in frontier areas of learning, can't be moving away from the global trends. The basic philosophy and goals of CUSAT expressed through its Coat of Arms emblazoning the motto 'Tejaswinavadhitamastu' means '**may learning enlighten**'. So it is the duty of the university to enlighten the world through the fruits of our intellectual contributions. We provide pioneering research in nine Faculties viz. Engineering, Environmental Studies, Humanities, Law, Marine Sciences, Medical Sciences and Technology, Science, Social Sciences and Technology. Centre of excellences are also established in areas like Lasers and Opto-electronic sciences, Test and Instrumentation, Microprocessor Research, Rural Development & Appropriate Technology, Ocean Electronics Science in Society, Information Resource Management, Neuro Science, Population Studies, Aquatic Animal Health, Monsoon Studies, Intellectual Property Rights and Economic Policy. It is high time that we take measures to take the output of these pillars of learning to the outside world for the benefit of the society.

CUSAT has produced more than 1000 research papers out which over 500 are in international refereed journals. We are ranked number 1 in Kerala and number 3 in India among universities on the basis of research output. CUSAT is one of the few research universities with a strong management department. The expertise of the school of management studies in project management, entrepreneurial training, HR development and small business management differentiate CUSAT from any other public funded research centre in Kerala.

The proposed technology transfer centre is a win-win for all - to CUSAT and its members, to industry in general, to smart Kerala based entrepreneurs, to the government, to other universities and research centres of Kerala and to the general public.

CUSAT derives direct financial benefits from transferring technology generated by its researchers to industry. For leading US Universities, more than 10% of the research funds come through this route. Transfer activities also can lead to close relationships between researchers and companies which often provide sponsored research or outright gifts and grants for basic research as well. The university can attract the best faculty and the best students. Finally, the world-wide recognition CUSAT will receive for its leadership in the transferring of university technology will contribute to its reputation.

The faculty members and research associates of CUSAT profit directly by receiving a percentage share of all net royalties received on their licensed inventions. Also, the successful licensing of their inventions contributes to their work by providing meaningful feedback and evaluation from the corporate and industrial worlds. They also get further research opportunities or, can be consultants / director board members to the companies licensing their inventions. The US universities encourage the faculty to take up entrepreneurship as well.

Such relationships with industry will benefit CUSAT students too. They get a chance to work on state of the art technologies. The licensee may offer the students employment upon their graduation.

Industry is well aware of the benefits of licensing university technology. Companies gain access to the newest scientific advances by some of the most talented scientists and engineers. Companies get a collaborative environment between industry and academia to undertake joint research projects. This helps the industry to create, integrate, and apply advancements in knowledge resulting in matchless technological innovation and transfer. Public sector companies, who face shortage of funds for R&D, will benefit maximum through sponsored research with public universities.

The Governments both at the state and the national levels will be happy to see the funding in research reaching the society. This will also go a long way in making research institutions self sustaining. The technology transfer leads to generating new

employment, additional tax income and infrastructure development. Technology licensing creates new products, which in turn create new companies, which also create new jobs. The new technology can also contribute to the prosperity of existing companies, especially public sector units, often providing avenues into new endeavors and new markets. It generates products that improve our health and well-being- be it in medical advances and progress in environmental monitoring and technology. What Stanford has done to the development of Silicon Valley can be done by CUSAT to the development of Cochin as a technology hub.

Other public funded research institutions in Kerala, especially those sponsored by the government of Kerala and other universities in Kerala can also leverage on the expertise of CITTIC. Thus CUSAT can act as a nodal centre in Kerala to interface between academia and industry

Thus the opportunities can be summarized as

- The opportunity for the efficient conversion of innovation into goods and services to stimulate economic development and growth, create jobs, and improve the standard of living.
- The opportunity to demonstrate that investment of public funds into research support at universities produces tangible benefits for society.
- The opportunity for the university to acquire income from royalties or the sale of equity from technology transfer to start-up companies, to support teaching and research activities.
- The opportunity for employees of universities to supplement income through a share of royalty income from the transferring of their inventions, paid consulting work for companies or compensation for serving on Advisory Boards.
- The opportunity to support the Government of Kerala to coordinate with its research centers to interface with industry
- The opportunity for industry to fund research projects in the laboratory of the university.
- The opportunity for licensees to hire students when they graduate.

- Opportunity for talented youngsters to setup up new ventures with minimum investment with active support from CUSAT

3.2 Objectives of the centre

The CITTIC strives to advance the basic philosophy and goals of CUSAT to be a source of enlighten to all the stakeholders. The Mission of CITTIC is to lead the efforts to translate the fruits of academic research of the University into products and services for the benefit of the society. The specific objectives include

1. To facilitate the protection and transfer of university created discoveries into new products and services
2. To promote regional economic growth and job creation.
3. To be the nodal centre for channelizing the research efforts of other universities / public institutions in Kerala to maximize the benefits to the society
4. To attract, reward and retain talented faculty and research students through increased income and sponsored research and consulting opportunities.
5. To enhance relationship with industry by identifying a range of models for collaboration with the university.
6. To provide research and management support for industry, especially public sector companies
7. To generate new funding support for the university
8. To actively facilitate formation of university-connected start-up companies.
9. To facilitate the promotion of small / singly owned entrepreneurial ventures
10. To accelerate the successful development of entrepreneurial companies through an array of business support resources and services,
11. To Provide a base for technology businesses to set up and grow leveraging on the expertise of CUSAT

3.3 Business Models supported

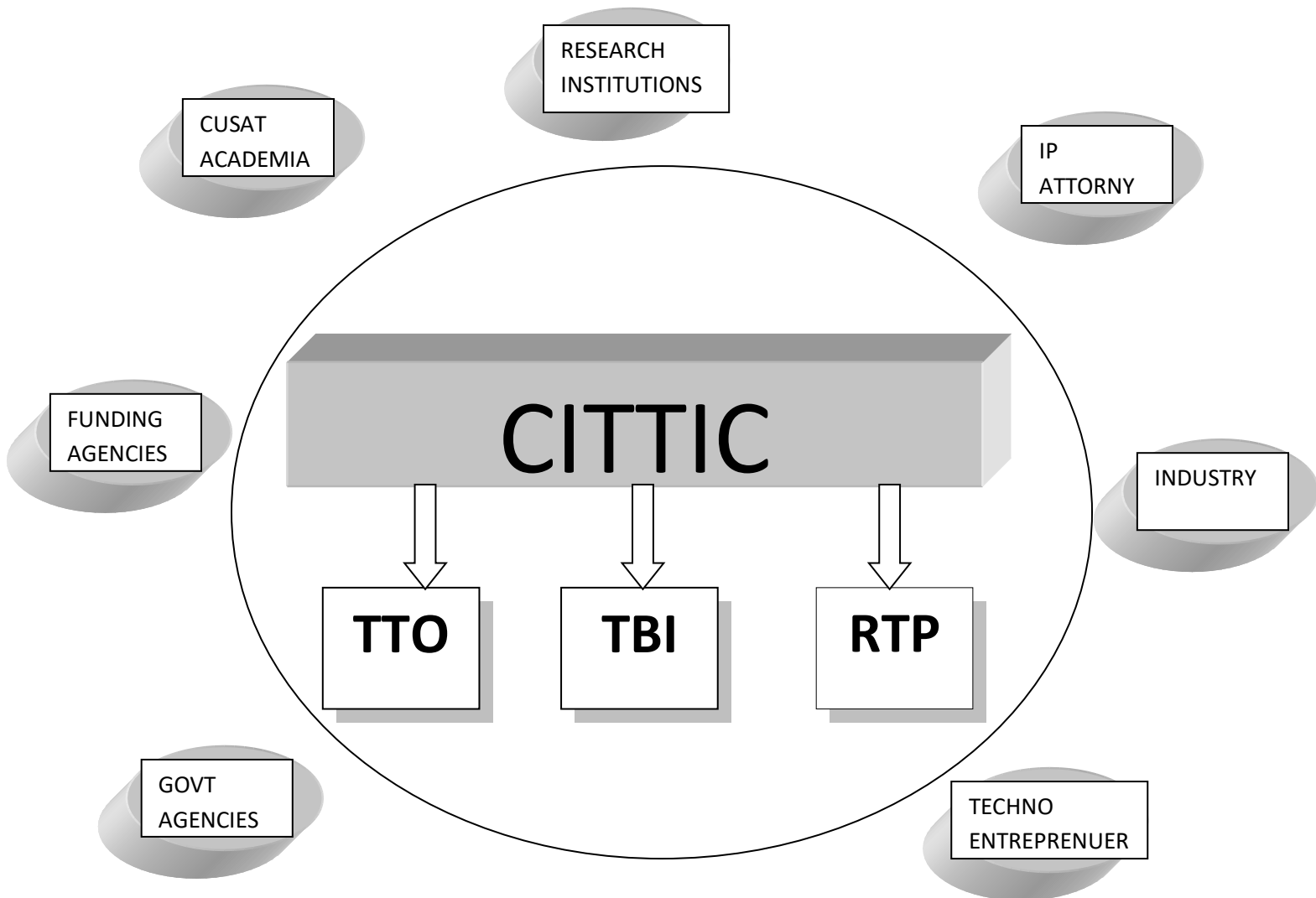
Range of business options is to be supported for the centre to be viable. Some of them are listed below

1. Pure technology transfer: A new or existing company (private or public sector), small or large takes up the technology for commercialization. They don't need management or production assistance from CUSAT.
2. Technology transfer + incubating service. The company taking up the technology is also looking for assistance – both business and technology proving production – from CUSAT.
3. Sponsored research: A company wants to improve upon an existing technology or a new idea (product / process). It wants to work closely with the university to achieve this.
4. New start up assistance : A new start up is looking for assistance in setting up the firm. They may need research, prototype development and business management assistance from CUSAT.
5. Setting up a new unit: An existing company may request CUSAT to develop a new technology, set up a basic production unit and run it for some time to prove the viability. They will take the unit away once the viability is proved.
6. Technology Park: A new or existing company is looking for a space to set by its full fledged production unit. They want to remain in close contact with CUSAT.

3.4 Structure

CITTIC is proposed as a centre of the University under a centre director reporting to the Vice Chancellor. An advisory committee consisting of five eminent domain experts nominated by the Vice Chancellor will guide the operations of the centre. The will have regular interaction with centre administrators though video / audio teleconferencing. The proposed structure is shown in figure (1).

The major blocks under CITTIC are (a) TECHNOLOGY TRANSFER OFFICE (TTO) (b) TECHNOLOGY BUSINESS INCUBATOR(TBI) (c) RESEARCH AND TECHNOLOGY PARK (RTP)



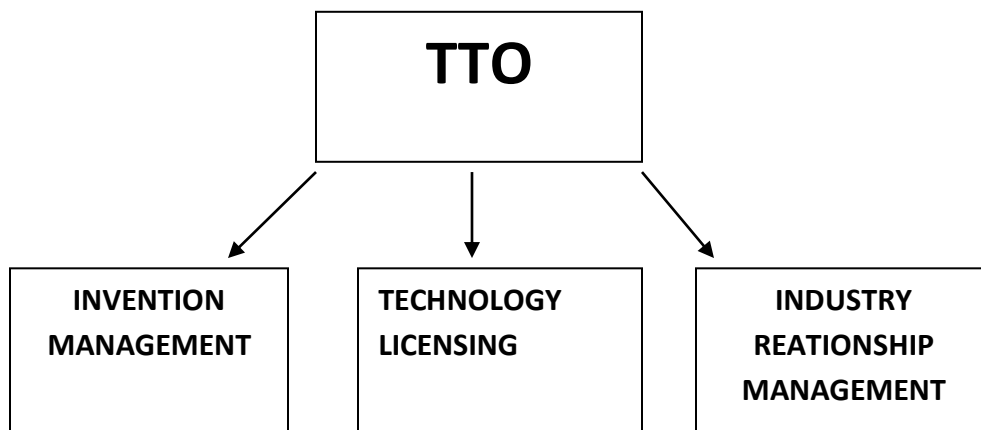
TTO has the mandate of taking the technologies developed inside the university to the industry. It is the major interface between research and commercialization. **TBI** tries to accelerate the successful development of entrepreneurial companies through an array of business support resources and services. It also provides facilities for clinical

and field trials and technology proving prototype development. **RTP** provide state of the art housing facilities for a range of companies from multinational corporate to small companies allowing them to leverage on the expertise available in the campus.

The three units compliment each other in the long chain from an idea to a complete production set up.

TECHNOLOGY TRANSFER OFFICE (TTO)

The major functions of TTO are explained below



1 Invention management

(a) Disclosing the invention

The process of technology transfer starts with an invention disclosure. The inventions may be the output of the sponsored research or personal research conducted for academic (doctoral work) purposes. The details are to be transferred to the TTO for evaluation purposes. The process has to begin even before publications are made out of the work to protect the IP rights.

(b) Evaluating the invention

During this phase, the TTO works closely with the inventor in order to understand the novel aspects and potential applications of the invention. The inventor can usually provide much of this information, but the TTO will also seek input from outside sources - both within and outside the university - often under a confidential disclosure agreement. This will help TTO to understand the uses and applications of the invention, its relationship to existing technology, likely markets, and companies active in the field that might be interested in licensing.

(c) Protecting the invention

If the invention is seen to be of core discovery with future implications or has tremendous use and commercial interest, the next step is to initiate the invention protection through patenting. All patent activities may be handled through patent attorney firms. The inventor is usually needed to provide detailed information and current experimental results in order to get the best possible patent claims. The patent is in the name of the university and the inventor's name will also be mentioned as the originator. Software developed will be protected through copyrights.

2 Technology Licensing

(a) Marketing

After the evaluation phase, TTO has to approach firms who may be the potential candidates for technology transfer. This activity will overlap with the patenting process. Sometimes the inventor may have more contacts and preferences. Those companies interested in evaluating the invention then are offered a confidential disclosure agreement, giving them the right to evaluate detailed and complete information on the invention but prohibiting them from making any commercial use of it. TTO has the final responsibility of choosing the right partner(s) keeping the interest of the university, industry, inventors and the society.

(b) Negotiating a license agreement

If a company is seriously interested, the next step is to begin negotiating a technology transfer / license agreement. A typical license agreement requires some up-front license issue fee, some earned royalties on products sold, and an annual payments to keep the license in operation. In some cases, there are provisions for milestone payments or for issuance of company shares (equity). The objective is to arrive at a mutually beneficial license agreement, i.e. a win-win deal. For example, a start-up company usually has limited cash, so TTO may minimize the license issue fee in return for a higher earned royalty or a deferred milestone payment or some equity in the company.

3 Managing Industry Relationship

(a) Performance monitoring

TTO is responsible for the future of the licensing relationship. This entails monitoring the licensee's performance, receiving reports and royalty payments, and overseeing the distribution of funds to the inventor, the inventor's department, and the university as per the CUSAT formula. The performance of the licensee has to be evaluated and suggestions may be given. After the expiry period / few years, the contract may have to be re negotiated.

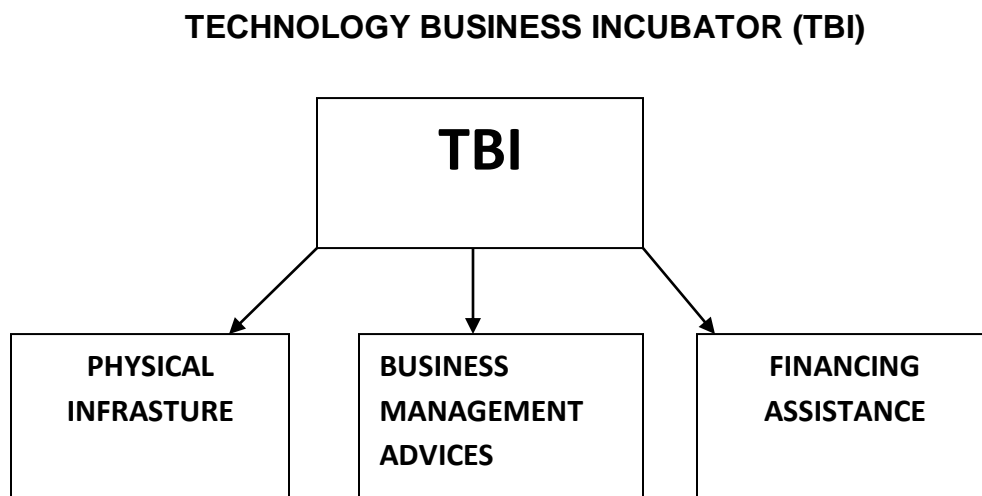
(b) Negotiating sponsored research

Most of the new innovations will be made through sponsored research undertaken by the university. Funding agencies could be central / state government departments, government agencies, government institutions or private firms. TTO with the concerned research department may negotiate the entire lifecycle of sponsored research from proposal submission through award closeout. It can help to identify the potential products or processes which can come out of the research which has future license options. TTO can assist faculty members and students in searching for funding

opportunities, reviewing proposals, negotiating awards, maintaining and fulfilling sponsor requirements for reporting and compliance with sponsor terms and conditions.

(c) Creation of Start up companies.

The university technology may form the base for creating a new company. TTO may give preference to talented entrepreneurs to take up the new technology under attractive transfer agreement. This may be preferred by the university as the new companies tend to remain in the vicinity of the originating university and contribute to the rejuvenation of the local economy. The TTO can help them to work with the TBI for business and funding assistance



Technology Business Incubator (TBI) provides physical infrastructure facilities, business management advices and financial assistances to start up firms.

1 Physical Infrastructure

A range of infrastructural facilities are provided to the start up to help them with the initial phase of setting up the company. The facilities are given to them for a limited period to facilitate the development of the commercial entity. Eventually the firm has to mature to a point and move out to its own premises. The facility may be open to faculty, students with an entrepreneurial mind. The facilities provided include

- Built up office modules equipped with Internet access facilities, telephone, electrical installations etc.
- Business facilities like FAX, photocopying, mail handling etc.
- Secretarial assistance
- Place for setting up technology proving (prototyping) production facility
- Shared facilities like conference halls, interview rooms, auditoriums, meeting rooms etc.

2 Business Management Advices

The assistance provided here includes management advisory service helping the entrepreneur to successfully establish his enterprise. The services are

- Help with business basics
- Developing marketing plan
- Developing business plan
- Preparing project reports
- Marketing assistance
- Help with presentation skills
- Help with accounting/financial management
- Comprehensive business training programs
- Advisory boards and mentors
- Management team identification
- Help with regulatory compliance

3 Financing Assistance

One major constraint for the start up venture will be capital. TBI tries to help the entrepreneur by linking him with financial assistance provider. The university may also think of investing in the start up for a stake. TBI can help with services like

- Access to bank loans, loan funds and guarantee programs
- Link to government assistance like DST, DIT
- Links to strategic partners
- Access to angel investors or venture capital

RESEARCH AND TECHNOLOGY PARK

Research and Technology Park is designed as a complete home for technology companies. They can have full fledged R&D and production set up in the park. RTP will provide world class infrastructure to companies from different sectors – Information Technology, Bio Technology, Electronics, engineering etc. It differs from the normal parks like KINFRA parks as the companies live in constant touch with the vibrant research environment of CUSAT. For companies on the leading edge of technology, the Park provides vital access to extraordinary talent, creativity, and innovation. Support firms like venture capitalists, legal and accounting firms would also be given space in the Park to support the ventures. The companies in the park can leverage the specialized expertise of the faculty; utilize their research facilities, while providing part time employment and experience to the students

3.5 Risk analysis

The concept of a full fledged technology transfer centre also comes with few risks. In addition to the financial constraints, the following issues are to be addressed.

- The risk that licensing and commercializing by universities might inhibit the progress of fundamental science and technology innovation.
- The risk of a loss of public trust in the university and/or its employees.
- The risk of unfulfilled commitments to research sponsors, to students, or to the university.
- The risk of exploiting the work of students to benefit personal interests of their supervising professor.

- The risk of incorrectly deciding the ownership in a collaborative research environment.
- The risk that publications may be compromised for commercial gains.
- The risks that new discoveries made by university employees are not reported to TTO but are directly diverted to a company in which the employee has a personal interest.

But these risks are nothing exclusive to CUSAT. World over universities have shown that these risks can be overcome through clear policies and a transparent system. A supervisory committee set up by the vice chancellor will have the authority to approve proposal from private companies. The government of India is coming out with a comprehensive set of guidelines for the universities in this regard.

3.6 Project Requirements

The project is proposed to be completed in 3 phases.

Phase 1 : TTO and TBI

Phase 2: RTP (basic)- Will have limited facilities for setting up a commercial unit. It will contain space for setting up office, production space for limited commercial production. Companies can avail all these at concessional rates. Preference will be given to start up firms working on technologies transferred from CUSAT / other public funded research instituted. Companies can avail these facilities for a maximum period of 5 years after which they have to relocate to set up a full fledged unit.

Phase 3: RTP (full fledged)

This will house fully grown companies who want to set up complete units. Companies operating in RTP (basic) can relocate to RTP (full fledged) after 5 years. Or new companies from all sectors are welcome to have their units set up here. All in close association with the stimulating research and management expertise of CUSAT.

Land Requirement

Phase 1 : 5 acres

Phase 2 : 20 acres

Phase 3 : 75 acres

Staff Requirements (only for phase 1)

	CTOT	TTO	TBI	TOTAL
Director –in-charge	1			1
Assistant Director		1	1	2
Liaisoning Officers *		2	2	4
Office administrator		1	1	2
Accountant	1			1
Office assistants	1	1	1	3

*Liaisoning Officers in TTO are people with concerned technology background with a flair for marketing and commerce. They act as a single point contact for an invention / contract concerning that technology area. They handle everything from collecting details on the invention, interacting with industry, negotiating contract details, coordinating for patents, documentation for the research sponsor etc.

*Liaisoning Officers in TBI are people who coordinate with new ventures to give them the required support. Each firm will be attached to one officer who will work closely with the firm to help them with commercial support.

Physical infrastructure requirement (phase 1)

Built in space (sq ft)

	CITTIC +TOT	TBI
Office	3000	3000
Incubation + techno proving facility		5units @2000 sqft = 10000
Shared facilities*	5000	10000
Misc	1000	1000
TOTAL		33,000 sq ft

*Shared facilities include conference halls, discussion rooms, video / audio conferencing facilities, cafeteria, etc

Other requirements

- Office furnishing
- Networking and Wifi enabling
- Office equipments
- Computers, software
- High speed Internet

3.7 Budget (for phase 1)

Fixed Cost

Building 33,000 sq ft @ Rs 1500/ sq ft = 4.95 crores

Furnishing with networking, internet

Office equipments, computers etc

@ Rs1500 / sq ft = 4.95 crores

TOTAL = 9.9 crores

Recurring cost

Salary = 30 lakhs per annum

Utilities and maintenance = 10 lakhs per annum

Marketing expenses = 10 lakhs per annum

Patenting and documentation expenses = 10 lakhs per annum

TOTAL = 60 lakhs per annum

In the first 5 years, the centre can generate an income which is 50% of the cumulative recurring cost.

The funding requirement will be Fixed cost + 50% of the recurring cost for 5 years

= 9.9 crores + 50% of 3 crores

= **Rs. 11.4 Crores**