

## **RESEARCH, INNOVATION AND COMMERCIALIZATION (RIC)**

### **Introduction**

1. By definition, a “University” is a place for free exchange of ideas, where research and teaching advance side by side for the general betterment of an appreciative society. In institutions of higher learning, teaching and research are not parallel activities – both are part and parcel of the overall learning process. Therefore, institutions of higher education where R&D is not at par with teaching, usually the most common excuse being that the faculty is too committed in teaching and do not have time for research, are compromising on standards of education and performing only half of what they must do to fulfil their primary commitment. Additionally commercialization of knowledge and technology is an essential precondition for improving quality of life. Globally, entrepreneurship has appeared as a major source for converting knowledge, ideas or inventions into successful products or services. Faculty and students of universities like MIT, Cambridge, Stanford and others have developed very successful businesses from university R&D projects. These businesses have created millions of jobs and generate revenues in billions of dollars annually. For a developing country like Pakistan, the importance of converting knowledge to practice and injecting this knowledge based input into our economic and social growth is the requirement that cannot be over emphasized.

2. Therefore, National University of Sciences and Technology (NUST) with the mission “*to develop NUST into a comprehensive research led university, with the focus on technology, innovation and entrepreneurship*” must give high priority to Research, Innovation and Commercialization of its technologies and Research output. For this end, RIC ecosystem has been established with following objectives:

- a. To establish and maintain a Research culture at NUST.
- b. To ensure that the Research pursuit at NUST has relevance to the community and society.
- c. Commercialize R&D performed at NUST.
  - i. In short term identify commercial and industrial prospects of solutions and technologies developed at NUST.

- ii. In medium term align R&D activities at NUST with local and global commercial and industrial needs.
- iii. In long term facilitate creation of new industries based on R&D performed at NUST.
- iv. Promote industry focused multidisciplinary R&D.
- d. Promote training and education related to entrepreneurship.
- e. Improve productivity and quality of services and products in industry.
  - i. Provide professional development training and coursework.
  - ii. Effective value-add consultancy services.
- f. Be a catalyst for creation of new industries.
- g. Create job opportunities for NUST graduates.
- h. Achieve financial Independence for NUST.
  - i. Reduce NUST dependence on direct government financial support.
  - ii. Achieve financial sustainability.

### **NUST - RIC Eco-system**

3. NUST believes that seats of higher education cannot operate as isolated islands of knowledge and has formulated an integrated, interdependent Research and Development/Knowledge Management Eco-system that helps in establishing and consolidating Academia-Industry Linkages that further helps in commercializing research. The NUST RIC Eco-system consists of following entities:

- a. **The Centre for Innovation and Entrepreneurship**
  - i. **Research Directorate:** The Directorate of Research established at NUST is acting as a focal point for providing guidance and support to the constituent institutions in all activities related to research (Details are listed in the preceding paragraphs).

- ii. **Innovation & Commercialization Directorate:** The role of Innovation & Commercialization Directorate is to encapsulate NUST's research and intellectual property opportunities at the earliest stage, and to translate these benefits to industry by working closely with the industry through partnerships, collaborations and licensing.
  - iii. **Technology Incubation Centre:** The Centre has been established to facilitate and support the innovation engine of the University. The objectives of TIC include fostering an entrepreneurial culture, by providing the students and faculty of NUST, an opportunity to transform their technology-based business ideas to reality. These facilities are also open to the general public, provided they contribute to NUST knowledge base.
  - iv. **Science and Technology Ventures:** ST Ventures NUST is the first holding company to be established in academia in Pakistan. It acts as a platform for the creation of new enterprises by commercializing R&D output for successful businesses.
- b. **Corporate Advisory Council (CAC):** CAC is the epitome of university-industry collaboration aimed at producing knowledge for application in industry and society for equitable socio-economic development in Pakistan. To this end, the council has significantly allowed NUST to utilize its integrated R&D platform for delivering innovation-based solutions to the Pakistani industry. CAC combines thought-leadership from 11 key sectors across the national economy which are as follows:
- i. Engineering
  - ii. Automotive
  - iii. IT & Telecommunication
  - iv. Chemical
  - v. Defense Technologies
  - vi. Infrastructure
  - vii. Social Sector
  - viii. Intellectual Property
  - ix. Health & Pharmaceutical
  - x. Power & Energy
  - xi. Banking & Financial Services
- c. **National Science and Technology Park:** NUST aims to become a hub for public and private technological, financial and human capital through the establishment of a

Technology Park at the new campus in Islamabad. The Park will promote interaction between institutional elements, i.e., universities, research parks, large companies, venture funds, etc. and non-institutional elements, i.e., talent, bodies of knowledge and virtual communities to create job opportunities for the youth and link local assets to global markets in order to generate value.

- d. All of the above organs of the eco-system play a key role in establishing much needed linkages between the industry and academia and therefore bridge gaps between the engagement and action neutral zones; as well as those between industry needs and University research.

### **Research Directorate**

4. It is imperative that apart from maintaining high standards in teaching, research is rigorously pursued and suitably rewarded at NUST. The R&D output of NUST is in line with national needs and contributes towards socio-economic growth of the country. Directorate of Research established at NUST is acting as a focal point for providing guidance and support to the constituent institutions in all activities related to research and development. Directorate of Research is an integral part of Offices of Research, Innovation and Commercialization (ORIC) eco-system, headed by Pro-Rector (RIC).

#### **a. Responsibilities of Research Directorate**

- i. Promoting research culture to ensure research remains an integral component of academic activities at NUST.
- ii. Ensuring high quality of research directly relevant to Pakistan's needs is pursued at NUST.
- iii. Facilitating and supporting NUST researchers in their pursuits for publication and presentation of their research work.
- iv. Maintaining efficient and productive communication channels with funding agencies.
- v. Processing of research proposals for acquiring financial support and generate research output.
- vi. Serving as liaison between Principal Investigator and Sponsoring Agency/Organization.

- vii. Overseeing the contracts and grants related research activities.
  - viii. Monitoring the research activities, and where necessary, conducting technical audit and physical inspections.
  - ix. Furnishing progress/completion reports to the Sponsoring Agencies.
  - x. Ensuring expenditure on research activities as per the approved proposals and as per NUST Financial Statues.
- b. **RIC Coordinator and Research Groups:** Each constituent institution will establish an R&D Department headed by a PhD qualified faculty member who will be designated as “RIC Coordinator”. The “RIC Coordinator” will be responsible to the Dean to coordinate, monitor and record all the R&D activities of the institution and report all required information to Directorate of Research NUST. Additionally the institutions will establish research groups in the areas of their expertise. These research groups will be monitored by respective RIC Coordinator of the institutions, who shall be coordinating all research related activities for publicity and for possible collaborations with other organizations. The functions of R&D Department and Research Groups will be in accordance with NUST RIC Policy.
- c. **Initiating Project Proposals:** NUST faculty members across the board are encouraged to secure sponsorship for research projects to further the mission of the University in teaching, research and social service. Such projects allow creation of new knowledge and industrial development enabling national growth.
- The person initiating the project will be called the Principal Investigator (PI). It is preferable to have a Co-PI and a team in each project who will assist the PI. PI of each of the research project must identify the end-users)/beneficiary of the R&D output and also focus on the priority areas, because such proposals have better chances of getting funding / sponsorship. The choice of selection of sponsoring agency will depend on the type of the project and areas of interest of sponsoring agencies. There are many agencies/organizations that provide funding or sponsor research projects. These agencies/organizations publish their sponsorship programs on their respective website. Similarly each sponsoring agency or organization has its own specific application or proposal form which the Principal Investigator are required to fill-in and can be downloaded from the concerned agencies’ websites. The project proposals will be

initiated by PI on prescribed forms of the suggested sponsoring agency. In case funding is required from NUST own resources, the proposals are to be raised on “NUST Project Proposal Form”, (NUST PPF) in line with NUST RIC policy. As regards to the externally funded projects, the Terms and Conditions mutually agreed upon into contract deeds/ agreement will assume preference.

- d. **Externally Funded Projects:** Research Directorate will coordinate externally funded research projects assisting or facilitating faculty and professional research staff in their efforts to secure external fundings. The Research Directorate provides technical assistance to Principal Investigators in preparation of project proposals. The project proposals are reviewed and found in order are processed by Research Directorate for signing by the Competent Authority before dispatch to the concerning funding agency for their approval.
  
- e. **NUST Funded Project:** The project proposal will be analyzed / scrutinized at Research Directorate, HQ NUST in the light of RIC policy and its requirement/usefulness towards the academic achievements, human resource development, permanent equipment to be inducted, marketing/commercialization aspects and the extent of contribution of the project towards socio-economic growth of the country. The thoroughness with which the proposal is prepared in terms of expenditure, cash plan and timelines with deliverables will also be taken into account. The funding will be provided from the NUST R&D Fund Account for the approved projects by the Competent Authority.
  
- f. **Research Cost:** The Sponsoring Agencies are expected to pay the actual costs of the research projects. These costs include both the direct and indirect; facilities and administrative cost obligations incurred by the NUST in the conduct of a project. The direct costs include salaries, fringe benefits, equipment, supplies, travel and other expenses. The indirect costs i.e. (facilities and administrative costs) are those institutional research infrastructure costs that cannot be readily attributed to an individual project or monitored on an individual basis and include building and equipment use, operations maintenance and utilities, general departmental and sponsored projects administration, library and capital improvements. Each sponsored project is expected to pay its proportional share of these research infrastructure costs. All research project budgets should include indirect costs as per negotiated and approved cost rate.

- g. **Remaining within Legal Bounds:** Federal regulations and sanctions promulgated and enforced by various government agencies will have to be strictly observed. However, the University will acquire prior government approval as per the procedure in vogue in case there exists any exclusion for the research at campus from these regulations. The consequences of violating the existing rules without prior permission from the concerned federal agencies can be quite severe, ranging from loss of research contracts to monetary and criminal penalties for the individual and / or organization violating these regulations.
- h. **Publications:** The University will retain the right to publish all the research work done at NUST and researchers are encourage to disseminate the result of their research work. The delay in the publication for a reasonable time may be allowed to permit filling of a patent application, to permit review for possible premature disclosure of patent application information and to review for inadvertent disclosure of a sponsor's confidential information. The final decision to publish rests with the NUST.
- j. **Utilization and Sharing of Research Laboratory Facilities for Academic and Research Purposes:** NUST has invested heavily on its research facilities and infrastructure including procurement of a lot of hi-tech lab equipment and expansion and up-gradation of laboratories. These laboratories are expected to become the centre of excellence in their respective fields. Optimum utilization of our state-of-the-art equipment for benefit by NUST faculty, students and other researchers and also making this available to other organizations / institutions to contribute to the country's development is necessary. Therefore, formulation of a methodology to calculate charges, account for the funds so collected and their disbursal is essential. Guidelines for utilization and sharing of NUST research facilities are given below:
- i. Research infrastructure at NUST constituent institutions is owned by NUST as whole and does not belong to any particular project, funding or donor agency/ institution/organization/individual.
  - ii. NUST institutions will maintain a policy of open access of research facilities and willingly share these facilities with the researchers/scholars.
  - iii. The research facilities will be offered to the researchers and conducive research environment will be provided to the scientific community/ researchers.

- iv. Only authorized users/researchers will be permitted to use the offered facilities as per the procedure.
- v. No facility/equipment will be moved, relocated or rearranged outside the authorized laboratory / institution without prior approval by Competent Authority.
- vi. No equipment documentation/associated gears, materials may be removed from its location at any time or for any reason except portable instruments requiring movement for survey purpose which will then be returned.
- vii. Priority for use will be as follows:
  - (1) By the students and faculty of the parent institution.
  - (2) By the faculty and students of other NUST institutions.
  - (3) By any other researcher / organization.
- viii. The research facilities will not be utilized by any individual user for commercial / business purposes or any profit venture, sub-let etc.
- ix. The utilization charges, their accounting and dispersal will be done as per provisions of NUST RIC policy in vogue.
- x. Laboratory facilities for UG classes within NUST constituent institutions can be shared / utilized with mutual consent without utilization charges, however, provision of essential consumables and material for project/class will be the responsibility of the parent institution.
- k. **Research Paper Publication in Journals and Presenting in Conferences:** It is mandatory for the faculty and postgraduate students to publish research papers in journals and present their research work in conferences on regular basis under the name of “National University of Sciences and Technology, Islamabad”. Each faculty member is expected to produce at least one research publication annually in ISI indexed journal. Highest credit will be given to publications in journals with high Impact factor. To encourage faculty for publication and presentation of their research paper publication charges, registration fee and visit can be sponsored by NUST. Likewise, sponsorship for

publication of book and chapter in a book will be made available after evaluating the research work, publishing agency and standing of the publication.

- l. **Grant of Financial Award for Publication:** NUST has always encouraged its faculty and students to actively involve themselves in research activities. In this context, encouragement for research publication, NUST will also provide cash award for contribution of its faculty and students in publication of their research work as per the details of NUST RIC policy.
- m. **Research Specific Foreign Visits:** NUST faculty and students are sponsored for their visits abroad in connection with their research activities. The funding can be provided from NUST budget or ongoing research programs/initiatives/ projects for the purpose.
- n. **University Best Researcher Award:** In order to encourage young researchers and to motivate them to perform better. University Best Researcher of the year Award will be given on Postgraduate Convocation. The nomination of two to three faculty members for the award of best researcher duly recommended by each constituent institution shall be forwarded to HQ NUST. Final selection / approval of the best researcher of the year shall be made by NUST Evaluation Committee (NEC).
- o. **Faculty Research Performance Evaluation:** All NUST institution will evaluate annual research performance of its faculty in accordance with Criterion of Performance Evaluation of Faculty issued by HR Directorate, HQ NUST. Performance of “RIC coordinator” will be finalized in consultation with Pro-Rector (RIC) by respective institution.
- p. **Hiring of HR for Research Work:** HR is the core of research work at any educational institute. Research grants for hiring full/part-time researchers may be obtained by faculty members, out of the funds allocated through sponsored R&D projects being handled by them. The hiring of researchers will be as per the Terms and Conditions contained in the contract deeds/agreement signed with sponsoring agencies. NUST may also consider the request for hiring researchers depending upon the research work and teaching workload undertaken by the faculty member as per the approved policy in vogue.
- q. **Conferences/Workshops /Seminars at Institutions:** Each constituent institution of NUST is required to organize at least one national level conference/ workshop/ seminar each year and at least one international level conference/workshop/ seminar every

alternate year in their respective fields of discipline. The participants should also be shown the research work in the area and may be taken around the Labs and Library facilities highlighting the strength of R&D work. The objective is to enhance our rapport with the industry by developing understanding and strengthening industrial linkages. The grant, on as required basis, to accomplish specific research objectives such as seminars, conferences, training, or to publish awareness building or educational materials be solicited from sponsoring agencies like HEC, PSF etc and in case of additional requirements funds can be provided from NUST Budgets.

- r. **Avoidance of Plagiarism:** Higher Education Commission (HEC) has formulated a “Plagiarism Policy”, which aims to apprise the students, teachers, researchers and staff about plagiarism and how it can be avoided. HEC Plagiarism Policy has been implemented at NUST for avoidance of plagiarism.
  
- s. **Publication Secrecy:** It is the university policy to support research and the researcher to publish and materialize research results. Researcher shall however not enter into projects requiring secrecy without the specific permission of the Dean/Principal/Commandant. During implementation of the R&D projects, if any confidential information has been made available to the investigator / researcher, the confidentiality of such information is to be protected. Any person furnishing such information may require submission of manuscript for review the Higher Authority for obtaining permission.

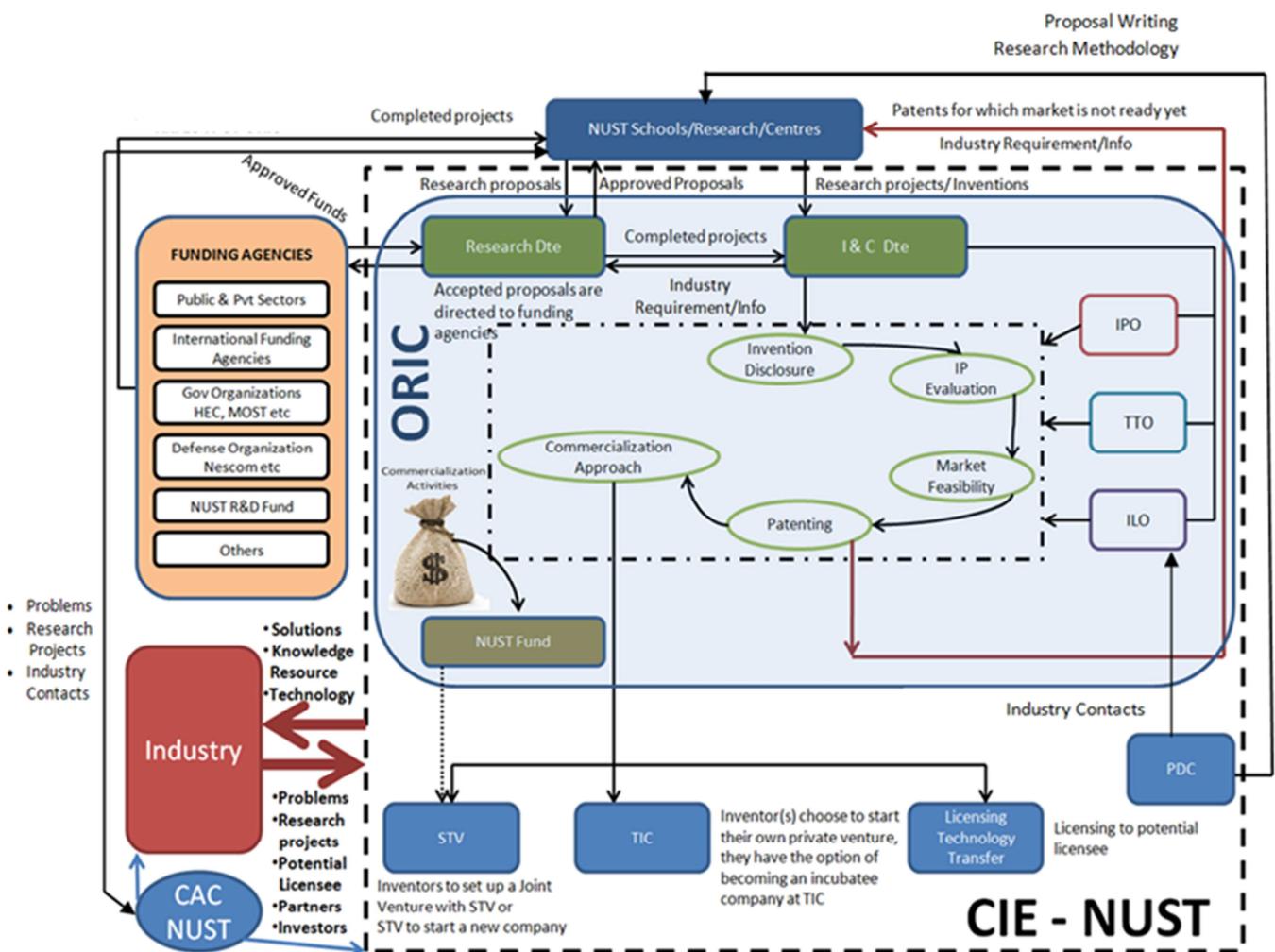
### **Innovation & Commercialization (I&C) Directorate**

5. Vision for National University of Sciences and Technology (NUST) emphasizes its role in fostering innovation and entrepreneurship. Directorate of Innovation and Commercialization has a significant role to play towards achieving this vision. Commercialization at universities internationally is not just restricted to technology transfer. In fact, it explores various avenues to achieve the end of revenue generation through University-based technologies. Generally, the most common paths for commercialization may broadly be divided into four categories i.e. contract/collaborative research, technology and business incubation, equity based partnerships and licensing out university technologies.

- a. **Objectives:** Objectives of I&C Directorate are to:

- i. Maintain a climate in which exploitation of Intellectual Property generated in the course of research and development activity is a normal and automatic consideration by creating awareness about the concept of commercialization at NUST constituent College/ Schools/ Institutes/ Centres.
  - ii. Develop and maintain industry linkages and identify specific industry partners for the ongoing research and development at NUST.
  - iii. Provide efficient and comprehensive services for IP management, technology transfer and industrial relations.
  - iv. Explore and evaluate market potential for technologies that developed within and outside NUST.
  - v. Market technologies and inventions by seeking industry partners who are best placed to take advantage of such technologies.
  - vi. Negotiate licensing terms to develop a mutually beneficial business relationship.
- b. **Intellectual Property Office (IPO):** The Intellectual Property Management Office determines the patentability of a technology and provides assistance with protection of intellectual property. Intellectual Property system contributes to a strong University economy, encourages investment in innovation, and fosters entrepreneurial spirit leading to new products and services for the competitive global market.
- c. **Technology Transfer Office (TTO):** Technology Transfer Office is responsible for moving research results from the laboratory to the market place. It evaluates and manages invention portfolios, gets assistance from IPO in patent prosecution, negotiates licensing agreements and periodically reviews cooperative research agreements already in place.
- d. **Career Development Centre (CDC):** CDC provides programmes and services to help students and alumni to explore and make effective career choices, foster professional networks with employers and assist employers in meeting their recruitment needs. The office helps students connect with their potential employers through job fairs and employer sessions.
- e. **Industrial Liaison Office (ILO):** NUST – ILO develops and maintains industry linkages to make NUST graduates their premium choice and identifies specific industry partners for the ongoing research at NUST. It gauges industry needs and processes match making with NUST Institutions to solve industrial problems. This office has direct bearing on commercialization activities. It currently looks after following two areas:

- i. **Industrial Relations (IR):** The role of IR is to build and maintain strong Academia Industry Linkage with the focus on promoting and making NUST graduates the premium choice for the employers. IR is already fostering professional networks; therefore it also supports TTO to leverage these contacts in finding the potential industrial partners for the research/technologies being developed at NUST for commercialization purposes.
- ii. **Alumni Affairs:** The role of this department is to build and maintain lifelong relations with the NUST Alumni through a common platform in order to stimulate interest, build loyalty, increase involvement and generate support for the National University of Sciences and Technology.



### **Key Challenges Expected in Achieving These Objectives and Goals**

- a. **Delivering Integrated Solutions to Industry:** Industry expects complete and integrated solution to their key problems which require minimum change in their infrastructure and processes. Technologies developed at universities are the brain child of an expert in a particular domain. There is lack of experts who can give industry, the complete integrated solution after analyzing problems faced by industry.
- b. **Alignment of Academic R&D with Industry's Needs:** Technologies developed at universities are the outcome of some research which most of the times is not aligned with the industrial problems or needs. When such inventions are made, either they do not have market potential at all or they have entered the maturity and decline stage.
- c. **Industrial Problem Identification:** Succinct information about key problems, bottlenecks and rate limiting factors faced by industry is not available to faculty. Industry and academia often use incompatible terminology which further accentuates the situation.
- d. **Commercial Scale Implementation of Laboratory Scale Solutions:** Academia typically lacks facilities, expertise and resources needed to scale up laboratory scale solutions to commercial scale implementation.
- e. **Lack of Incentives for Faculty:** Current criteria for faculty career growth heavily favors publication of research papers instead of rewarding efforts towards solving local industry's problems.
- f. **Lack of Incentives for Industry:** Frequently there is lack of industrial willingness to incorporate indigenous solution in high cost machinery and equipment developed at local universities. Typically the risks involved in incorporating newly developed technology outweigh its benefits, especially when the cost benefit analysis is done based on current sunken infrastructure cost and projected revenue models.

- g. **Stretched Funding Process:** At times the funding processes for development of technology are so stretched out that technology matures by the time it comes to the market. Furthermore these specialized grants are generally awarded in small amounts which fall short of the substantial cost to build a commercial enterprise or to commercialize that technology.
  
- h. **Mismatch in Timescales Followed by Industry and Academia:** R&D in universities has to follow time scale set by degree awarding programs. Industry on the other hand follows market driven timescales.
  
- i. **Pool of Experts:** We face critical shortage of experienced professionals who are capable of handling the complex, multidisciplinary and meticulous work associated with University-Industry collaborations. There is an acute need for personnel with a good deal of business expertise who can handle the administrative and business work associated with University-Industry collaboration and technology transfers. Such personnel should have an understanding of science and engineering and knowledge of the law. These individuals must also understand how two different communities, the academic and the business, operate. The challenge is to have the pool of experts from different fields to analyze the diverse technologies and their commercial potential.
  
- j. **Conflict of Interest:** The call for more University-Industry collaboration is well grounded amid trends toward intensifying global competition and the drive towards a knowledge-based economy. But these changes should not take place at the expense of the fundamental mission of universities. It remains that universities must pursue several different, conflicting goals. They must still fulfill their primary mission to teach students, and this goal cannot be compromised. While university professors are given greater freedom to work with the private sector, there should be a separation between their academic and commercial activities. There is a real risk of a conflict of interest. In general, such a conflict is defined as a situation in which a public obligation competes with a financial interest. Research priorities may be skewed towards applied research that tends to produce immediate financial benefit. Universities may inhibit intellectual freedom and thus foster public mistrust and distract faculty members from the university's essential functions of teaching and basic research.

## Strategies

- a. **Develop a Pool of System Integration Experts:** A pool of system integration experts will be created. Services of these experts will be acquired for analyzing industry's needs and delivering integrated solutions to industry. These experts will translate industry's needs into specifications understood by researchers and developers who excel in their own specializations. Funds for leveraging services of such experts will be made available through NUST Fund. For this, there is a requirement of "Case Managers" to work with Technology Transfer Office. The desired organization structure of TTO is given at Appendix 3D. Till the time TTO is organized, "HoD Research" will also act as Case Managers in their particular domain.
  
- b. **Align University Research with Industry Needs:** A strong Industry Liaison Office (ILO) will be developed to nurture industry linkages and identify specific industry partners for ongoing research at NUST. Support and focused knowledge exchange with NUST Corporate Advisory Council (CAC) and its subcommittees will be essential for achieving this connectivity with industry. Research Directorate and Technology Transfer Office will gauge industry needs and process match making with NUST Schools to develop R&D proposals and projects focused at solving industrial problems. Industrial relations developed by Professional Development Center (PDC) and Career Development Center (CDC) will also be leveraged to create this connectivity.
  
- c. **Incentives for Faculty:** It may be emphasized that delivery of solutions to industry through adaptation of existing or newly developed technology will be given equal recognition towards faculty career development than research and development that leads only to publication of research papers in international conferences and professional journals of repute. NUST will hold conferences titled "National Industrial Technology Conference" followed by "NUST Technology Fair". These conferences will be focused at solutions delivered to industry. Papers will be accepted through a peer review process. Referees will be selected from industry. Members of CAC and its subcommittees will play a significant role in evaluating submitted papers. The conference may be held in Islamabad and Karachi. For NUST internal evaluation of faculty performance papers published in this conference will be equated to Impact Factor publications through evaluation.

- d. **Incentive for Industry:** NUST technology strengths including laboratory equipment and specialized manpower will be made available to industry to reduce industry's cost of maintaining such specialized resources. In addition, industry needs financial incentives to incorporate locally developed solutions. Providing such financial incentives is truly out of scope of NUST charter. However, NUST will join hands with CAC and other professional trade organizations to encourage government to create industry specific innovation and commercialization funds. A good example is the National ICT R&D Fund. This fund is financed by an R&D fee collected from telecommunication operators based on their revenues. In fact such funds for other industries like pharmaceuticals and energy already exist but are not functional. Similarly, HEC will be approached to aggressively promote its University-Industry Technology Support Programme, under which if industry puts 20% for funding needs HEC gives 80% of the financial requirement. A similar program for technology commercialization should be supported by HEC and MoST.
- e. **Provide Support for Technology Commercialization:** Public funding is typically available for research and development. There are very few resources available for converting laboratory scale prototype and solutions developed as a result of R&D to commercial scale integration, production and distribution of goods and services. Cost of commercialization of technologies developed at universities is typically higher than the cost of R&D that produces these technologies. In addition, an industry partner is needed. Following strategies will be pursued to meet challenges mentioned above:
- i. **Early involvement of Industrial Partners:** Given the high cost of some forms of commercialization, a general strategy followed in the 1st world is for universities to fund discovery stage academic research and then seek industrial partnerships to continue development of potential commercial technology. In this model basic scientific discoveries or innovative engineering technologies with translational potential are identified and out-licensed to industry for further development and testing. In context of a 3rd world country like Pakistan it is much more prudent to involve industrial partners in very early stage of R&D project and proposal development. This early stage involvement of industry goes a long way in smooth industrial integration of developed technology and minimizes cost of commercialization.

- ii. **Streamlining the function with Research Directorate:** Projects are submitted at R & D Directorate for funding and other facilitation. The application of such projects will be shared with I & C Directorate for analysis of its commercial potential. This will encourage timely involvement of commercialization team and will also help in looking for industrial partners who are potential buyers for the technology.

### **Methodology for Commercialization**

6. There are several routes to commercialization of technology created via research and development in a university. Depending on characteristics of an innovation we can chose from the methods of commercialization described subsequently.

- a. **Creating a New Business :** The creation of a new business based on the innovation reflects situations where the innovation forms the basis for creation of a new firm to exploit the innovation. This new firm acquires or develops complementary assets needed to commercialize the innovation. Services of STV or TIC will be leveraged for this purpose, inline with their existing policies.
- b. **Promoting Innovations:** Ongoing development and marketing of the innovation to firms that use the innovation in their business reflects situations where the right to use innovation is licensed to firms for a specified period. University/researcher will retain ownership of the innovation and will be often involved in enhancing the innovation so that it can continue to mine the innovation for additional revenues. In such situations, the innovation will be licensed to more than one entity. This will occur through non-exclusive licensing.
- c. **Disposition of the Innovation to an Established Firm:** Disposition of the innovation to an established firm reflects situations where the innovation will be adopted by an existing firm. The established firm should have the capacity and complementary assets needed to commercialize the innovation. The innovation will be sold outright or licensed on an exclusive basis so that licensee obtains substantially all of the risks and benefits of ownership of the innovation. The university/researcher will retain no ongoing rights to the innovation or its future enhancements.

## **Stake Holders**

The key stakeholders of commercialization process and policy are:

- a. Inventor (student, faculty or employee of NUST or researchers from other universities)
- b. Institution (NUST)
- c. Industry
- d. Funding Entities
- e. Communities, Legislators, media are all important stake holders

### **a. Support I&C Directorate will expect from Stakeholders**

- i. I&C Directorate understands and accepts that teaching, research, and publishing research results are of paramount importance, and will not ask faculty to unreasonably delay publication of research results in the interests of commercialization.
- ii. We expect that Inventors should be sensitive to the institutional and public interests at stake in the commercialization process and equitably balance them with their personal interests.
- iii. The institution has a responsibility to the public to ensure that the institution is reasonably compensated for the use of its intellectual property so that it can further support its public mission.

### **b. Support I&C Directorate will provide to Stakeholders**

- i. Manage strong relationships among licensees, the institution, and faculty.
- ii. Devise and implement commercialization strategy for NUST.
- iii. Oversee, supervise, manage and coordinate activities within the Directorate of Commercialization related to technology transfer, IP protection and industrial relations.
- iv. Develop relationships with public/private sector with respect to intellectual property and commercialization activities.
- v. Enhance commercialization capacity of University's researchers through disseminating relevant information and conducting coaching sessions.

### **Ownership of Technology**

7. Refer to NUST IP Policy.

### **Implementation**

8. The Innovation & Commercialization Directorate NUST shall implement this part of the policy and maintain appropriate processes and procedures to administer it.

### **Review**

9. This policy will be reviewed biennially with effect from date of its approval