

Innovation and Start-up Policy of NITC

A framework for Students, Faculty and Staff of NITC

Adopted from

National INNOVATION and STARTUP Policy 2019 (NISP-2019) for Students and Faculty: A Guiding Framework for Higher Education Institutions



 **Ministry of Education**
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NATIONAL INSTITUTE OF TECHNOLOGY CALICUT

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PREAMBLE

In November 2016, the All India Council of Technical Education (AICTE) released a start-up Policy document for AICTE approved institutions, to address the need for inculcation of innovation and entrepreneurial culture in Higher Education Institutions (HEIs). The policy primarily focused on guiding the AICTE approved institutions in implementing 'Start-up Action Plan' of the Government of India. Subsequent to the release of the start-up policy by AICTE and further interaction & feedback received from education institutions, a need was felt for a more detailed and comprehensive policy guiding document, which could be applicable for all the HEIs in India. A committee of fifteen members was constituted by the Ministry of Human Resource Development (MHRD) (Currently, Ministry of Education (MoE)) to formulate detailed guidelines for various aspects related to Innovation, Start-up and Entrepreneurship management. This committee deliberated on different facets for nurturing the innovation and start-up culture in HEIs, which covered Intellectual Property (IP) ownership, revenue sharing mechanisms, norms for technology transfer and commercialization, equity sharing, etc. After multiple rounds of meetings, the National Innovation and Start-up Policy 2019 (NISP-2019) for students and faculties of HEIs were prepared. The policy is being implemented by MoE's Innovation Cell, in coordination with AICTE, University Grants Commission (UGC), and State governments & Union territories, in various universities and HEIs.

NISP-2019 permits HEIs to develop their own comprehensive guidelines and policy on innovation and start-ups. A committee was constituted at NITC to formulate institute level policy. The committee is responsible for appropriately framing the policy at the institute level, considering the available resources and facilities. Formulation of institute level policy is strictly based on the guidelines given by NISP-2019. The innovation and start-up policy of NITC (ISPN) shall integrate the existing facilities available in the Institute, to support the internal and external aspirants. NITC shall establish a full-fledged platform to convert innovative ideas into successful businesses. As in NISP-2019, ISPN shall give equal priority for both the student and faculty/staff communities. ISPN shall act as a catalyst to transform the current educational ecosystem of the Institute into a better form supporting the vision of India to become 5 trillion-dollar economy by 2024. ISPN covers various aspects such as management of Intellectual Property Rights (IPR) ownership, technology licensing and equity sharing in start-ups or enterprises established by student, faculty, and staff.

LIST OF ABBREVIATIONS

AICTE	All India Council for Technical Education
ARIIA	Atal Ranking of Institutions on Innovation Achievements
CCD	Centre for Career Development
CIEI	Centre for Innovation Entrepreneurship and Incubation
DIN	Director Identification Number
DST	Department of Science & Technology
EDP	Entrepreneurship Development Programme
FDP	Faculty Development Programme
HEI	Higher Education Institution
ICT	Information and Communication Technologies
ICTAK	ICT Academy of Kerala
I & E	Innovation and Entrepreneurship
IEDC	Innovation & Entrepreneurship Development Centres
I, E & S	Innovation, Entrepreneurship and Start-ups
IIC	Institution's Innovation Council
IRCIES	Institute level Review Committee for I, E & S
ISPN	Innovation and Start-up policy of NITC
IT	Information Technology
KPI	Key Performance Indicator
KSCSTE	Kerala State Council for Science, Technology and Environment
KSUM	Kerala Start-up Mission
MHRD	Ministry of Human Resource Development
MoE	Ministry of Education (Previously, Ministry of Human Resource Development (MHRD))
MOOC	Massive Open Online Courses
MSME	Micro, Small & Medium Enterprises
NCBED	National Science & Technology Entrepreneurship Development Board
NISP	National Innovation and Start-up Policy
SPV	Special Purpose Vehicle
TBI	Technology Business Incubator
VC	Venture Capital

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1. ISPN FORMULATION TEAM OF NITC

In order for the formulation of Innovation and Start-up Policy for students and faculty at NIT Calicut, a committee has been formulated. The details of the committee members are given below.

Dr. P. K. Rajendrakumar	Professor, MED	Chairman
Dr. V. Madhusudanan Pillai	Professor, MED & Dean (R&C)	NISP Coordinator
Dr. J. Sudhakumar	Dean (FW)	Member
Dr. Ashok S	Professor, EED	Member
Dr. Kumaravel S	Associate Professor, EED, President IIC	Member
Ms. Preethi M.	CEO, TBI	Member

This committee is responsible for suitably framing the innovation and start-up policy of NIT Calicut (ISPN) according to the guidelines given in the NISP-2019 draft published by the Ministry of Human Resource Development (MHRD), Government of India. According to NISP-2019, the entrepreneurial plan should be the responsibility of the NISP coordinator that must bring in the required commitment and be well understood by the higher authorities.

The initial committee formed at the end of May 2020 had different members. The committee had a chairman, the then Dean (R&C), Dr. Ashok S, and Dr. Abraham T. Mathew was also a member and other members. Later, Dr. Sandhyarani was inducted as the activities proposed in the Innovation and Start-up policy of NITC will directly link with the activities of the Institute's Innovation Council (IIC) and is the president of IIC. A new president (Dr. Kumaravel S) has taken charge as president of IIC from February 2022 onwards, and hence he also be part of the ISPN formulation committee. Similarly, Mrs. Preethi, CEO of TBI-NITC, was inducted. As Dr. Ashok S relinquished the Dean(R&C) post, and on the retirement of Dr. Abraham T. Mathew, Director nominated Dr. Ashok as a member of the committee. Now the new committee is at the helm to formulate the Innovation and Start-up policy of NITC.

2. HIGH LEVEL ORGANIZATIONAL STRUCTURE

High level organizational structure of the Innovation and Entrepreneurial ecosystem at NIT Calicut is shown in Figure 1. The structure integrates all the existing facilities at NITC, which is essential for the successful implementation of NISP.

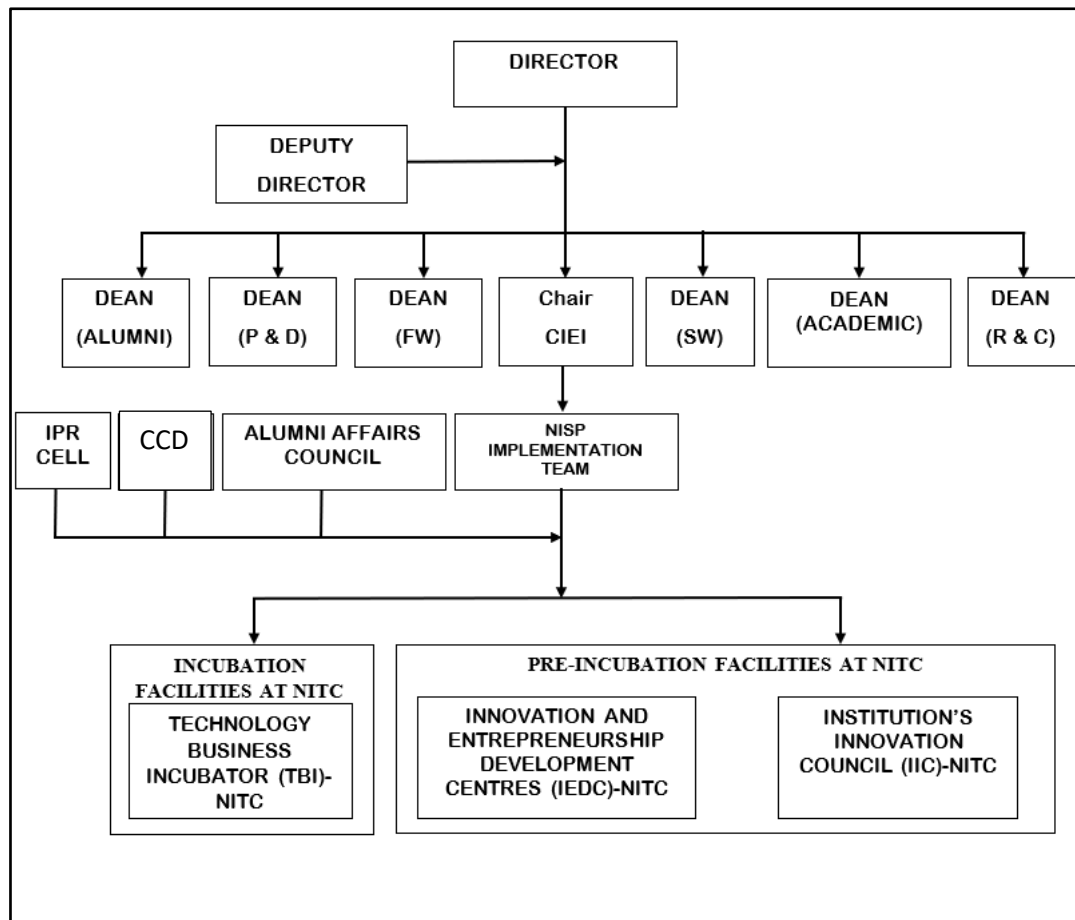


Fig. 1: High level organizational structure

3. ENTREPRENEURIAL VISION AND MISSION OF NITC

Vision

International standing of the highest calibre in innovation and entrepreneurship.

Mission

To actively engage students, faculty and staff in innovation & entrepreneurship by creating a robust ecosystem to develop high quality start-ups that can solve industrial and social problems, thereby transforming innovations into viable solutions and products.

4. GOALS AND OBJECTIVES

4.1 GOALS

For effective implementation of innovation and start-up policy, framing well-defined short-term and long-term goals for the Institute are essential. The short and long-term goals of NITC's innovation and start-up policy are given below. Short-term goals are targeted to achieve within three years, whereas long term goals are to be achieved within five years (A total of 8 years shall be considered). Short term goals of NITC aim to create a proper awareness of the relevance and requirements of innovation & entrepreneurship in the institute level educational ecosystem. Ultimately, through achieving the long-term goals, NITC aims to build a fully established hub for innovation and entrepreneurship.

4.1.1 Short-Term goals

1. Properly ensemble and use the existing facilities to create awareness on innovation and entrepreneurship
2. Create a culture of innovation and entrepreneurship among the students, staff and faculties
3. Reform existing educational ecosystem to include innovation and entrepreneurial aspects
4. Enable proper communication channels by making use of technologies to gear up the Institute for innovation and entrepreneurial initiatives

4.1.2 Long-Term goals

1. Make the Institute a resource hub to support innovation and entrepreneurship
2. Discover novel means to revolutionize the concept of innovation and entrepreneurship
3. Support social development through providing institutional facilities to external aspirants
4. Collaborate with other agencies/organizations to share the capabilities for innovations and entrepreneurships
5. Establish a platform for students, faculty and staff to convert innovative ideas into successful businesses
6. Increase the rate of self-employability and the quality of start-ups within the Institute

4.2 OBJECTIVES

Framing specific objectives to facilitate the development of an entrepreneurial ecosystem in the organization is necessary. The objectives of ISPN are given below.

4.2.1 Short-Term Objectives

1. Conduct events such as workshops, seminars, conferences, conclaves, etc. under the auspices of existing facilities (IIC, IEDC, TBI, etc.) to create awareness on innovation & entrepreneurship for students, staff, and faculty of NITC
2. Introduce awards and incentives for students, staff, and faculty to stimulate the interest in innovation & entrepreneurship
3. Design new courses in curriculum/facilitate certification courses from reputed external institutions to help students, faculty and staff in enhancing their skills in innovation and entrepreneurship
4. Collaborate with national/international level institutes/agencies/organizations to establish partnerships in innovations and entrepreneurships
5. Develop an ICT mediated knowledge-sharing platform for supporting innovation and entrepreneurial activities

4.2.2 Long-Term Objectives

1. Attract funds from external R & D centres, external incubators, government agencies, etc. to support innovation and entrepreneurial activities/initiatives of NITC
2. Establish permanent linkage with regional, national, and international agencies for start-ups and innovation
3. Establish additional facilities for supporting innovation and entrepreneurial activities to achieve top-notch quality in institute level innovation and entrepreneurship
4. Declare ‘innovation and entrepreneurship’ as a separate stream for research to identify/develop new ideas/pipelines/pathways on innovation & entrepreneurship
5. Generate revenues through innovation and student start-up activities/initiatives to spend for further improving the institute level facilities
6. Introduce incentives for those (students, faculty and staff) who obtain patent which can be commercially used in production
7. Provide an established platform for internal (students, faculty and staff) and external aspirants to develop innovative products with global recognition and generate business opportunities

5. KEY PERFORMANCE INDICATORS FOR INNOVATIVE AND ENTREPRENEURIAL IMPACT ASSESSMENT

Objectives should be associated with appropriate performance indicators to regularly monitor the development of the entrepreneurial ecosystem in the organization. Impact assessment of the Institute's entrepreneurial initiatives such as pre-incubation, incubation, entrepreneurship education, etc. should be performed regularly using these evaluation parameters. Regarding the Key Performance Indicators (KPIs), NISP-2019 suggests the following (Section 10, NISP-2019):

1. Monitoring and evaluation of knowledge exchange initiatives, engagement of all departments and faculty members in the entrepreneurial teaching and learning.
2. The number of start-ups created, support system provided at the institutional level, satisfaction of participants/start-ups, new business relationships built by the Institute, etc. should be recorded and used for impact assessment.
3. Impact should also be measured for the support system provided by the institute to the student entrepreneurs, faculty, and staff for pre-incubation, incubation, IPR protection, industry linkages, exposure to the entrepreneurial ecosystem, etc.
4. Formulation of strategy and impact assessment should go hand in hand. The information on impact of the activities should be actively used while developing and reviewing the entrepreneurial strategy.
5. Impact assessment for measuring the success should be sustainable social, financial, and technological impact in the market. For innovations at the pre-commercial stage, the development of a sustainable enterprise model is critical. **COMMERCIAL** success is the **ONLY** measure in the long run.

Adhering to these points mentioned in NISP-2019, the following KPIs are proposed for the impact assessment of NITC's entrepreneurial initiatives. KPIs are framed for pre-incubation and incubation stages separately. Under each category, KPIs are further sub-divided in terms of activities, outputs, outcomes, goals, vision, etc. In addition to these, a separate category of KPIs is proposed for assessing the financial aspects. Details of KPIs proposed for NITC are listed below.

Pre-Incubation Stage

KPIs related to activities

1. Number and types of education/skill certification program on entrepreneurship, IPR, innovation, etc.
2. Number of workshops, awareness, market outreach events, orientation, advocacy meetings, etc.
3. Number of networking events (intra and inter-institutional, enablers, stakeholders) organized
4. Number of skill and competency development training programs/ Faculty Development Programmes (FDPs)/ Entrepreneurship Development Programmes (EDPs) organized
5. Number of research studies related to entrepreneurship conducted
6. Number of schemes/programmes offered by significant enablers
7. Number of the national and regional award and campus hackathon like events organized
8. Incentivizing entrepreneurship and innovation; services and facilities; start-up manual, policies, tool kits, etc.

KPIs related to outputs

1. Number/Percentage of student & faculty mass exposed to awareness/orientation building programmes
2. Number/ Percentage of students covered through entrepreneurship education; Massive Open Online Courses (MOOC), class room, experiential learning programs, etc.
3. Number of beneficiaries accessing the infrastructure & facilities per day, month, or year
4. Number of innovators identified; Number of innovators awarded/ recognized; Number of innovators supported
5. Number of entrepreneurs identified; Number of entrepreneurs awarded/ recognized; Number of entrepreneurs received support
6. Number/ Percentage of in-house trained professionals developed for advisory services
7. Number of research studies on entrepreneurship published
8. Number of regional, national, and international linkages established for the start-up & innovation
9. Number/Percentage representatives of experts & entrepreneurial students across departments & disciplines.

KPIs related to outcomes

1. Number/Percentage of students & faculty mass with entrepreneurship orientation
2. Number/Percentage of students & faculty motivated to start any entrepreneurial activity
3. Number/Percentage of in-house expert capacity available for advisory services
4. Network established with connecting multiple stakeholders & ecosystem enablers

KPIs related to goals/impact

1. Enabling environment established with multiple levels of support for innovation & entrepreneurship in Institute

Incubation Stage

KPIs related to outputs

1. Number of beneficiaries accessing the infrastructure & facilities per day, month, or year
2. Number of innovators identified; Number of innovators awarded/ recognised; Number of innovators received support
3. Number of entrepreneurs identified; Number of entrepreneurs awarded/ recognised; Number of entrepreneurs received support
4. Number of student project turns to (commercialize) innovations
5. Number of IPR based product/services generated and registration filed
6. Number/Percentage of in-house trained professional developed for advisory services
7. Number of regional, national and international linkages established for the start-up & innovation
8. Number of beneficiaries referred to incubators/investors for further support through start-up cell
9. Number of beneficiaries generated under various schemes and programs leveraged and converged at start-up cell

KPIs related to outcome

1. Number of IPR/Innovations developed for commercialization
2. Number of student/early-stage start-ups formed
3. Percentage of satisfaction over advisory services offered to innovators & early-stage entrepreneurs

KPIs related to goal/impact

1. Number/Percentage of graduate students choosing entrepreneurship as career and the increase in the number/percentage per year
2. Number/ Percentage of student and graduates practising entrepreneurship

KPIs related to vision

1. Percentage increase in self-employment rate
2. Number of established start-ups with Director Identification Number (DIN)
3. Number of faculty as founder/ co-founder with DIN
4. Number of start-ups with annual turnover Rs. 50 lakhs/ 10 employees or more

KPIs related to financial parameters

1. Amount of total budget/ yearly spending against total institution revenue for start-up
2. Budget allocation and spend ratio for the start-up mandate in Institute
3. Total expense towards IPR and start-up
4. Total seed fund/ grant disbursed to start-ups
5. Total income from incubation (training + skill development + mentoring + office space + rent)
6. Total revenue for technology/ IP commercialization
7. Total angel/ Total Venture Capital (VC) fund amount raised/ Current funding level by start-ups

6. THRUST AREAS

ISPN will focus on the expertise and facilities available at the Institute, and the regional requirements as the primary criteria for identifying thrust areas/ domains. This is according to the requirements specified by the National Science & Technology Entrepreneurship Development Board (NSTEDB) for identifying the thrust areas. Innovation and Start-up Policy at NITC shall promote innovation led technology entrepreneurship that focuses on the future and emerging technologies. Few of the emerging thrust areas, but not limited to, are as follows:

- Virtual and Augmented Reality
- Artificial Intelligence and Machine Learning
- Blockchain
- Internet of Things
- Robotics and Automation
- Civic Technology
- Cyber-Security
- Renewable Energy
- E-waste Management
- Green Technology
- Sustainable Development
- Smart mobility
- Additive manufacturing/3D printing
- Novel and extreme materials
- Health informatics

Based on the requirements and the expertise available with the Institute, ISPN can support technology start-ups in various sectors like:

- Information Technology
- Software
- Electronic Industries
- Manufacturing
- Agriculture and Allied Fields
- Healthcare
- Rubber Technology
- Biotechnology

- Nanotechnology
- Financial Services
- Educational Services
- Administrative Services
- Industry 4.0 and Cyber physical systems

7. EXISTING FACILITIES AT NITC

As per the guidelines in NISP-2019, the creation of pre-incubation and incubation facilities for nurturing innovations and start-ups in HEIs should be undertaken. Incubation and innovation needs to be organically interlinked. Without innovation, new enterprises are unlikely to succeed. The goal of the effort should be to link INNOVATION to ENTREPRISES to FINANCIAL SUCCESS. NISP-2019 advises all the HEIs to create facilities within their institutions for supporting pre-incubation (e.g., IIC, EDC, IEDC, New-Gen IEDC, Innovation Cell, Start-up Cell, Student Clubs, etc.) and Incubation/ acceleration by mobilizing resources from internal and external sources. NITC has well established facilities to support the implementation of NISP. These facilities include Institute Innovation Council (IIC), Innovation and Entrepreneurship Development Centre (IEDC), Intellectual Property Rights Cell (IPR Cell), Student clubs, Departments, Technology Business Incubator (TBI), Centre for Career Development (CCD), Alumni associations, and other external partnerships. NITC shall aim to integrate these facilities in different combinations to develop an entrepreneurial culture within the Institute. An overview of the existing facilities at NIT Calicut is presented below.

7.1 Technology Business Incubator (TBI)

Technology Business Incubator (TBI) at NITC is a venture set up jointly by the Department of Science and Technology (DST), Govt. of India, and NITC in the year 2003-2004 to support the start-up industries in Information Technology (IT) and electronics field. Along with IT and electronics industries, TBI also supports technology start-ups in various sectors like software, rubber technology, biotechnology, nanotechnology, agriculture, and renewable energy. The units incubated in the TBI generate employment opportunities for at least 300-350 people. TBI can claim 70% success considering the sustenance of the incubated units. The TBI currently manages to incubate 15-17 companies at a time. TBI provides workspace with shared office facilities, emphasising business and professional services necessary for bringing up and supporting the early-stage growth of technology and technology-based enterprises.

TBI at NITC focuses on building sustainable regional platforms for incubating technology-related businesses. It helps the student community in utilizing technology as a way for economic development. The incubator accelerates the development of the entrepreneurial companies from ideation stage to independent self-sustaining successful businesses. TBI at NITC has well-defined vision and mission statements as given below.

Vision

To be a technology business incubator of international recognition.

Mission

To develop entrepreneurs and provide business incubation to lead and use technology for the progress of the mankind and to be strategically adaptive to the technological advancement.

TBI-NITC functions with the following objectives:

- To contribute regional development through incubating knowledge-based start-ups into a sustainable business by providing specialized guidance, critical assistance, innovative financing and networking support within an affordable and well-equipped workspace.
- To assist the start-ups in identifying and assessing the technology know-how and generating high skilled employment.
- To encourage the entrepreneur to conduct the feasibility study, project appraisal, market research and economic survey.
- To help the start-ups in enhancing their technical and management skills.

Concerning the role of entrepreneurship in stimulating economic growth, TBI-NITC aids the aspirants by improving the survival and growth of experimental entrepreneurial units. TBI performs a level playing role by acting as a focal point of interactions among seed funding governmental agencies, academicians, students, venture capitalists, industry and other government institutions. These potential stakeholders enable the start-up companies by providing solutions to the problems they come across in their journey as start-up businesses. Thus, these stakeholders act as catalysts for the region's economic growth and the country as well. The ultimate goal of TBI, NITC is to nurture just began ventures into established businesses by applying good practices through benchmarking and continuous learning systems. TBI-NITC encourages innovative ideas through mentoring, infrastructure and resources, which is essential for successful technology businesses.

7.1.1 Prayas Shala - Fab Lab

TBI NITC has set up a FAB Lab with the Department of Science and Technology (DST) support under the NIDHI PRAYAS Scheme. The innovators can try out their idea with the help of the equipment available in the Lab and come up with prototypes. The FAB Lab is set up at a total cost of over 100 lakhs.

The PRAYAS SHALA is set up for the innovators' prototype development selected under the PRAYAS funding scheme. It is also proposed to be open to the students of the Institute. Entrepreneurs and innovators outside the TBI can also use the FAB lab on a chargeable basis. Various training programmes are being planned based on the FAB Lab, which will also be open to the public.

7.2 Institution's Innovation Council (IIC)

NITC with an aim of fostering entrepreneurship initiatives among the students, has established IIC in association with MoE (then MHRD) in the year 2017-18. The role of IIC would be to identify and nurture technology based innovative start-ups. Following are the major focus of IIC-NITC.

- To create a vibrant local innovation ecosystem.
- Act as a start-up supporting mechanism.
- Prepare Institute for Atal Ranking of Institutions on Innovation Achievements (ARIIA) framework.
- Establish a functional ecosystem for scouting ideas and pre-incubation of ideas.
- Develop better cognitive ability for technology students.

IIC at NITC plans to conduct various innovations and entrepreneurship-related activities such as periodic workshops, seminars, interactions with entrepreneurs, investors, professionals, and create a mentor pool for student innovators. Such activities bring outcomes such as successful innovative projects carried out by institution's faculty and students. Hackathons, idea competitions, and other mini-challenges are some of the other programmes which IIC can also organize.

7.3 Innovation and Entrepreneurship Development Centre (IEDC)

At NITC, Innovation and Entrepreneurship Development Centre (IEDC) serves as a key platform for fostering innovation and entrepreneurship among students. The Kerala Start-up Mission (KSUM), the former Technopark TBI, acts as the nodal agency of the Kerala government for entrepreneurship development and incubation activities in the state and it has set up IEDCs in 193 institutions across the State. IEDC stands as an enabler in promoting entrepreneurship among students by converting innovative ideas from the ideation phase to commercially viable products/ services.

IEDC focuses on nurturing the creative and innovative ideas of students and helping them in transforming these ideas into feasible products and services. IEDC acts as the first launch-pad for students' entrepreneurial journey and provides them with access to cutting-edge technology, world-class infrastructure, high-quality mentorship, early risk capital and global exposure. IEDC also provides opportunities for the student community by organizing various IEDC events in association with KSUM and other agencies like ICT Academy of Kerala (ICTAK). Various kinds of training in business planning, product designing, frontier technology domains and product presentation skills will be provided in collaboration with many industry partners. Several workshops and competitions would be organized at institutional and regional levels to identify the top aspiring student start-ups. Several other events like hackathons and ideathons organized and facilitated by IEDC are also expected to contribute to the entrepreneurial interests of the students. IEDC offers the students a platform to showcase their innovations, share their success stories, learn from each other's failures, meet up with like-minded individuals and develop networks that may eventually turn out as long-term successful businesses.

7.4 IPR Cell

The IPR Cell of the Institute helps the students, faculty and staff know more about securing the IP rights. The cell joins with various agencies and the IPR Cell of KSCSTE to conduct workshops and training programmes to make the people understand the significance of inventiveness in the research and the mechanisms for obtaining IPRs. The IPR Cell maintains the database of patent attorneys and a login in the website of Indian Patent Office. Activities also reach out to the start-ups in the TBI to guide them in protecting their business interests by adequately securing their IPRs.

NITC is getting support from the Kerala State Council for Science, Technology & Environment (KSCSTE) under the Government of Kerala to provide patent-related services to inventors through the IPR Cell of KSCSTE. Many patent searches have been conducted with the help of the Patent Information Centre in KSCSTE. Following are the patent related services offered by the IPR Cell, NITC.

- Patent Search (through the Patent Information Cell of Kerala)
- Patent Application (facilitated through competent attorneys for Institute owned patents)

7.5 Design Innovation Centre (DIC)

Design Innovation Centre (DIC) was established by an MoU signed between NIT Calicut and IISc, Bangalore on 06-05-2015. The objectives of this centre are the following: (i) to promote a culture of innovation and creative problem solving, (ii) to promote knowledge sharing and (iii) to enhance interdisciplinary design-focused education, research and entrepreneurial activities. It is also intended to disseminate product design concepts among all the stakeholders including students, faculty and staff of NIT Calicut, and the society at large, by conducting workshops and courses, and to develop marketable products. DIC is also meant for providing basic facilities for making models and prototypes for innovators in the process of designing new products.

Basic facilities for making models and prototypes for innovators in the process of designing of new products are being developed. The facilities added to the DIC so far include a 3D printer, 3D Scanner, Workstations, Materials Selection Software and various tools for making models and prototypes. The process of procurement is still continuing.

More activities of the centre are also in the pipeline. Requests from outside and within the institute have been received for support of various product development activities. A number of faculty members are participating in the activities of the centre. Students taking up innovative projects as part of their curriculum are also utilizing the facilities of the centre.

7.6 Student Clubs

As of now, twenty student clubs are successfully functioning at NITC. These include the Indian Society for Technical Education (ISTE), Industrial and Planning Forum, Codechef, AI Club, Club Unwired, Robotic Interest Group, Nova Club, IEEE Student Branch, etc. ISTE chapter of NITC organizes alumni talks, hackathons, etc. This club organizes activities through which students know about industry and managerial activities. AI club organizes activities that would enable the students and faculty members of NITC to innovate and design solutions with the help of Artificial Intelligence, for open problems in various areas. Codechef technical club organizes activities that will enable the students of NITC to develop programming skills and promote coding culture among students of all branches. Club Unwired (CUW) is a platform for creative and original ideas with innovation at its core. CUW views itself as a part of a global community. It stands by the motto-"think global, live local".

Robotics Interest Group (RIG) was formed out of the passion for robotics, to facilitate learning and research in the areas of Mechatronics/robotics and Intelligent Systems, Automation, Advanced Control Systems, Modeling and Simulation, and Sensors & Algorithms. The aim of this club is to acquire knowledge and appropriate hands-on experience, to meet the needs of these rapidly changing technologies and provides services to industry for promoting new technologies as well as designing and manufacturing commercially viable products for the development of the country. Along with technological advancement, taking up socially relevant projects that can be brought to the aid of common people are of prime importance to this club. The club also makes sure that the knowledge acquired is shared with students, by conducting workshops, exhibitions and talks; thereby introducing them to the stream and invoking an interest among them for the same. The club promotes innovative ideas leading to product development and entrepreneurship among the students of the institute.

NOVA club provides an opportunity for students to generate creative ideas, thereby bringing about sustainable innovations in the society through effective implementation. IEEE chapter of NITC conducts courses, workshops, technical competitions and organizes tech fests for students of Electrical, Electronics and Computer Science & Engineering students of NITC.

8. INNOVATION PATHWAYS AND PIPELINES FOR ENTREPRENEURIAL ACTIVITIES AT NITC

Innovation pathways and pipelines for entrepreneurial activities start from the existing pre-incubation facilities of NITC. These facilities include Institute's Innovation Council (IIC), Innovation and Entrepreneurship Development Centre (IEDC), Intellectual Property Rights Cell (IPR Cell), Student clubs, Academic Departments & Schools, Technology Business Incubator (TBI), Centre for Career Development (CCD), Alumni associations, and other external partnerships. Under the auspices of these facilities, events related to innovation and entrepreneurship such as competitions, bootcamps, conferences, seminars, business conclaves, hackathons, ideathons, awareness programs, training programs, exhibitions, industrial interactions, long-term and short-term certificate courses, teaching and research exchange programs, social gatherings, etc. can be organized. In addition to this, institute curriculum and syllabi can be appropriately reframed as a way to nurture the interest of students towards innovation and entrepreneurial activities. By introducing innovation and entrepreneurial agendas into the curriculum and syllabi, the vision of ISPN to turn the education system towards start-ups and entrepreneurship opportunities can be met at a good pace. Compulsory courses for UG/ PG/ PhD, induction programs, internships, etc. are some of the means that can bridge the gap between the existing education system and the Institute's entrepreneurial ecosystem. NITC can always enable partnerships with other educational institutions, research organizations, and training institutes to promote innovation and entrepreneurship culture among the students and faculty. Partnerships can be at either national or international level. Internships/ teaching and research exchange programmes can be organized in this way. IIC, IEDC, TBI, and IPR cell of NITC can mentor and monitor the students/ faculty to conceptualize feasible business ideas. Also, these facilities can formulate a dedicated mechanism to evaluate the scope/ relevance/ feasibility of their ideas.

All the activities and initiatives taken by the existing facilities of NITC need to be reached to all the internal and the external stakeholders. For this purpose, a dedicated, ICT mediated innovation knowledge platform is to be developed at the institute level. According to NISP-2019 guidelines, this platform will act as a single point of contact for the stakeholders to take part in the various entrepreneurial activities. Internal stakeholders include students, faculty and staff of NITC. External aspirants can be any outsider who is interested to use the facilities of NITC to convert his/her idea into a successful enterprise. Through extending institute

facilities for external aspirants, NITC can create opportunities for regional start-ups. Such initiatives define strategic direction for local development.

Those who are able to have a feasible idea for constituting a start-up can contact the TBI-NITC for incubation. In the incubation stage, TBI-NITC offers services like mentoring, monitoring, resourcing of finance, resourcing of technology, resourcing of space, assistance for IPR, etc. The assistance for IPR will be through the institute level IPR cell. Activities of TBI-NITC and IPR cell needs to be updated in the knowledge sharing platform then and there. Regular updates in the knowledge sharing platform will help the stakeholders to effectively utilize the innovation and entrepreneurial initiatives from the Institute. For financial resourcing, TBI-NITC is already in touch with central and state level funding agencies. In addition to this, incubatees can get support from angel investors or venture capital providers via TBI. Angel investors/ venture capitalists can follow the institute level entrepreneurial initiatives/ activities through the knowledge sharing platform.

Graduated incubatees can also contribute to the pre-incubation level activities and initiatives of NITC. For instance, it will be a great experience for the students to hear from the graduated incubatees about the success/ failure instances that they faced. In fact, NISP-2019 guidelines clearly highlight the importance of discussing and debating the role of failures in creating the ultimate success. Similarly, incubatees that graduated as financially successful enterprises can create opportunities for NITC students via CCD. NITC can utilize the alumni association in the pre-incubation level activities for the entrepreneurial activities by including alumni who successfully run businesses. The links between various activities and facilities are provided in Figure 2. This figure shows both innovation pathways and information flow between facilities, stakeholders, and activities.

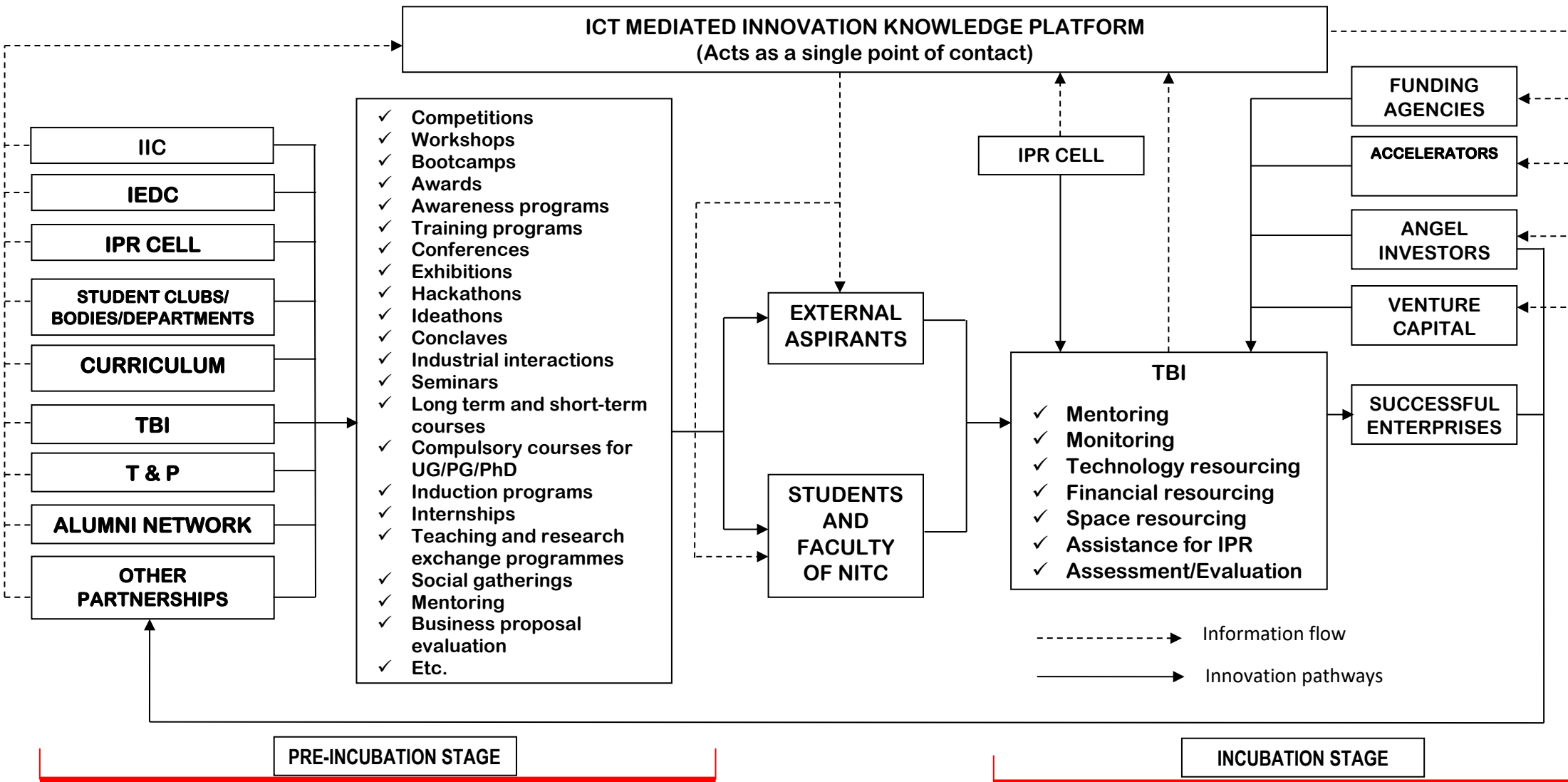


Fig. 2: Innovation pipelines and pathways for entrepreneurs at NITC

9. ORGANIZATIONAL STRUCTURE FOR THE IMPLEMENTATION OF ISPN

The proposed organizational structure for the implementation of ISPN is depicted in the following diagram. The key part of the organizational structure is a Policy Implementation Council for Innovation, Entrepreneurship and Start-up (I, E & S). This council will be responsible for steering the entire I, E & S related activities at NITC. Director will be the head of this council. The existing facilities at NITC shall associate with this council to implement the innovation and start-up policy.

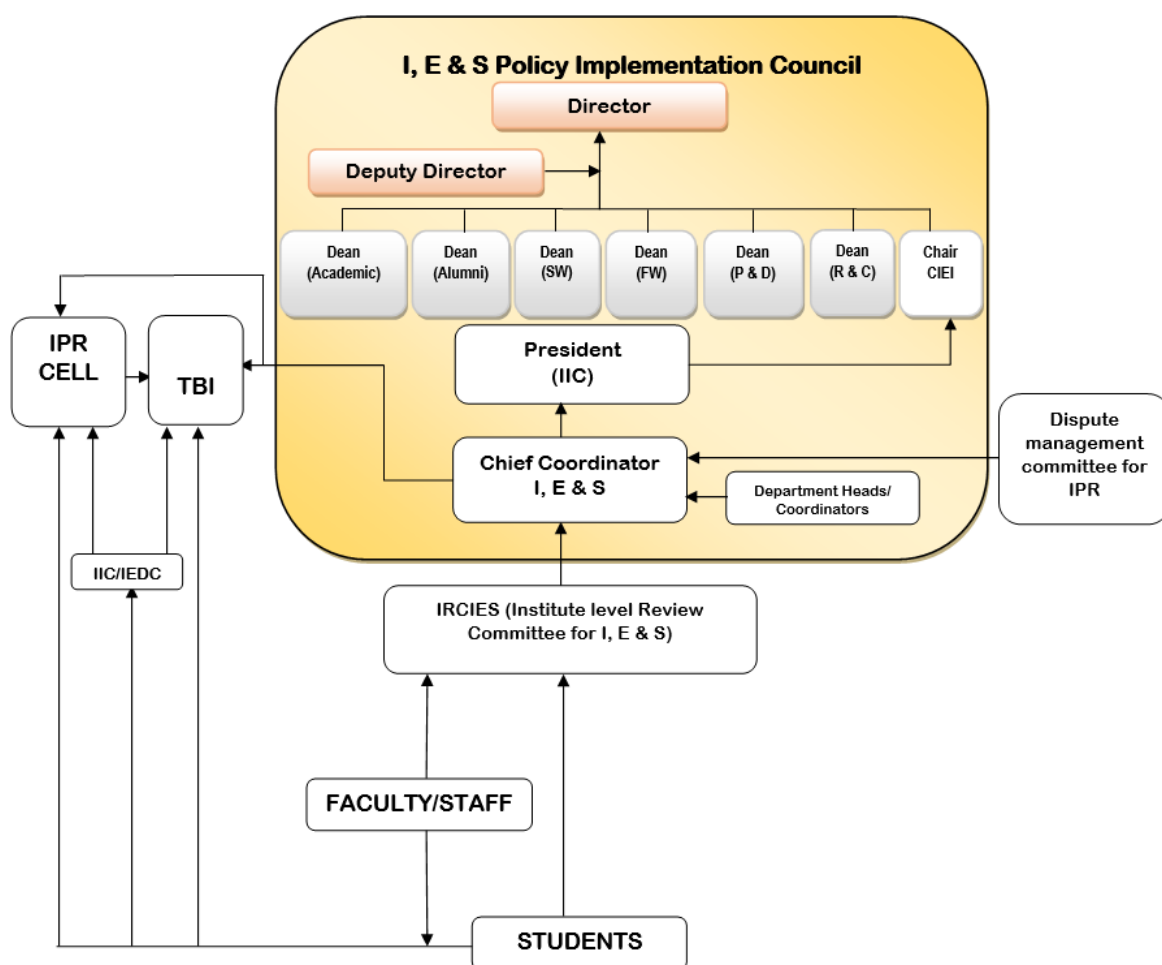


Fig. 3: Proposed organizational structure for the implementation of ISPN

Director, Deputy Director, all the Deans, Chair CIEI (Centre for Innovation Entrepreneurship and Incubation), President (IIC), Chief coordinator I, E & S, and Department heads /coordinators are members of this council. Policy Implementation Council for I, E & S is associated with two important sub-committees; Institute level Review Committee for I, E & S (IRCIES) and dispute management committee. The primary responsibility of IRCIES is to

systematically review and evaluate the proposals made by students, faculty, and staff of the institute. Dispute management committee is mainly for resolving the disputes related to IPR, incubation, etc. The structure of dispute committee can be framed as per the guidelines of NISP-2019 (see Section 4, Paragraph c of NISP-2019). Dispute management committee and IRCIES will be under the coordinatorship of Chief Coordinator (I, E & S). Chief Coordinator (I, E & S) will be responsible for monitoring the activities of institute level innovation and entrepreneurship activities. In terms of the KPIs, Chief Coordinator (I, E & S) has to periodically assess the impact of innovation and start-up policy. All the department heads and nominated department coordinators (nominated by HOD) will be also there in I, E & S Policy Implementation Council as members. Department coordinator and department heads will be responsible for administrating the department level Innovation and entrepreneurship activities. Chief Coordinator (I, E & S) will function under the President of IIC. Chair CIEI will be the authority responsible for the entire management of innovation, Entrepreneurship, and Start-up related activities in the institute. The following mandates (but not restricted to) may be included under the responsibility of the IRCIES Committee.

- Coordinate the activities under the innovation and start-up policy formulated for NITC
- Recommend new guidelines for the workflow of I, E & S activities, related works of CIEI, etc.
- Recommend suggestions for liaise with external agencies to attract to more projects and funds
- Collect innovative suggestions to strengthen the Institute's I, E & S ecosystem.
- Coordinate the department level I, E & S activities and recommend guidelines on the important matters related to I, E & S
- Recommend guidelines for programmes related with I, E & S such as certificate programmes, short-term training programmes, collaborative programmes with external agencies, etc.
- Recommend IPR policy guidelines for the institute and coordinate the related activities
- Etc.

For the revision/formulation of policies related to innovation, entrepreneurship, and research, the Director of NITC can announce I, E & S Policy Implementation Council meetings. External experts shall be invited to the council meetings, if required.

Students of NITC can submit their innovative ideas to TBI mainly via three ways as depicted in Figure 3: a) through department coordinators, b) directly to TBI in response to call for innovative ideas, and c) through other facilities of NITC such as IIC and IEDC.

The IRCIES committee under the Chief Coordinator (I, E & S) consists of expert faculties from all the thrust areas, from various departments. The expert committee can include industrial experts as well. The IRCIES committee can induct new members as experts as per the expertise required for evaluating proposal received and it shall be approved by the Chair CIEI. Department coordinators also can be (invited) members of IRCIES.

Students/faculty/staff can submit their innovative ideas directly to the IRCIES committee, at any time. The submission received from the students/faculty/staff in the prescribed format needs to be reviewed by the institute level expert committee. Review processes are to be periodically scheduled to avoid delays in completing the review. After the careful scrutiny, expert committee can accept or reject the submission with proper justification. The expert committee needs to give the feedback on submission to the inventors. If the submission is accepted, in the next step, the expert committee will forward the submission to the TBI, if the candidate requires establishing a business firm out from the innovative idea submitted. The submission can be directly forwarded to the IPR cell if the idea is eligible for any intellectual property rights. If the proposals require pre-incubation, IRCIES can send the proposal to IIC/IEDC.

TBI can organize various programmes to promote the culture of innovation and entrepreneurship within the institute. On such occasions, TBI can directly invite innovative ideas from students/faculty/staff. The review of submissions will be done by the internal expert committee of TBI. Similar to TBI, IIC and IEDC of NITC host various events to attract students towards innovation and entrepreneurship initiatives. Students can present their innovative ideas in such events as well. IIC and IEDC can forward feasible ideas to the IPR cell for protecting the rights or to TBI, to provide incubation facilities to the inventors. In addition to this, in response to special calls, students can directly avail the services from the IPR cell of NITC.

Regarding the disputes in the ownership of ideas, students, faculty, and staff can file complaints to the chief coordinator (I, E & S) through department heads. The chief coordinator (I, E & S) can forward the complaint to the dispute managing committee to review the same. The dispute management committee is a five-member committee consisting of two faculty members (having developed sufficient IPR and translated to commercialisation), two of the

institute's alumni/ industry experts (having experience in technology commercialisation) and one legal advisor with experience in IPR. They will examine the issue after meeting the inventors and help them settle this, hopefully to everybody's satisfaction. Institute can use alumni/ faculty of other institutes as members, if they cannot find sufficiently experienced alumni/ faculty of their own. This structure of the dispute management committee is as per the NISP-2019 (see Section 4, Paragraph c of NISP-2019). In case, the decision by the dispute committee is not acceptable, inventors can request Chair CIEI to re-review the case.

Institute IPR cell or incubation centre will only be a coordinator and facilitator for providing services to students, faculty and staff. They will have no say on how the invention is carried out, how it is patented or how it is to be licensed. If the invention is patentable, it shall be submitted to IPR Cell. If the institute requires to examine the patentability of an invention, it shall be submitted to a committee which can examine whether the IPR is worth patenting. The committee may consist of faculty who have experience and excelled in technology translation. If the idea (or IP) is developed by inventors using their own funds or non-institute funds, then they alone should have a say in patenting. All institute's decision-making body with respect to incubation/ IPR/ technology-licensing will consist of faculty and experts who have excelled in technology translation. Other faculty in the department/ institute will have no say, including heads of department, heads of institutes, deans or registrars, but they can always present their suggestions before committee for review (see Section 4, Paragraph e of NISP-2019).

10. INNOVATION AND START-UP POLICY FOR THE STUDENTS AT NITC

10.1 Introduction

For the successful implementation of NISP for the students at NITC, the existing curriculum and the regulations for UG/ PG/ PhD have to be carefully modified. Recommendations extracted from NISP-2019 framework on the changes to be made in the curriculum and regulations are explained below with specific guidelines for NITC.

Section 10.2 provides the actions to be taken for creating the awareness on the importance of innovations and entrepreneurship (I & E), among the students, faculty and staff of NITC. Section 10.3 suggests the changes to be made in the curriculum, academic rules and regulations. Section 10.4 briefly elaborates the ways with which NITC can support external aspirants in providing resources for I & E initiatives. Section 10.5 highlights the changes required in pedagogy.

10.2 Awareness: the first step towards the implementation of NISP

The first step to implement NISP is to create awareness on the relevance and requirements of I & E among the students, faculty and staff.

10.2.1 Possibilities with core facilities (TBI, IIC, IPR Cell, IEDC)

As suggested in NISP-2019 guidelines, existing facilities at NITC such as Institute's Innovation Council (IIC), Innovation and Entrepreneurship Development Centre (IEDC), Intellectual Property Rights Cell (IPR Cell), Student clubs, Technology Business Incubator (TBI), etc. can be appropriately utilized to successfully integrate the culture of I & E into the existing educational ecosystem. These existing facilities can host various kinds of awareness programmes not only for the students, but also for the faculty and staff of NITC. Spreading awareness among students, faculty and staff about the value of entrepreneurship and its role in career development or employability should be a part of the institutional entrepreneurial agenda. Importance of innovation and entrepreneurial agenda should be known across the Institute and should be promoted and highlighted at institutional programs such as conferences, convocations, workshops, etc. To ensure exposure of maximum students to innovation and pre-incubation activities at their early stage and to support the pathway from ideation to innovation to market, mechanisms should be devised at institution level. In the beginning of every

academic year, under the auspices of the above-mentioned facilities, NITC should conduct an induction program about the importance of I & E so that freshly inducted students can become aware about the entrepreneurial agenda of the Institute and the available support systems.

10.2.2 Possibilities with students' clubs and alumni network

If required, NITC can take initiative to form students' clubs exclusively for I & E with an aim to spread awareness and to host various events. With the well-established alumni network of NITC, the Institute can organize various events/ programmes for spreading awareness on I & E. In association with alumni network and students' clubs, the Institute can conduct training series consisting combination of talks and focused workshops covering core entrepreneurial themes and start-up related topics. The above training programs are targeted at new entrepreneurs, start-ups, innovators, and start-up ecosystem enablers. The recordings of such events can be preserved in the Institute's digital library for future reference.

10.3 Restructuring curriculum, and academic rules & regulations

To continue attracting the students towards the world of I & E, and to make them capable of creating their own ventures, constant support is to be provided throughout their academic journey in the Institute. Here is the significance of restructuring the curriculum, and academic rules & regulations.

10.3.1 Restructuring the curriculum

Relevant programmes/courses are to be newly introduced on I & E for providing the opportunity to learn about various aspects of entrepreneurship (design, prototyping, IPR, etc.). Entrepreneurship education should be imparted to the students at curricular/ co-curricular/ extra-curricular level through elective/ short term or long-term courses on innovation, entrepreneurship and venture development. Validated learning outcomes should be made available to the students. While attempting to restructure the curriculum, the following points can be considered:

- NITC can also introduce new courses under various programmes.
- NITC can start a part-time/ full time MS/ MBA/ PGDM (Innovation, Entrepreneurship and Venture Development) program where one can pursue an academic program while incubating and nurturing a start-up company. AICTE has already issued guidelines for a similar programme (see Section 3, Paragraph h of NISP-2019). With such initiatives, students from other programmes can attend the courses under these programmes as

electives. It will reduce the burden of regularly offering courses and other activities in I & E.

- Audit courses are for the purposes of self-enrichment and academic exploration. Evaluations of audit courses can be done through several means (written exam/ viva-voce/presentations), but are not considered for the computation of CGPA. While offering audit courses related to I & E in every semester, interested students can flexibly attend the same.
- The School of Management Studies (SOMS), NITC already offers a set of courses related to I & E for the MBA program. Interested students from others programs can audit these courses/ opt as electives.

10.3.2 Restructuring of academic rules and regulations

Novel criterion and assessment schemes are to be introduced to make the regulations flexible enough for encouraging students in the direction of I & E. The following points can be considered for revising the regulations:

- Student entrepreneurs should be allowed to appear for the examination, even if their attendance is less than the minimum permissible percentage, with due permission from the Institute (see Section 3, Paragraph d of NISP-2019). Student entrepreneur must be mentored by a faculty of the institute and incubated (if incubation is needed) at TBI_NITC. In case if TBI-NITC does not hold required facilities then the student may opt external incubator as necessary with appropriate certification from TBI-NITC and recommendation from faculty mentor.
- NITC should allow their students to take a semester/ year break (or even more depending upon the decision of the review committee constituted by the Institute) to work on their start-ups and re-join academics to complete the programme. Student entrepreneurs may earn academic credits for their efforts while creating an enterprise. NITC should set up a review committee for review of start-up by students, and based on the progress made, it may consider granting appropriate credits for academics (see Section 3, Paragraph e of NISP-2019).
- Student inventors may also be allowed to opt for start-up in place of their mini-project/ major project, seminars, and summer trainings/ internships. Evaluation for those who opt for start-ups should be systematically done and a dedicated committee is to be formulated for the same. Depending on the thrust area opted for start-ups, an expert

should be included in the evaluation committee. Based on the recommendations from the committee, students can approach TBI for further assistance. Regulations can be customized for UG/ PG students to turn their project thesis into start-up. Students may be interested to work on inter-disciplinary domains. The thrust areas addressed by the TBI can be introduced to the students before the start of project so that they can come up with a problem from those areas. However, the student must describe how they will separate and clearly distinguish their ongoing research activities as a student from the work being conducted at the start-up.

- Most importantly, in the syllabi for UG/ PG project courses, preference can be given for I & E related topics. If possible, Institute's thrust areas can be highlighted in the syllabi to attract students to do projects in those domains. Course outcomes of mini-project, main project, internship, seminar, etc. can be revised to give preference for I & E.
- Similar to the seminar course in the curriculum, NITC can design a new course that creates opportunity for the students to have deliberations on entrepreneurship and start-up, preferably in the 4th or the 5th semester. Such a course can be designed for two to three hours per week. Similarly, new mandatory courses (say, a course on IPR and innovation) can be introduced for PG and PhD students. Syllabus can be appropriately framed for these courses.
- NITC can also consider the concept of activity points in the curriculum (UG/ PG) to systematically integrate ISPN. Various programmes on I & E (competitions, workshops, training sessions, etc.) can be announced for the students for earning the activity points to get these credits. It may be institute run programmes or outside agencies-based programmes. Students should earn a minimum number of points in order to become eligible to get degree (UG/PG)

Activity points also can attribute to activities suggested in ISPN. The following also can be considered for activity points:

- Students should be encouraged to develop entrepreneurial mindset through experiential learning by exposing them to training in cognitive skills (e.g., design thinking, critical thinking, etc.), by inviting first generation local entrepreneurs or experts to address young minds. Initiatives like idea and innovation competitions, hackathons, workshops, bootcamps, seminars, conferences, exhibitions, mentoring by academic and industry

personnel, throwing real life challenges, awards and recognition should be routinely organized.

- Student clubs/ professional bodies/ departments must be created for organizing competitions, bootcamps, workshops, awards, etc. These bodies should be involved in institutional strategy planning to ensure enhancement of students' thinking and responding ability.
- NITC should offer annual 'innovation & entrepreneurship award' to recognize outstanding ideas, successful enterprises and contributors for promoting innovation and enterprises ecosystem within the Institute.
- Innovation champions should be nominated from within the students/ faculty/ staff for each department/ stream of study.

For the participation of students in each of these activities/events/competitions, certain points can be awarded. Students can attend such activities/events/competitions organized by other institutes as well. Proper guidelines are to be prepared for awarding these points. This strategy will automatically pull the students towards the culture of entrepreneurship.

NITC can consider changes in the Ph.D. regulations to give more opportunity for research scholars in the direction of I & E. A few points are proposed here for consideration.

1. Criteria for thesis submission can be appropriately modified by considering IPRs/ involvement in start-ups.
2. Relief from Ph.D. Programme to take up job can be re-structured by giving additional relaxations for working in start-ups.
3. Leave rules can be modified in such a way to devote sufficient time for taking part in start-up related activities.
4. Changes can be made in the maximum duration of PhD programme for considering the duration involved in start-ups.
5. Rules for course work can be effectively revised to include mandatory courses related to I & E.
6. The structure of doctoral committee can be reframed to properly guide and monitor the scholars in the direction of I & E. For example, rules can be modified to include an external industrial expert from the area of research.

10.4 Support for external aspirants

NITC shall act as a resource hub of I & E for the external aspirants as well. For this purpose, NITC can offer short-term certificate programmes utilizing the available resources. Certificate programmes shall provide advanced knowledge in the wide-ranging aspects of entrepreneurial success: organizational behaviour, large-scale entrepreneurship, marketing, accounting, corporate finance, etc.

10.5 Pedagogical changes required

In addition to the above points, it is recommended to change the existing way of teaching to motivate the students in the direction of I & E. For example, diversified approach shall be adopted to produce desirable learning outcomes, which shall include cross disciplinary learning using mentors, labs, case studies, games, etc. in place of traditional lecture-based delivery. For creating awareness among the students, the teaching methods shall include case studies on business failure and real-life experience reports by start-ups. Pedagogical changes need to be done to ensure that maximum number of student projects and innovations are based around real life challenges. Learning interventions developed by the Institute for inculcating entrepreneurial culture shall be constantly reviewed and updated. To prepare the students for creating the start-up through the education, integration of education activities with enterprise-related activities shall be included in the curriculum.

10.6 Conclusions

Considering the above-mentioned points, NITC can take necessary actions to restructure the curriculum and regulations of UG/ PG/ PhD programmes. The changes shall be made in the educational ecosystem of NITC in accordance with the ISPN guidelines. A successful integration of the existing facilities at NITC is essentially required for the implementation of ISPN. The execution of tasks related to the ISPN should be under the control of institute level ISPN implementation team as proposed in Chapter 9.

The proposed suggestions in the academic curriculum and regulations are definitely suitable for achieving the goals and objectives (Chapter 4) suggested in ISPN.

11. INNOVATION AND START-UP POLICY FOR FACULTY AND STAFF AT NITC

11.1 Introduction

Faculty, staff, and students are the major pillars of any educational ecosystem. Hence, while attempting to transform an existing educational ecosystem, all these three communities are to be carefully considered. This chapter mainly proposes a set of norms and guidelines for faculty and staff at NITC aiming at the successful integration on NISP-2019. These guidelines will enable NITC to actively support the faculty and staff to participate in innovation and entrepreneurship (I&E) related activities, thus encouraging them to consider start-ups and entrepreneurship as a career option. The proposed norms are made strictly in accordance with the recommendations in NISP-2019 framework.

Section 11.2 highlights the need of awareness on I & E among the staff and faculty of NITC. Section 11.3 proposes various strategies to attract and retain right people for fostering I & E culture within the Institute. Section 11.4 narrates the possible ways for the faculty and staff to utilize the existing facilities at NITC. Section 11.5 is all about the terms and conditions for the faculty and staff to utilize the institute facilities. Section 11.6 presents norms for faculty/staff start-ups. Section 11.7 provides the modalities for promoting faculty/staff start-ups.

11.2 The first step: Awareness and training for faculty and staff

Full-fledged implementation of ISPN requires critical changes in the existing working culture within the Institute. For the ease of getting adapted with these changes, faculty and staff should get proper awareness on the importance of innovation and entrepreneurship (I & E). As NISP-2019 guidelines suggests, spreading awareness among faculty and staff about the value of entrepreneurship and its role in career development or employability should be a part of the institutional entrepreneurial agenda. Also, in order to support students in I & E related initiatives, faculty and staff have to gain sufficient knowledge in this domain. Faculty and staff should be taught that innovation (technology, process or business innovation) is a mechanism to solve the problems of the society and consumers. Entrepreneurs should innovate with focus on the market niche. As an initial step, Institute should host various awareness programmes and courses/workshops to facilitate this. For instance,

- Some of the relevant faculty members with prior exposure to innovation & entrepreneurship and interest should be deputed for training to promote I & E.

- Periodically some external subject matter experts such as guest lecturers or alumni can be engaged for strategic advice and bringing in skills which are not available internally.
- Faculty and staff should be encouraged to undergo courses on innovation, entrepreneurship management, and venture developments.

Considering these points, NITC can revise the existing institute policy on career development of faculty and staffs.

11.3 Proposed strategies to attract and retain right people for fostering I & E culture

NITC shall consider various incentives and reward mechanisms for faculty and staff to attract them towards I & E initiatives.

11.3.1 Incentives and reward mechanisms

As always, incentives and reward mechanisms will help the Institute to filter out and retain right candidates for any projects. In order to assign faculty members for steering I & E activities at NITC, Institute can design and execute well-structured reward mechanisms. Incentives will motivate the candidates to actively continue their participation in supporting innovations and entrepreneurship initiatives. Incentives shall be academic or non-academic. For reference,

- The reward system for the faculty may include sabbaticals, office and lab space for entrepreneurial activities, reduced teaching loads, awards, trainings, etc.
- The recognition of the stakeholders may include offering of facilities and services, strategy for shared risk, as guest teachers, fellowships, associateships, etc.

In order to drive the reward mechanisms and to deliver the incentives in an effective manner, ISPN strongly recommends developing a performance matrix for the annual performance evaluation.

Regarding the credit system for the appointment of faculty to various positions, the credential required can be revised by giving importance to the involvement of faculty in I & E initiatives. Institute level Key Performance Indicators (KPIs) can be considered for systematically awarding the credits. For instance,

1. Number of research studies on entrepreneurship published by the candidates
2. Number of IPR/ innovations developed by the candidates for commercialization
3. Number and types of education/ skill certification program on entrepreneurship, IPR, innovation, etc., attended by the candidates

4. Number of workshops, awareness, market outreach events, orientation, advocacy meetings, etc., organized/ hosted/ participated by the candidates
5. Number of national and regional awards received as part of entrepreneurial activities
6. Number of student projects turned to (commercialize) innovations
7. Involvement in start-ups (inventor/an owner/ direct promoter/ mentor/ consultant or as on-board member of the start-up)

For the purpose of evaluating the KPIs, valid proofs are to be submitted by the candidates.

11.3.2 Recruitments

In the long run, for the ease of uplifting the quality and quantity of I & E activities at NITC, authorities can consider recruiting faculty and staff having strong innovation and entrepreneurial/ industrial experience, behaviour and attitude. This will help in fostering I & E culture at a good pace. For the recruitment process, involvement of candidates in I & E initiatives shall be considered as an additional requirement for the selection. KPIs mentioned in Section 11.3.1 can be made into the form of additional requirements.

11.4 Existing facilities at NITC for faculties and staff

As mentioned in the above section, Institute should allow the faculty and staff to use the available resources for the purpose of establishing start-ups and to take part in related I & E initiatives/activities. NISP-2019 insists all the institutes to facilitate the start-up activities/ technology development by allowing faculty/staff to use institute infrastructure and facilities, as per the choice of the potential entrepreneur (Section 3, Paragraph i of NISP-2019). Notably, NITC has fully established facilities that favour the institutional entrepreneurial agendas. In order to support faculty and staff, NITC can take initiatives to effectively integrate the entrepreneurial activities across various centres, and departments within the Institute, thus breaking the silos. Effective integration of existing facilities is an important point to be considered by the Institute. A well-structured process flow is essential to promote and support faculty led enterprises.

NITC already provides pre-incubation & incubation facility to start-ups by faculty and staff, for mutually acceptable time-frame. These pre-incubation/incubation facilities can be made accessible 24×7 to staff and faculty of all disciplines and departments across the institution. NITC can consider establishing processes and mechanisms for easy creation and nurturing of start-ups/enterprises by staff (including temporary or project staff) and faculty. Regarding the utilization of existing facilities at NITC, proper guidelines are to be framed.

11.5 Terms and conditions for utilization of facilities/ services/ resources at NITC

In return of the services and facilities, Institute may take 2% to 9.5% equity/ stake in the start-up/ company, based on brand used, faculty contribution, support provided and use of Institute's IPR (a maximum limit of 9.5% is suggested so that Institute has no legal liability arising out of start-up. The Institute should normally take much lower equity share, say 3 – 4 percent). Other factors for consideration shall be space, infrastructure, mentorship support, seed funds, support for accounts, legal, patents, etc.

- For faculty and staff, Institute can take no-more than 20% of shares that faculty/staff takes while drawing full salary from the institution; however, this share will be within the 9.5% cap of company shares, listed above.
- No restriction on shares that faculty/staff can take, as long as they do not spend more than 20% of office time on the start-up in technical, managerial, advisory or consultative role and do not compromise with their existing academic and administrative work/ duties. In case the faculty/staff holds the executive or managerial position for more than three months in a start-up, then they will avail sabbatical/leave without pay/earned leave. It is possible for the faculty/staff to take the role of mentor/advisor without compromising their academic and administrative work/duties as well as not receiving any payment from the startup. Formal consulting activity to any startup can be as per the Institute policy.
- In case of compulsory equity model, Start-up may be given a cooling period of three months to use incubation services on rental basis to take a final decision based on satisfaction of services offered by the institute/incubator. In that case, during the cooling period, institute cannot force startup to issue equity on the first day of granting incubation support.

11.6 Norms for faculty/staff start-ups

The set of norms proposed for faculty/staff start-ups are as follows:

- a. For better coordination of the entrepreneurial activities, norms for faculty/staff to do start-ups should be created by NITC. Only those technologies which originate from within the Institute or involving role of faculty/staff in mentoring/consulting/advising shall be taken for faculty/staff start-ups.
 - i. Role of faculty may vary from being an owner/direct promoter, mentor, consultant, or as on-board member of the start-up.

- ii. Institute should work on developing a policy on 'conflict of interests' to ensure that the regular duties of the faculty do not suffer owing to his/her involvement in the start-up activities.
- iii. Faculty start-up may consist of faculty members alone or with students or with faculty of other institutes or with alumni or with other entrepreneurs.
- b. In case the faculty/staff hold the executive or managerial position for more than three months in a start-up, they will have to avail sabbatical/ leave without pay/ utilize existing leave. It is possible for the faculty/staff to take the role of mentor/advisor without compromising their academic and administrative work/duties as well as not receiving any payment from the startup.
- c. Faculty/staff must clearly separate and distinguish his/her researches/projects at the Institute from the work conducted at the start-up/company.
- d. In case of selection of a faculty start-up by an outside national or international accelerator, a maximum leave (as sabbatical/ existing leave/ unpaid leave/ casual leave/ earned leave) of one semester/ year (or even more depending upon the decision of review committee constituted by the Institute) may be permitted to the faculty.
- e. Faculty must not accept gifts from the start-up.
- f. Faculty must not involve research staff or other staff of Institute in activities at the start-up and vice-versa.
- g. Human subject related research in start-up should get clearance from ethics committee of the institution.

NITC can frame norms for faculty start-ups under different modes of engagements (part time engagement/ full time engagement on a case-to-case basis). Through offering various modes of engagements, faculty can flexibly select their own pathways to work on start-ups. If necessary, faculty norms need to be periodically revised with the approval from concerned committee and authorities.

11.7 Modalities for promoting start-up among faculty and staff

To pull the faculty and staff fraternity towards the new culture of I & E, some incentives/ guidelines should be available. These guidelines shall be flexible enough to create pathways for the faculty to expand their focus onto I & E activities as well. Some of the guidelines can be as follows:

- **Leave:** Allow faculty and staff to take a break for a semester/ year (or even more depending upon the decision of review committee constituted by the Institute) as sabbatical/ unpaid leave/ casual leave/ earned leave for working on start-ups and come back.
- **Parallel involvement in start-ups:** NITC may allow their faculty and staff to work on their innovative projects and setting up start-ups (including Social Start-ups) or work as intern/ part-time in start-ups (incubated in any recognized HEIs/ Incubators) while working.
- **Utilization of resources:** Allow use of resource of faculty and staff wishing to establish start-up to put fulltime effort. The seniority and other academic benefits during such period may be preserved for such staff or faculty.
- **Duties and responsibilities:** Product development and commercialization as well as participating and nurturing of start-ups would now be added to a bucket of faculty-duties, and each faculty would choose a mix and match of these activities (in addition to minimum required teaching and guidance). Every faculty may be encouraged to mentor at least one start-up.
- **Performance evaluation:** Duties and responsibilities of faculty and staff related to I & E should be considered for their performance and promotion. The participation in start-up related activities needs to be considered as a legitimate activity of faculty in addition to teaching, R & D projects, industrial consultancy, and administrative duties. It shall be considered while evaluating the annual performance of the faculty. NITC needs to update/ change/ revise performance evaluation policies for faculty and staff. The existing credit system for promotion of faculty and staff can be restructured to give consideration for involvement in I & E activities. KPIs already mentioned in Section 11.3.1 can be used for evaluating the credits.

In order to drive the reward mechanisms and to deliver the incentives in an effective manner a performance matrix for the evaluation of annual performance shall be formulated.

11.8 Conclusion

In order to foster the culture of I & E within the Institute, active participation and involvement of faculty and staff is highly essential. To give them a clear idea on the objectives of ISPN, awareness and training programs are to be periodically conducted as the initial step. The existing facilities at the Institute should be flexibly available for the faculty and staff to support them in I & E initiatives. Appropriate modalities for promoting start-up among faculty and staff

has to be implemented to attract the faculty fraternity towards start-ups and I & E activities in general.

12.PRODUCT OWNERSHIP RIGHTS FOR TECHNOLOGIES DEVELOPED AT INSTITUTE

With an aim to attract students, faculty and staff of NITC towards I & E, a set of guidelines on product ownership rights for technologies or intellectual property rights (IPRs) in general are required. NITC has an IPR cell within the Institute. Institute can implement the guidelines on IPR with the help of IPR cell. These guidelines shall allow licensing of IPR from Institute to start-up in an easier way. Ideally, students, faculty and staff members intending to initiate a start-up based on the technology developed or co-developed by them or the technology owned by the Institute, shall be allowed to take a license on the said technology on easy term, either in terms of equity in the venture and/ or license fees and/ or royalty to obviate the early-stage financial burden. Major guidelines on IPR/product ownership rights are consolidated below.

a. When institute facilities/ assistance, mentorship or service of faculty members and or staff/ funds are used substantially or when IPR is developed as a part of curriculum/ academic activity, IPR is to be jointly owned by inventors and the Institute. (If inventors are not interested in start-up or technology transfer, and the Institute is paying for filing the patent, it is possible for the Institute to be the owner of the patent. In this case, the Institute shall take steps to include the name of inventors in the patent certificate. An undertaking from the inventors in this respect is to be obtained at the time of filing the patent. It is possible to share the benefit arising as a result of technology transfer with inventors if they are responding within a reasonable time to the invitation to be a party in the technology transfer. A committee shall be constituted to decide the terms and condition of technology transfer and benefit sharing with inventors.)

i. Inventors and Institute could together license the product/ IPR to any commercial organisation. License fees could be either/ or a mix of

1. Upfront fees or one-time technology transfer fees
2. Royalty as a percentage of sale-price
3. Shares in the company licensing the product

ii. An institute may not be allowed to hold the equity as per the current statute, so SPV may be requested to hold equity on their behalf.

- iii. If one or more of the inventors wish to incubate a company and license the product to this company, the royalties would be no more than 4% of sale price, preferably 1 to 2%, unless it is a pure software product. If it is shares in the company, shares will again be 1% to 4%. For a pure software product licensing, there may be a revenue sharing to be mutually decided between the Institute and the incubated company.
- b. On the other hand, if product/ IPR is developed by innovators not using any institute facilities/funds, without compromising academic, research and administrative duties (for staff and faculty) or not as a part of curriculum by student, then product/ IPR will be entirely owned by the inventors in proportion to the contributions made by them. In this case, inventors can decide to license the technology to third parties or use the technology the way they deem fit.
- c. If there is a dispute in ownership, a committee with a minimum five members, consisting of two faculty members (having developed sufficient IPR and translated to commercialisation), two of the Institute's alumni/ industry experts (having experience in technology commercialisation) and one legal advisor with experience in IPR, will examine the issue after meeting the inventors and help them settle the issue, hopefully to everybody's satisfaction. Institute can use alumni/ faculty of other institutes as members, if they cannot find sufficiently experienced alumni/ faculty of their own. See Chapter 9 for the proposed structure for implementing ISPN at NITC.
- d. As already mentioned in Chapter 9, institute IPR cell will only be a coordinator and facilitator for providing services to students, faculty and staff. They will have no say on how the invention is carried out, how it is patented or how it is to be licensed. If Institute is to pay for patent filing, they can have a committee which can examine whether the IPR is worth patenting. The committee should consist of faculty who have experience and excelled in technology translation. If inventors are using their own funds or non-institute funds, then they alone should have a say in patenting.
- e. Institute level decision-making body with respect to incubation/ IPR/ technology-licensing will consist of faculty and experts who have excelled in technology translation. The decision of this committee can be forwarded to the Director for final approval.
- f. Interdisciplinary research & publication and start-up & entrepreneurship shall be promoted by the Institute.

13. COLLABORATIONS FOR IMPLEMENTATION OF ISPN

Collaborations always bring mutual benefits for the involved parties. NITC can create collaborative environments inside and outside the Institute to extend and gain benefits for the sake of successfully implementing ISPN. Collaborations can range from inter-departmental level to international level. NISP-2019 insists all the institutes to collaborate with external agencies/ organizations to get benefits in various aspects. Strategic international partnerships should be developed using bilateral and multilateral channels with international innovation clusters and other relevant organizations. Moreover, international exchange programs, internships, engaging the international faculties in teaching and research should also be promoted. Industry linkages should be leveraged for conducting research and survey on trends in technology, research, innovation, and market intelligence. Guidelines related to collaboration, co-creation, business relationships, and knowledge exchange, proposed are consolidated below.

a. Stakeholder engagement should be given prime importance in the entrepreneurial agenda of the Institute. Institute should find potential partners, resource organizations, micro, small and medium sized enterprises (MSMEs), social enterprises, schools, alumni, professional bodies and entrepreneurs to support entrepreneurship and co-design the programs.

- To encourage co-creation, bi-directional flow/ exchange of knowledge and people should be ensured between institutes such as incubators, science parks, etc.
- Institute should organize networking events for better engagement of collaborators and should open up the opportunities for staff, faculty and students to allow constant flow of ideas and knowledge through meetings, workshops, space for collaboration, lectures, etc.
- Mechanism should be developed by the Institute to capitalize on the knowledge gained through these collaborations.
- Care must be taken to ensure that events DO NOT BECOME an end goal. First focus of the incubator should be to create successful ventures.

b. The Institute should develop policy and guidelines for forming and managing the relationships with external stakeholders including private industries.

c. Knowledge exchange through collaboration and partnership should be made a part of institutional policy and Institute must provide support mechanisms and guidance for creating, managing and coordinating these relationships.

- Through formal and informal mechanisms such as internships, teaching and research exchange programmes, clubs, social gatherings, etc., students, faculty and staff of the Institute should be given the opportunities to connect with their external environment.
- Connection of the Institute with the external environment must be leveraged for absorbing information and experience from the external ecosystem into the Institute's environment.
- Single Point of Contact (SPOC) mechanism should be created in the Institute for the students, faculty, collaborators, partners and other stakeholders to ensure access to information. The ICT mediated innovation knowledge platform proposed in Chapter 8 can be utilized for this.
- Mechanisms should be devised by the institutions to ensure maximum exploitation of entrepreneurial opportunities with industrial and commercial collaborators.

Collaborations are even possible between departments. Faculty and departments of the Institute have to work in coherence and cross-departmental linkages should be strengthened through shared faculty, cross-faculty teaching and research in order to gain maximum utilization of internal resources and knowledge.

NITC can take initiatives to collaborate with other NITs, IITs, and IIMs to create a consortium for innovation and entrepreneurship activities. NITC can either try to join such reputed networks or can constitute own networks including reputed organizations/institutes. With such a network, institutes can mutually share their knowledge and resources in accordance with well-defined norms. Similar networks can be formed among faculty from different departments. Again, NITC can collaborate with other industries to facilitate novel research ideas and ventures.

14.WAY FORWARD

For the implementation of a robust innovation and start-up ecosystem, NITC will be allocating a minimum of 1% fund of the total annual budget of the institution. This ‘Innovation Fund’ recommended in NISP-2019 will be mainly for the purpose of funding and supporting innovation and start-ups related activities. The following activities are to be funded using the allotted budget. Indicative budget for each of the activities is given in Table 1.

Table 1: Indicative budget for funding and supporting I & E activities

Activity	Frequency of Activity	Indicative Budget	Justification
Conducting training and workshops related to innovation and entrepreneurship for the faculty and students	15 programmes/year (Approx.)	1 lakh for a programme of 2 days	Budget covers, <ul style="list-style-type: none"> • Remuneration for the external resource persons, including TA, DA • Expense for stationary items/class room utilities • Expense for refreshments • Etc.
Expenses for conducting courses (academic programmes) related to innovation and entrepreneurship as part of the curriculum.	At least 4 programmes/year	Rs. 75,000 per programme (Approx.)	Budget covers, <ul style="list-style-type: none"> • Expense for additional inputs like sessions by entrepreneurs, including their TA and DA • Expense for company visits • Etc.
Conducting evaluations for the proposals submitted by the students and faculty	10-12 meetings/year (Approx.)	Rs. 20,000 per evaluation meeting (Approx.)	Budget covers, <ul style="list-style-type: none"> • Expert sitting fee, TA and DA • Expense for stationary items • Expense for refreshments • Etc.
Providing fund for IPR related activities	20 innovations/year	Avg. Rs. 75,000 per innovation for patent filing	Budget covers, <ul style="list-style-type: none"> • Fee for prior art search • Fee for filing/drafting patent application (provisional) • Fee for drafting complete specification application • Fee for examinations/accelerated examination • Adding inventors’ name in patent certificate

			<ul style="list-style-type: none"> • Etc.
Legal, Statutory consulting for equity/royalty and technology transfer		Rs. 50000/ year (Approx.)	Budget covers, <ul style="list-style-type: none"> • Fee for external consultancy services
Other administrative expenses and miscellaneous expenses		9.1 lakhs (Approx.)	<ul style="list-style-type: none"> • To meet contingencies
TOTAL		45 lakhs (Approx.)	
The above budget is an indicative budget. I, E & S council can frame the budget appropriately. Also funds available in one head may be permitted to be used for another head based on the IRCIES recommendation.			

Uniform and successful implementation of the 'National Innovation and Start-up Policy 2019' for students, faculty and staff of NITC is the main objective of ISPN. In order to achieve this objective, full-fledged integration of existing facilities in the Institute is important. The roadmap suggested through this document is in accordance with the NISP-2019 framework proposed by MoE.
