Session 5 :
Case Studies of TTOs

Case studies of TTOs in India
Discussion 2 : India- specific issues in operating a TTO

Raj Hirwani, Premnath V

Who's Speaking

Raj Hirwani

PhD

Raj Hirwani, an expert in technology transfer and IP management, has 45 years of experience in research and industry. A Fulbright Scholar with a Ph.D. from IIT Mumbai, he led CSIR's IP Directorate and URDIP, pioneering patent analytics in India. He played a key role in technology transfer, business development, and R&D commercialization at NCL, coordinating World Bank-funded programs. He has advised global institutions, chaired Licensing Executives Society India, and contributed to government committees. Currently, he mentors startups and teaches entrepreneurship at IIT Mumbai and AcSIR.

Affiliation

- Former Head, CSIR Unit for Research and Development of Information Products (URDIP)
- Former Head, Business Development Division, CSIR-NCL

Who's Speaking

Premnath Venugopalan

PhD, RTTP, FSTEM

Dr. Premnath, Director of Venture Center and Head of NCL Innovations, is a leader in technology transfer, IP commercialization, and venture creation. He has shaped national policies and established award-winning innovation management initiatives, fostering technology commercialization, startups, and deep-tech incubation across India through CSIR-NCL and Venture Center.

Affiliation

- Director, Venture Center, Pune

Case studies of TTOs in India

Raj Hirwani

Tech-Transfer (CSIR- NCL Case Study)

Historical Context

- 40s- Council set up to assist World War II efforts (Patent Unit part of Organisation Structure)
- 50s- Capacity Building
- 60s- Demand to support local industry
- 70s- Import substitution (Drugs, Pesticides)
- 80s- High Tech Areas (Catalysts, Polymers, Biotech)
- 90s- Globalisation- Opportunities for Patents Licensing
- 60s to 80s- Technology Transfer handled through NRDC (established in 1953)
- 80s- Guidelines for Technology Transfer
- 1987- Abid Hussain Committee- 33% revenue to be generated by CSIR Labs

Review of Portfolio

WE DID NOT CAREFULLY EXAMINE

- MARKETS FOR PROCESS, PRODUCT AND SERVICES
- TECHNO-COMMERCIAL VIABILITY
- SELECTION OF CLIENTS

RESULT

- DIRECTIONLESS PURSUIT OF MANY PROJECTS
- NO RETURNS EVEN ON INDUSTRIAL PROJECTS
- WASTE OF SCIENTIST MANYEARS & EXPENDITURE

I	II	III
PROJECT IDENTIFICATION	PROPOSAL IN CSIR FORMAT	PRODUCT DEVELOPMENT
MARKET RESEARCH	DIRECTOR/MC APPROVAL	APPLICATION DEVELOPMENT
TECHNO-ECONOMIC EVALUATION	CONTRACT AS PER MODEL AGREEMENT/TEMPLATE	MARKET DEVELOPMENT
CUSTOMER IDENTIFICATION		
MARKETING STRATEGY		
TECHNICAL PROPOSAL		
FINANCIAL PROPOSAL		
R&D FUNDING/VENTURE CAPITAL		

DOCUMENTATION

How to Do it?

'FOR EVERY 100 SCIENTISTS, WE EMPLOY 6-7 COMMERCIAL PLANNING ENGINEERS, WITH AT LEAST MBA DEGREES AND BACKGROUNDS IN TECHNOLOGV,3-4 CONSULTINGENGINEERS, AND ONE FINANCIAL PROFESSIONAL'.

- W.R. GRACE & Co., USA

WHAT IS EXPECTED OF THIS GROUP ?

INFORMATION RESOURCE PERSONS

- **A – MARKETS**
- **B – TECHNOLOGY**
- **C – COMMERICAL / LEGAL**

ESTABLISHING THE RIGHT CONTACTS AND GAINING THE RIGHT PERSPECTIVES IN BOTH THE QUARTERS i.e. INDUSTRY AND SCIENTISTS.

PROJECT PLANNING AND DEVELOPMENT UNIT

FUNCTIONS

- RELAY TO SCIENTISTS INFORMATION ON TECHNOLOGICAL AND MARKETING REQUIREMENTS
- BRING TOGETHER COMPANIES AND APPROPRIATE NCL DIVI-SION/SCIENTISTS
- ARRANGE FOR APPROPRIATE CONTRACT WORK TO BE UNDERTAKEN BY NCL
- ACT AS PRINCIPAL COMMERCIAL AGENT FOR MARKETING NCL RESEARCH AND TECHNOLOGY
- MAXIMISE RETURNS FROM CONTRACT RESEARCH AND CONSULTANCY

Project Planning and Development Unit

ACTIVITIES

- PROJECT IDENTIFICATION
- MARKET RESEARCH
- TECHNO-ECONOMIC EVALUATION
- CUSTOMER IDENTIFICATION
- MARKETING STRATEGY
- TECHNICAL PROPOSAL
- FINANCIAL PROPOSAL
- R&D FUNDING/ VENTURE CAPITAL

Active Participation in Technology Management

- DIVISIONAL REVIEW MEETINGS
- BUSINESS ANALYSIS OF APPLIED PROJECTS
- SYNERGY OF GIA PROJECTS WITH THRUST PROGRAMMES OF LAB
- IPR POSITION AND PROTECTION
- STRATEGY FOR COMMERCIALISATION

PROJECT SELECTION

- GENERIC STRENGTHS (TECHNOLOGY PUSH)
- INTEGRATE R & D AND BUSINESS STRATEGY OF COMPANIES (MARKET PULL)

Selection of Projects

GENERIC STRENGTHS

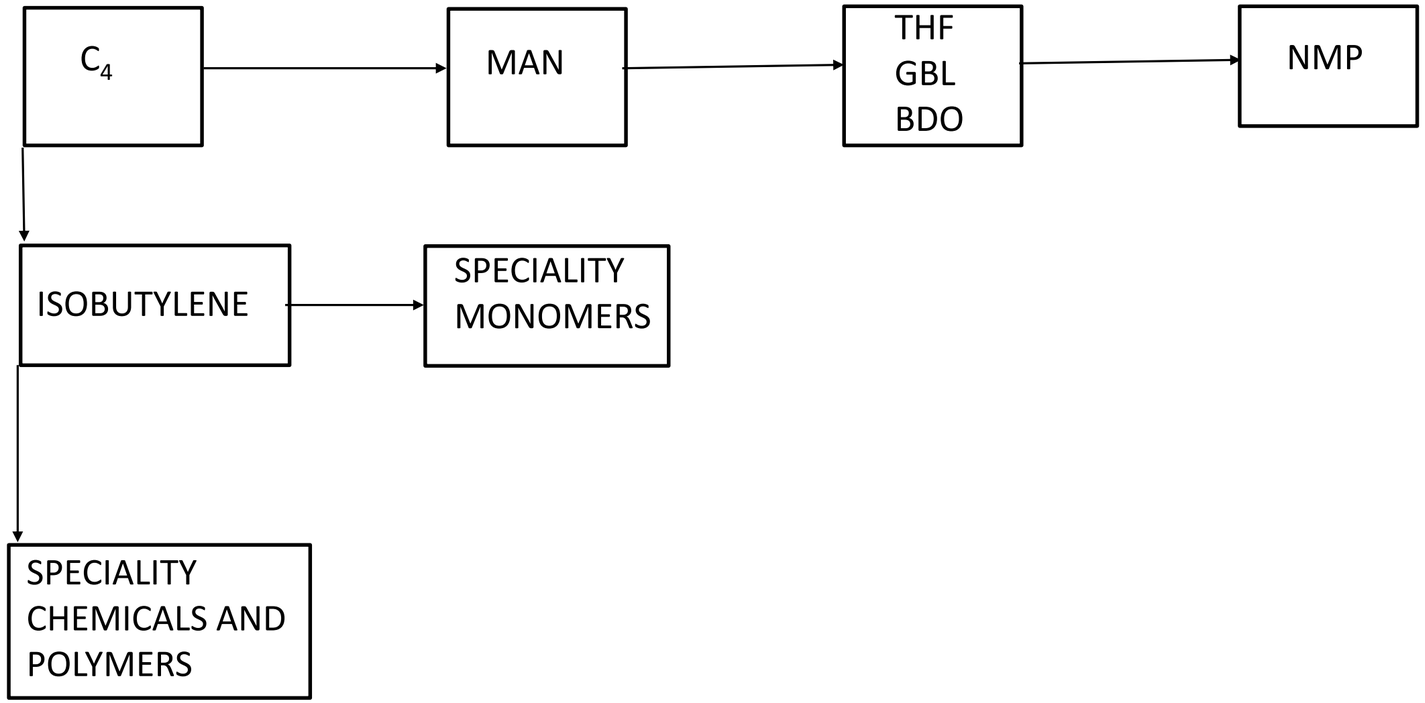
ALKYLATION BY ZEOLITES

- ETHANOL + BENZENE – ETHYLBENZENE
- PROPYLENE + BENZENE – CUMENE
- PROPYLENE + TOLUENE – ISOBUTYL BENZENE

WHY NOT LAB ?

- OLEFIN + BENZENE – LAB

INTEGRATE R&D AND BUSINESS STRATEGY



TECHNO – COMMERCIAL EVALUATION

- *EXAMPLE : CARBAMATE PESTICIDES*
- CARBARYL : 130
- CARBOFURAN : 700
- PROPOXUR : 1400

Evaluation of Inventions

Contd...

- Application of technology must make economic sense
- Estimate production methods (and costs)
- Estimate the investment of resources
- Companies license ‘profits’, not `ideas’
- Businesses do not get carried away by elegance of technical solutions
- The end user must see value in the final product / process
- Journey from idea to successful business

Evaluation of Inventions

- What need in the market might this fill?
- Is this market need recognized now or will it have to be developed?
- Is the market minuscule or large?
- How is the market being filled now?
- How does it differ from present solution?
- Is anyone investing in that market?
- How sure are we that this invention will work? Can we demonstrate on a reasonable scale?

Evaluation of Inventions

Contd...

- Do we have patents? Patentability?
- What is the nature of claims?
- Dominating patents?
- Is the invention too early?
- Rate of obsolescence?
- Regulatory issues? Address them upfront

WHAT IS BEING TRANSFERRED?

- Paper Licence
- Process Report / Know-how Package
- Demonstration / Prototype
- Engineering Drawings
- Everyone has his own understanding of technology
- Very often leads to mismatch of expectations and delivery
- Indian Industry wants Know-how and Show-how

Knowledge Spin-off Possibilities

- Don’t expect all great ideas to find a customer
- Look for underlying skills to capitalize on generated knowledgebase

Examples:

- Metallocene catalyst for polyethylenes - drag reducers, lube additives
- Bioremediation of PCBs - HCCP biodegradation
- Polyurethane foam making machine
- Polycarbonate- Transesterification

  CR-39 Resin (FORBES), TECHTRAN Japanese Company

Increase Capacity of Resource Team

- Converting invention into innovation requires additional skill sets
- Complement the team with engineers and technology facilitators
- As project moves from one stage to another stage, it requires different kind of leadership
- There is need for downstream product, application and market development
- This requires industrial partners at an early stage

Selection of Partners

- TRADERS
- IMITATORS
- INNOVATORS

What Should We Look for in Partners?

- Who is the customer
  - - Identifying targets
  - - Qualifying targets
- Appreciation of technology and willingness to invest in R&D, take risks and patience to wait for returns
- Technical, financial and marketing strengths to take ideas to the market place
- Past track record (in house R&D investments)
- Synergy of efforts and business
- Time frame and budget

Selection of Partners

Benzaldehyde		6-APA
	Phenyl Glycine	Pen- G
Phenyl Acetic Acid		Ampicillin
DCM		Lupin
IOC		SOL
Atul Products		CEPHAM/CADILA

Selection of Partners

Other Examples :

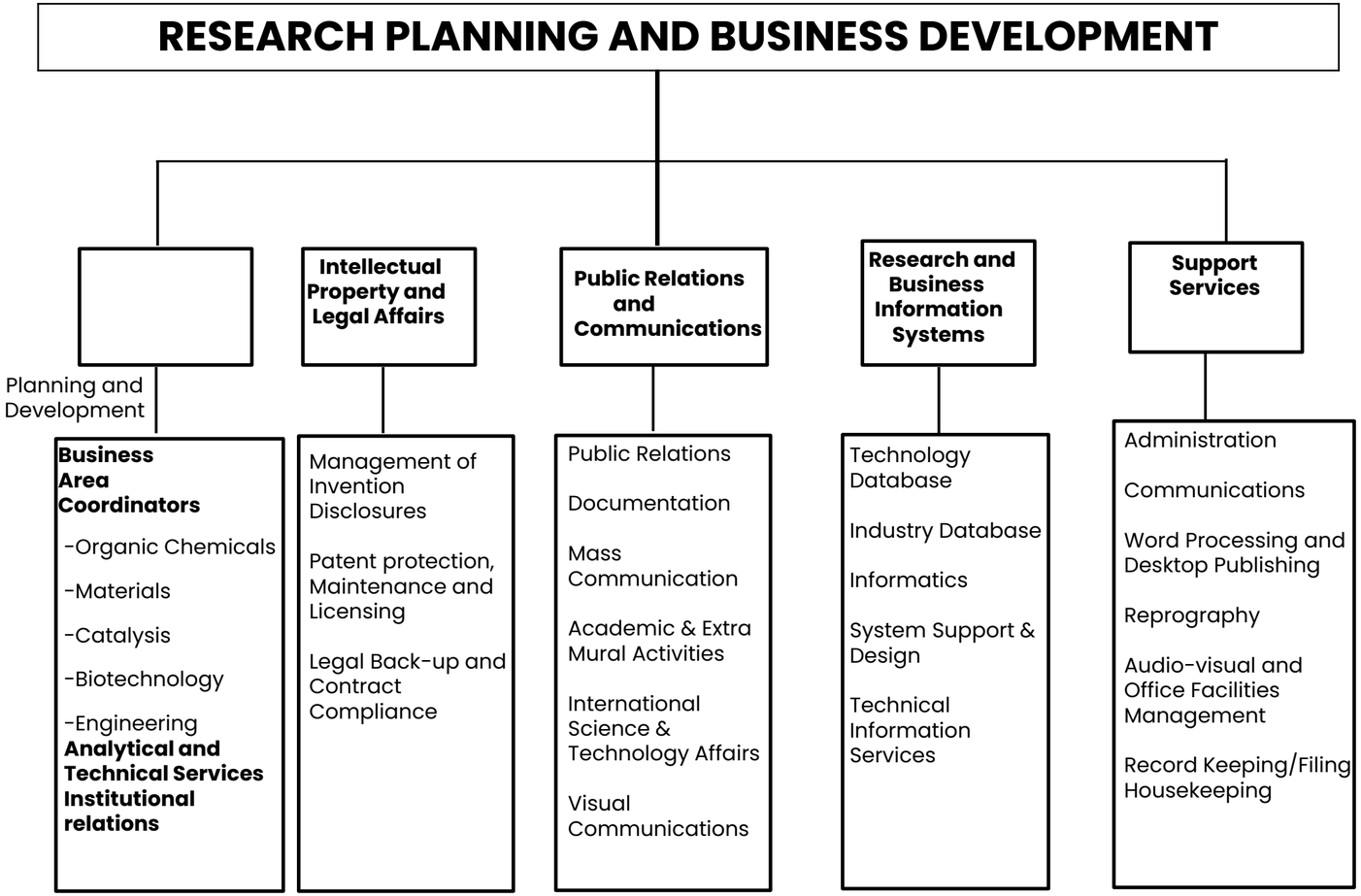
- LAB (IPCL, RELIANCE, TNPP, HLL)
- CARBAMATES (EXCEL,RALLIS)
- GIBBERLIC ACID (NEW *Vs* LUPIN)
- ISOPHORONE (ALCOHOL Vs PHENOL)

Marketing to Partners

- Emphasize the benefits of the invention rather than the features
- Describe what the invention does rather than how it does it
- Compare the invention to one or more current alternatives
- Highlight advantages (also prepare disadvantages)
- Describe the market potential
- Tailoring to your customer (fit between Technology and Needs)

COMMUNICATION WITH MANAGEMENT

- Profits
- Cost cutting
- Market share / Expand the product range
- Valuation
- Possibilities of M & A



WHAT IS REQUIRED TO SUCCEED?

- TOP MANAGEMENT SUPPORT
- MECHANISMS TO VALIDATE CLAIMS
- EFFICIENT PROJECT MANAGEMENT
- INTERNAL CONFLICT RESOLUTION
- MARKETING WITHIN THE LABORATORY
- R&D and TTO SHOULD PERCEIVE EACH OTHER AS 'BUSINESS PARTNERS'
- REWARD R&D/MARKETING/TTO JOINTLY

MARKETING IS REQUIRED TO SUCCEED

" CONSIDERING THE MARKET, THERE ARE MORE POEMS PRODUCED THAN ANY OTHER THING.NO WONDER POETS SOMETIMES HAVE TO SEEM SO MUCH MORE BUSINESS LIKE THAN BUSINESSMEN.THEIR WARES ARE SO MUCH HARDER TO GET RID OF."

- **ROBERT FROST, NEW HAMPSHIRE**

" GRACE IS GIVEN OF GOD BUT KNOWLEDGE IS BOUGHT IN THE MARKET."

- ARTHUR HUGH CLOUGH (1819-1861)

PRE- REQUISITES FOR PATENT LICENSING

- **Techno-commercial evaluation**
- **Inventing around**
  (patents only have value when they protect the very best way to do something.)
- **Freedom to operate/ market**
- **Nature of claims (good patents are written from the claims)**
- **Claims must “read” on an infringed product**
- **Infringement should be detectable/ enforceability**
- **Validity (assignments, timely filings, untimely disclosures)**

Lessons Learnt

DO

- KNOW YOUR CUSTOMER
- THINK (AND ACT) LIKE A TECHNICAL BUSINESS PERSON
- LINK TECHNOLOGY TO BUSINESS STRATEGY
- COMMUNICATE CLEARLY AND AT THE PROPER LEVEL
- BE OPEN ABOUT RISK/COST/TIMING
- INVOLVE R&D PARTNERS IN DECISIONS, PLANNING
- **Commit to hold hands till product reaches market**

DON'T

- OVERSELL, OVERCOMMIT, OVERPROMISE
- EXPECT ALL GREAT IDEAS TO FIND A CUSTOMER
- KEEP TRYING TO SELL IF THERE IS NO CUSTOMER
- BE DEFENSIVE OR ARROGANT
- 'OVERTEACH' SCIENCE TO NONTECHNICAL CUSTOMERS

NCL Innovations

- Intellectual Property Group
- Innovation Management Group
- Workflows, Toolkits , Processes
- Institutionalisation of Practices

TECHNOLOGY TRANSFER INFRASTRUCTURE

- EVOLUTION FROM IVORY TOWER TO ENTREPRENEURIAL PARADIGM
  - STARTUPS/SPINOFFS
  - INCUBATORS
  - TECHNOLOGY CLUSTERS
  - TECHNOPOLIS

Objectives

- To support the initiation of high-tech industry by supporting novice entrepreneurs at the earliest stages of technological entrepreneurship
- To encourage new science based industries
- To create new employment opportunities for technologically skilled persons
- To provide supportive and protective environment to individual inventors and entrepreneurs, for the development of technological innovations into business ventures

Supporting Technology Transfer: Role of TBIs

- Companies have moved away from funding discovery research: preferring to buy proven technologies or start-ups that own them
- Start-up companies founded on academic/government research offer a route to research funding and technology commercialisation
- Widespread use of incubators in entrepreneurial and innovation policy
- Business Incubators are a leading instrument used by US/EU to facilitate TT from Public Research Organisations
- Commercial risks pose a greater problem than technical risks when taking R&D results to market, not least because start-ups are often founded by scientists with technical capacities but without business skills

Four Generations of Incubators

- First generation- flexible workplace and common services- Multi tenant buildings (STPI)- Infra support
- Second Generation- FG + Enterprise incubation service (Business Parks)- Management Support
- Third Generation- SG+ Technology- Market focus & Comitment, lab involvement (Innovation Parks)- Technology Support
- Fourth Generation-Close involvement from investors and industry- Venture creation completing full chain of Knowledge generation- Application- Exploitation
- Fifth Generation of incubators (Future)

Merging the functions of TBIs and other instruments (S&T parks, BD/TTOs and VC funds (capacities, networks and goals are different/instruments needed are different)

CSIR- 80 years of leadership

- Technology Transfer Guidelines revised in 1989 and subsequently every year
- Annual business meet of all the Lab TTO Managers
- Mashelkar Committee Report 1993- Formalising Business Development groups
- New Mechanisms for Marketing of CSIR Knowledgebase-1994
- Setting up of Commercial arms/

CSIR was pioneer in Scientist entrepreneurship scheme (100+ enterprises)

- Incubator Scheme now two decade old
- Knowledge as Equity and Scientific Entrepreneurship Scheme
- Others Councils / Agencies have followed

Licensing & Technology Transfer @ IIT Bombay

Role of IRCC Technology Transfer Office

1. Manage end-to-end technology transfer activities at the Institute
2. Contract negotiations for licenses, publicity, financials
3. Disbursal of funds to inventors
4. Promotion of technologies on websites and publications
5. Continued monitoring of licensed technologies
6. Technology assessment and marketing support

Commercialization Models

Incubation

Joint Development & Commercialization

Licensing IITB IP

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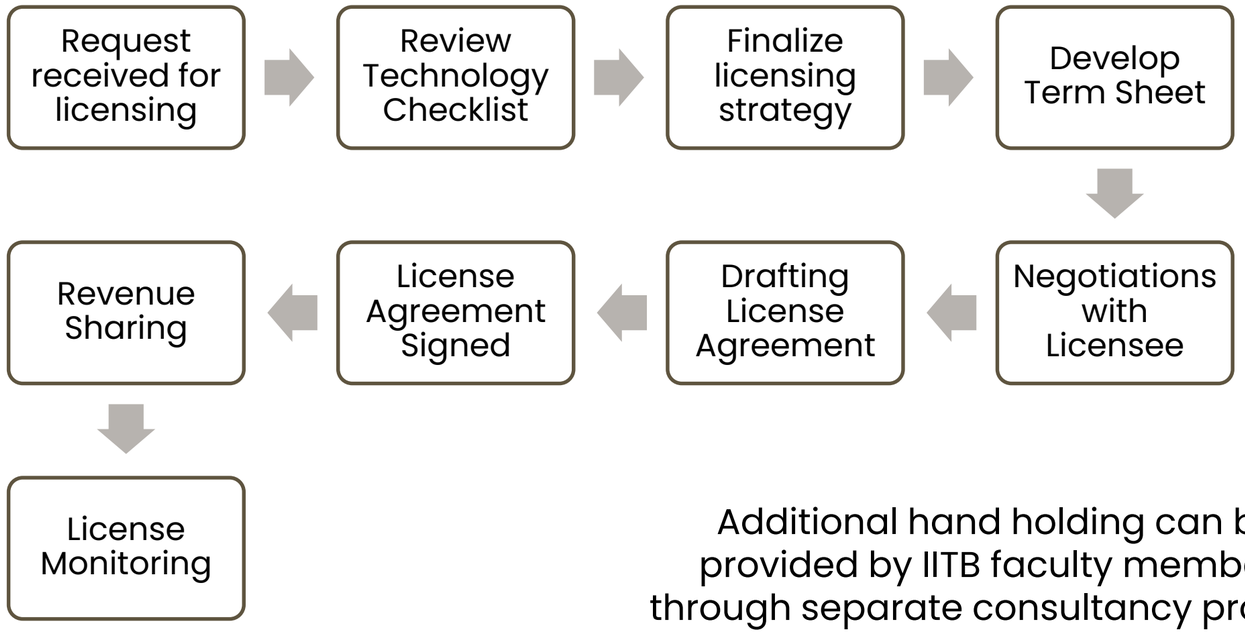
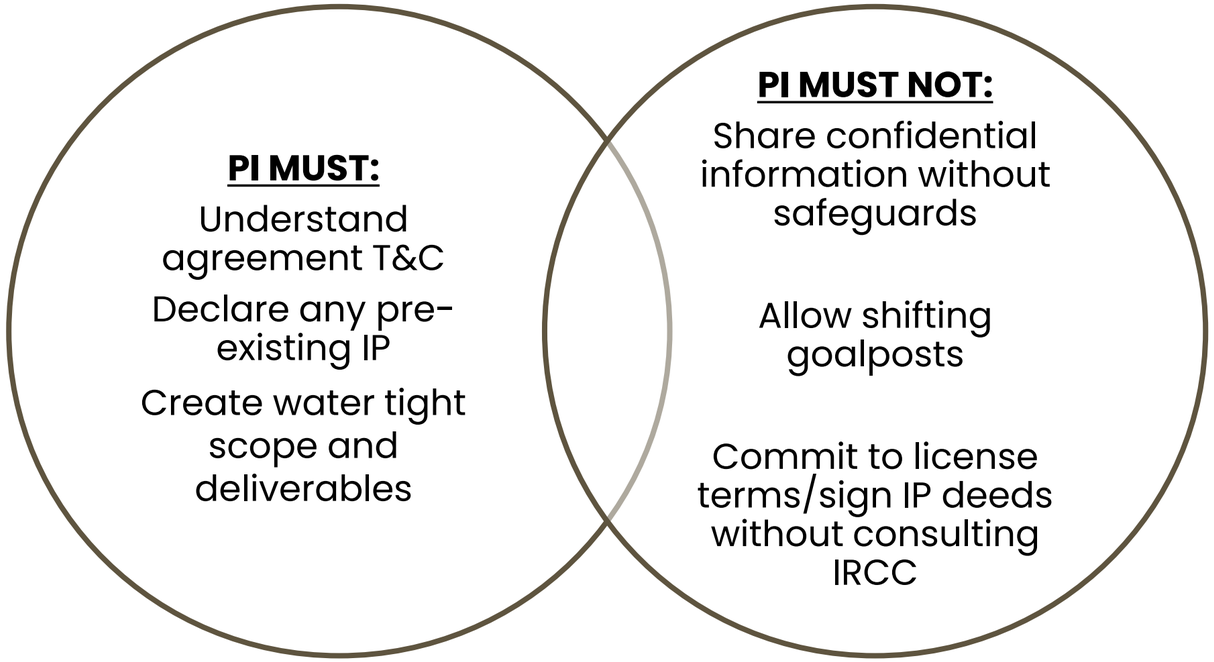
Licensing IITB IP



Additional hand holding can be provided by IITB faculty members through separate consultancy projects

Joint Development and Commercialization

1. IP developed jointly/solely
2. Governed by specific agreement
   A. Ownership of IP
   B. Type of license
   C. Licensing model (down payment and/or royalty)
   D. Usage rights
   E. Publication rights
   F. Confidentiality
   G. Indemnity/liability
   H. Infringement



IP Licensing to IITB Entrepreneurs

IP may be licensed to the IITB Researcher (inventor) initiated Start-up in 2 modes

Equity model	Revenue model
Licensing in lieu of equity	License in lieu of down-payment and/or royalty
IITB inventor may take only a bouquet of related IPs	License could be both exclusive (limited duration) or non-exclusive
License can be exclusive for a duration	Down-payment to minimally cover IP filing/ prosecution costs
Equity of 2% on first IP, additional 0.5% equity for each subsequent IP to be licensed	Final terms on mutual discussions
Equity + Down-payment model is also allowed	
Revenue earned/ Equity liquidated is shared with IITB inventors in the ratio of 70-30 (inventors-IITB)	

Case studies of TTOs in India

Premnath V

NCL Innovations:
Overview circa 2019

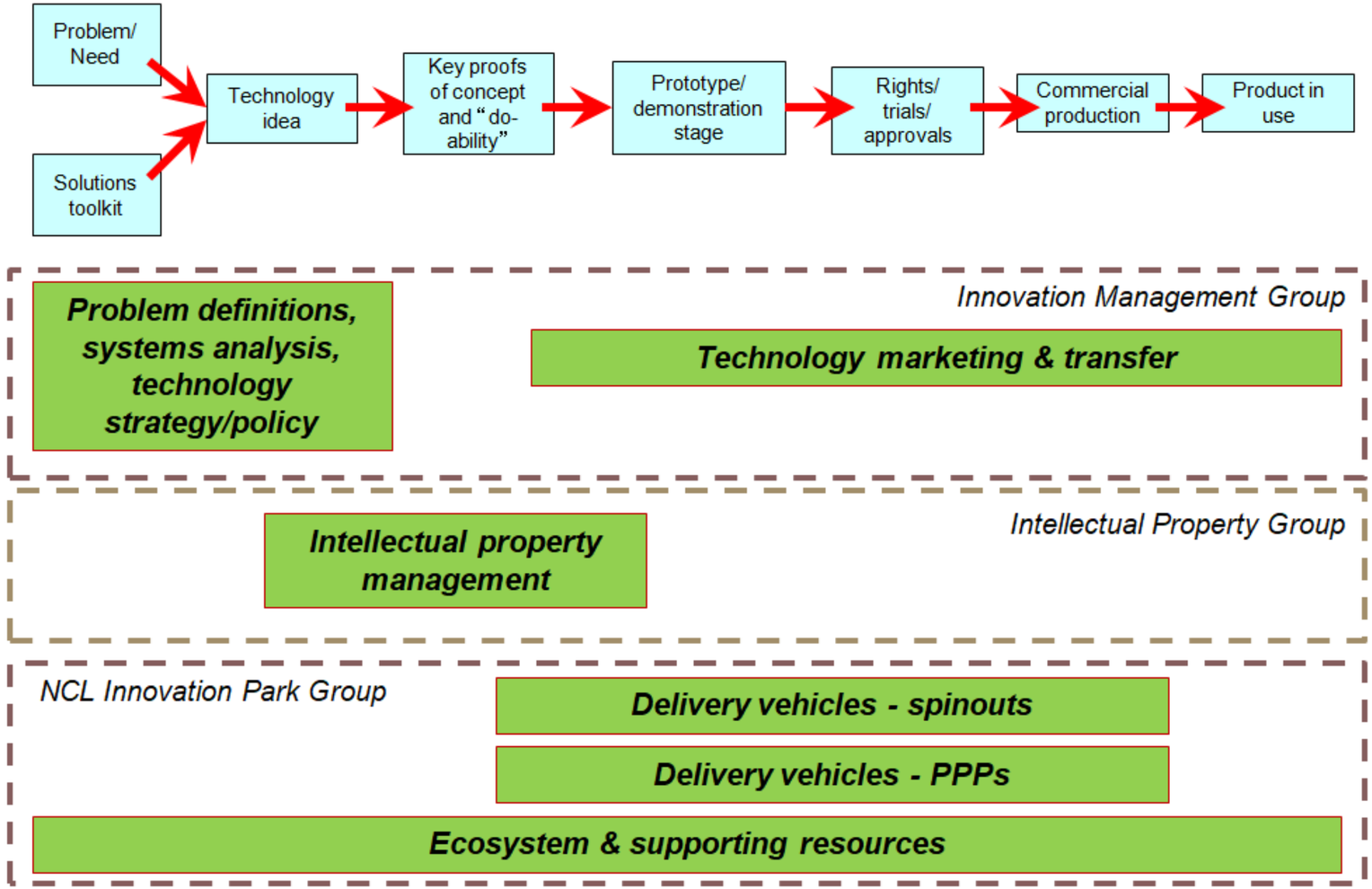
NCL Innovations

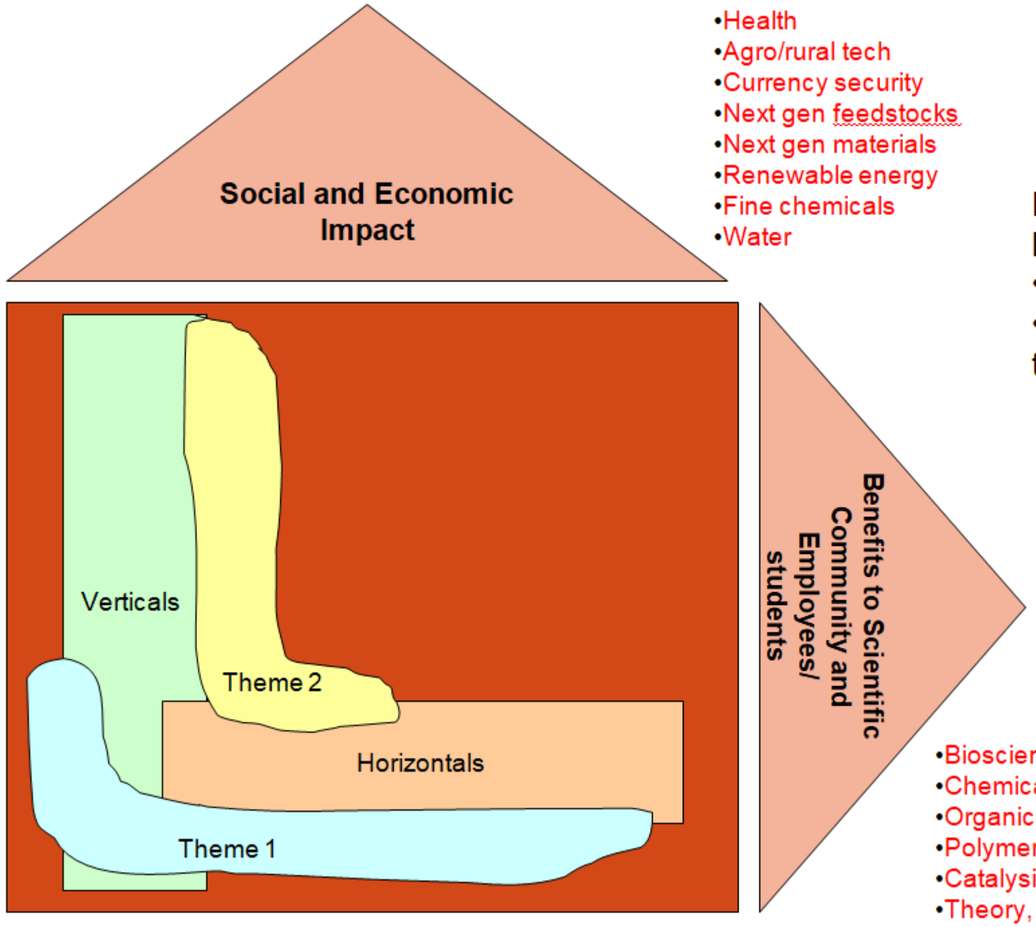
Purpose/mission:
To support, promote and champion the cause of technology innovations within NCL.

Vision/envisioned future:
To be recognized amongst the world's leading (top-20) non-profit innovation management groups by 2022.

Core values:
- ***TECHNOLOGY: Passion for technology (solving unmet needs, outstanding problems)***
- ***ENTERPRISE: Entre/Intra-preneurship, initiative, proactive***
- ***INDIA: Impact for the Nation***
- ***SCHOLARSHIP: Depth, scholarship and sharing learning (20% of time)***

Technology Innovation: A simplistic model





- Health
- Agro/rural tech
- Currency security
- Next gen feedstocks
- Next gen materials
- Renewable energy
- Fine chemicals
- Water

Role for NCL Innovations:

- Shape impact areas
- Delivery mechanisms & translation

- Biosciences & biotech
- Chemical engg
- Organic chemistry
- Polymers & hybrid materials
- Catalysis and interfacial chemistry
- Theory, computation, modeling

Intellectual Property Group

Purpose/mission :
•To help build and administer an IP portfolio (with an emphasis on patents) for NCL as cost effectively as possible and with efficient, scientist-friendly systems/ processes.
• To oversee and manage all issues relating to ownership, inventorship, sharing of information with IP potential, advise on IP clauses etc

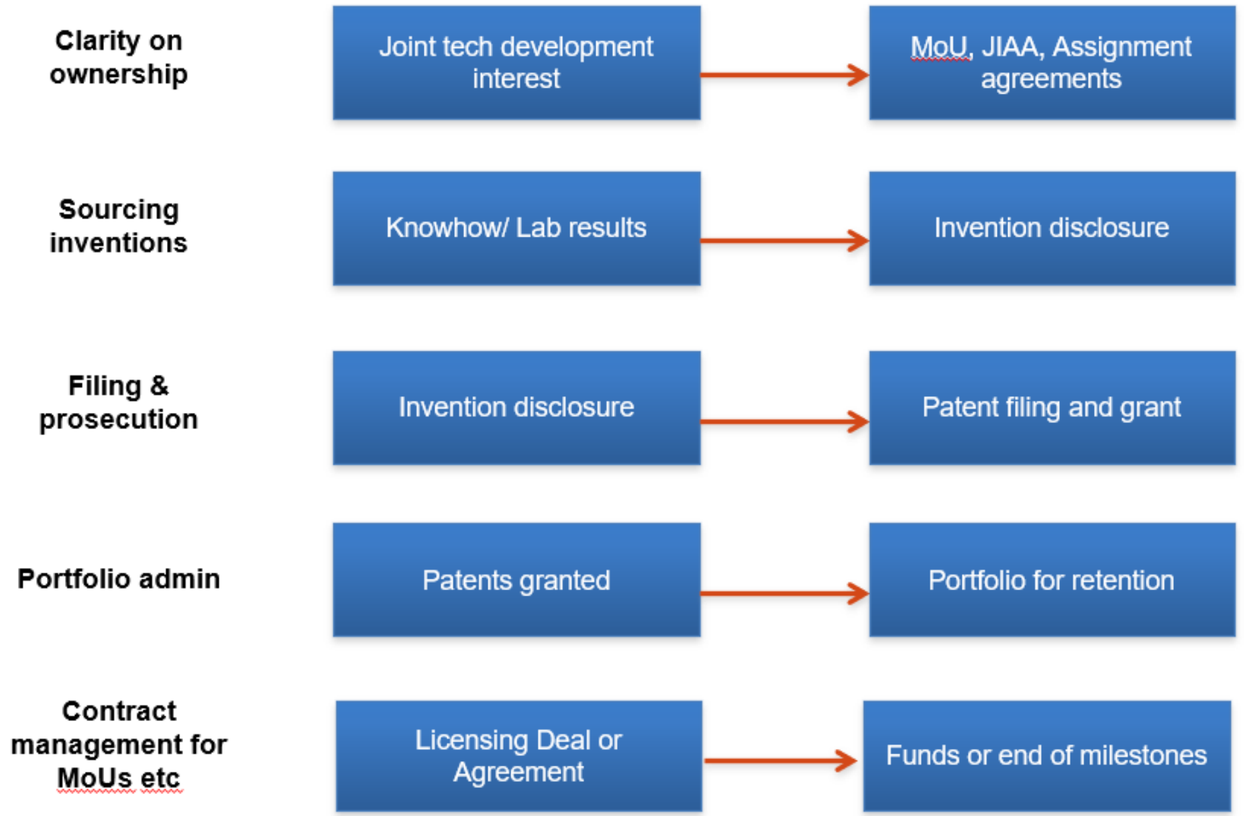
Focus areas:
• Quantity of IP
• Quality of IP
• Efficiency and speed
• Cost optimization
• Clarity in ownership rights, patent administration responsibilities, minimum disagreements/ surprises
• Good record keeping
• Increase awareness and sensitivity; patent evangelism
• Scholarship in IP; Good advise on IP related matters

Intellectual Property Group

Being done
Planned

INV receiving house/ tracking	Filing/ renewal decisions	IP Policy
Ownership & inventorship	Inventor guidance notes	Sponsored projects; IP clauses
Patent drafting -Provisional	Portfolio planning for costs	Pre-project planning for IP
Patentability assessment	Opinions and analytical reports	FTO assessments for all our filings
Patent drafting – complete & claim checking	IPMS & IPdb	Scholarship
MOU/CRA/JIA	Awareness talks	Advisory group
Patents administered by others/ tracking	Audit queries	Infringement tracking
Service providers contract management	Reports for D-NCL & IPU/CSIR	Direct filing/attorney arrangements

WORKFLOWS – SET 1 - IPG



Toolkit: Workflows Set 1

- Awareness talks
- Scouting for technologies, meetings with research groups
- Templates and formats (form A, B, C, I, J, TR-1, TR-2)
- Agreement templates and structures (mou, JIAA etc)
- Fast track agreements (pre-approved)
- Inventor guidance notes
- Database or samples of claims
- Contract management – tracking tools
- Decision framework and matrices
- IPMS and good documentation
- Enabling policies and guidelines

Career Growth

- PGD in IPR or PL or Patent Informatics
- LLB or Masters in Business Laws
- Registered Patent Agent
- Advanced workshops and certificate courses organized WIPO and other such bodies
- Advanced training in Patent Analytics and Informatics

Innovation Management Group

Purpose/mission:

- *To assess, advance, package, market and transfer technology*
- *To help build technology programs strategically and hence strengthen quantity and quality of NCL's technology pipeline*
- *To find means to promote and facilitate technology objectives of NCL by increasing awareness, making available resources, enriching the eco-system, creating new delivery mechanisms and tech transfer routes.*

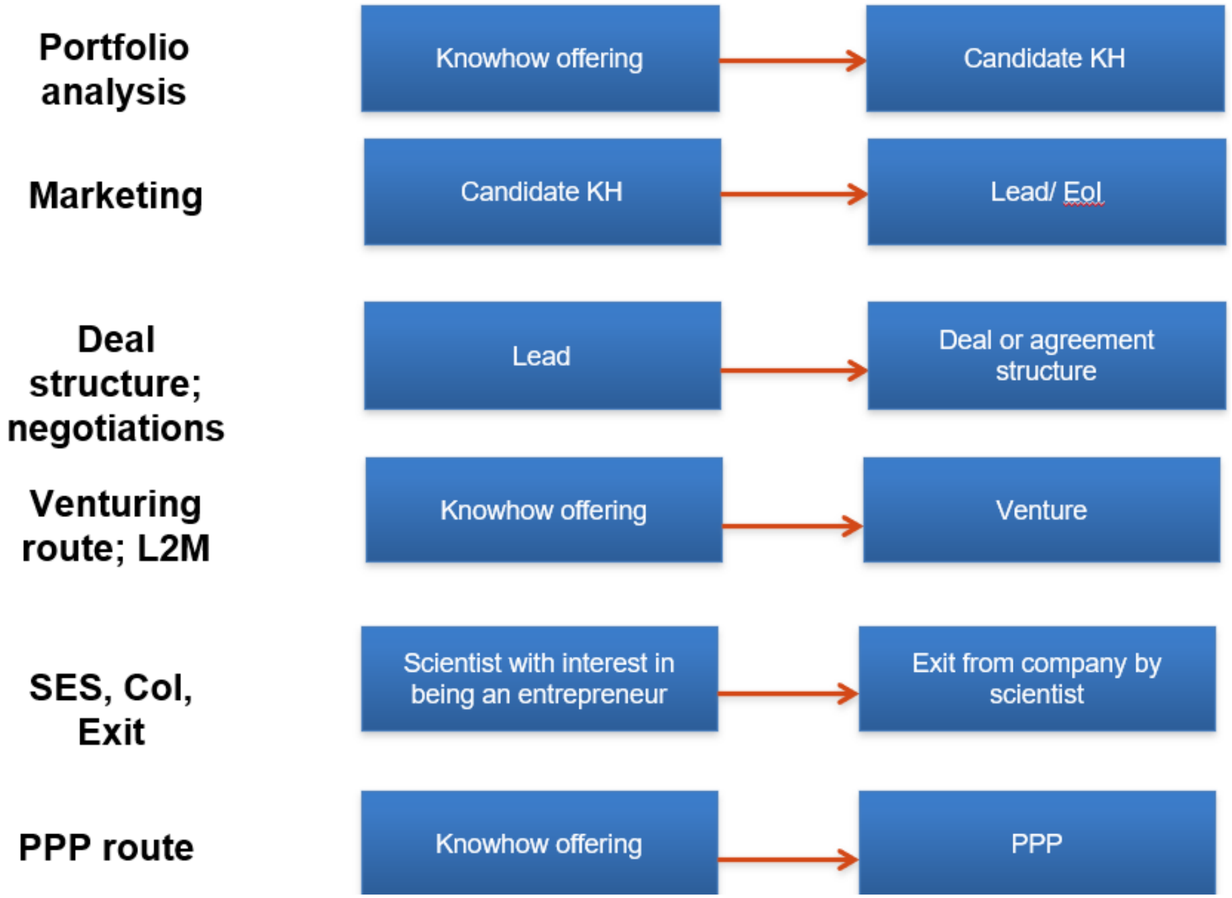
Focus areas:

- *Quantity and variety of technology/ IP offerings*
- *Quality of technology offerings and readiness of technology*
- *Tech transfer results – numbers and value; with or without partners*
- *Speed and efficiency in tech marketing and licensing operations*
- *Number and valuation of spin-offs emerging from NCL*
- *Quality and scope of innovation eco-system available to scientists*
- *Number and clarity of institutional mechanisms available to inventors*
- *Scholarship on technology management. High quality inputs drawing upon global best practices*

Innovation Management Group

Being done		
Planned	Open Innovation	Micro-Social-Rural
Technology assessment (Form C)	SES and KTE schemes	Portfolio analysis
Tech marketing, website, FlintBox	Interface to Venture Center; Mentoring	Knowhow database
Tech valuation/ licensing/ assignment/options; DB	Lab2Mkt/ POC	Formulating tech/ POC projects
IP clauses/ models of engagement	Contribute to relevant CSIR mechanisms	Contracts with Tech Mrtkg Service Providers
Secondary market research	Tech Mgrs Network/ Contacts DB; CRM	Scholarship
Primary market research	Student activities: NCL-TEC, iTeams, TLEP	Technology Legacy of NCL
Idea Catalyst workshop, NCLI Seminar Series	Business planning/case writing & analysis	MS (Tech Comm), AcSIR
Guide/Initiate Tech Projects	Innovation Management Guidance Notes	Systems analysis; Tech strategy, Technology Policy

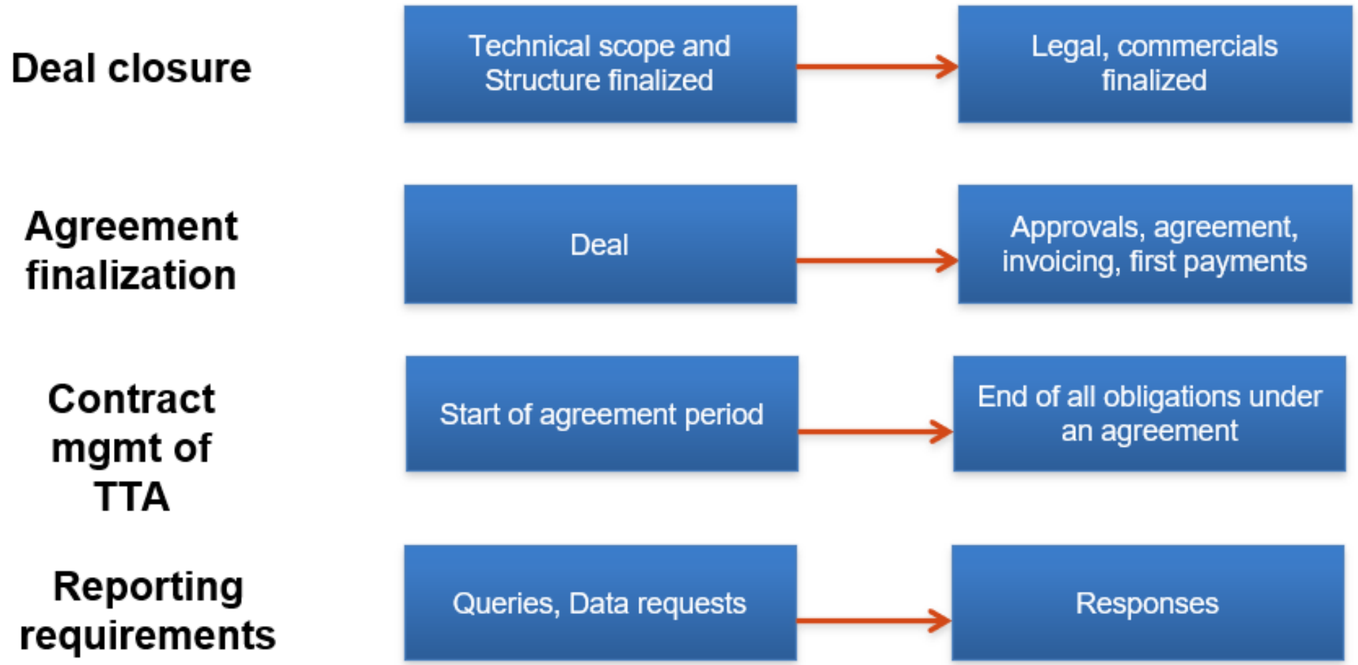
WORKFLOWS – SET 2 -- IMG



Toolkit: Workflows Set 2

- Knowhow database
- Marketing flyers/ slides
- AUTM GTP, Flintbox, etc
- Client/ industry database
- CRM; Sales funnel
- Licensing agreement templates, samples clauses, deal structures etc
- Access to an independent incubator
- Venturing models
- PPP models
- Enabling policies and guidelines (TT, SES, Spin-off etc)

WORKFLOWS – SET 3 – BDD
(and not with NCL Innovations)



Career Growth

- Advanced programs in:
  - Finance
  - Contract law
  - Tech transfer
  - Venturing
- MBA (Marketing/ Finance/ Entrepreneurship)
- Startup experience
- RTTP
- Certified Licensing Professional
- Certified Patent Valuation Analyst (?)
- Professional bodies:
  - AUTM, KE (Praxis Auril), STEM Global
  - LES

NCL Innovation Park Group

Purpose/mission:

- *To develop NCL Innovation Park into a National resource center for science-led (esp research based) innovation and a regional hub for technology, innovation and enterprise.*
- *To help nucleate and facilitate an innovation cluster in the Pune region*
- *To promote and support entrepreneurship and public-private-partnerships with a technology innovation focus.*

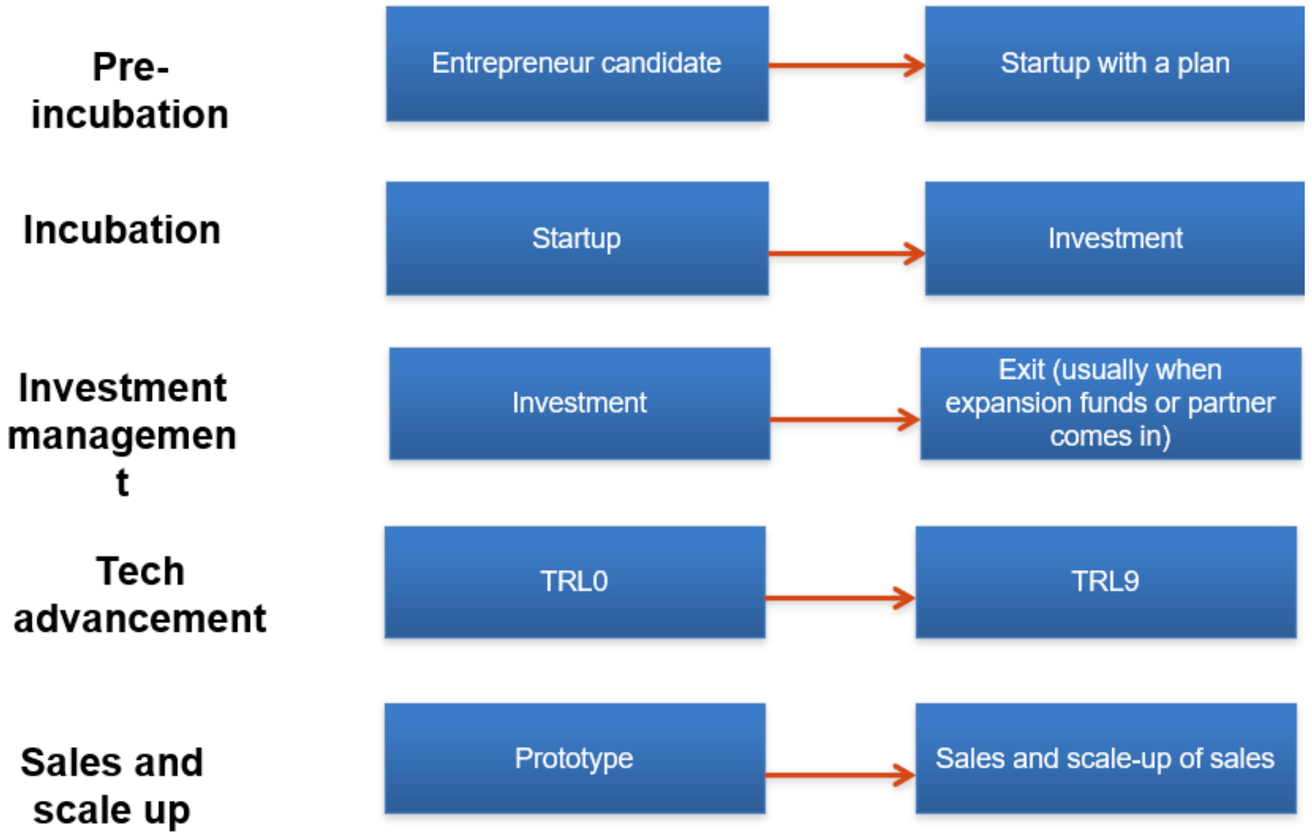
Focus areas:

- *Richness, quality and intensity of innovation eco-system*
- *Number of start-ups (NCL related or not) supported; value created by start-ups*
- *Number of individual innovators supported; impact of technologies*
- *Number of PPP entities created/ supported (based on NCL expertise)*
- *Financial sustainability*
- *Events, networks*

NCL Innovation Park Group

- Park development, project mgmt
- Agreements, contracts etc for the Park
- Promoting/supporting business incubator
- Raising funds, identifying new opportunities for park
- Development of models for PPP
- Others: Co-share facilities, ESG/Science outreach

WORKFLOWS – SET 4 -- VC



Toolkit: Workflows Set 3

- Mentoring tools, mentor pool; At different levels
- Funding and investor databases
- Networks with investors
- Technology de-risking facilities
- Seed investment kitties; Grant funding options; Fellowships
- Events

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Contact Us

https://www.low-carbon-innovation.org/

https://www.venturecenter.co.in/

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