Innovative R&D in Biotech Sector

Dr. Purnima Sharma

Managing Director

Biotech Consortium India Limited

New Delhi

ABOUT BCIL

Biotech Consortium India Limited

INCORPORATED : **1990**

PROMOTER : **Department of Biotechnology, Government of India & All India Financial Institutions**

Project Management	Consultancy	Technology Transfer	Certification Services
Biosafety	Information Services	IP Management	Human Resource Development

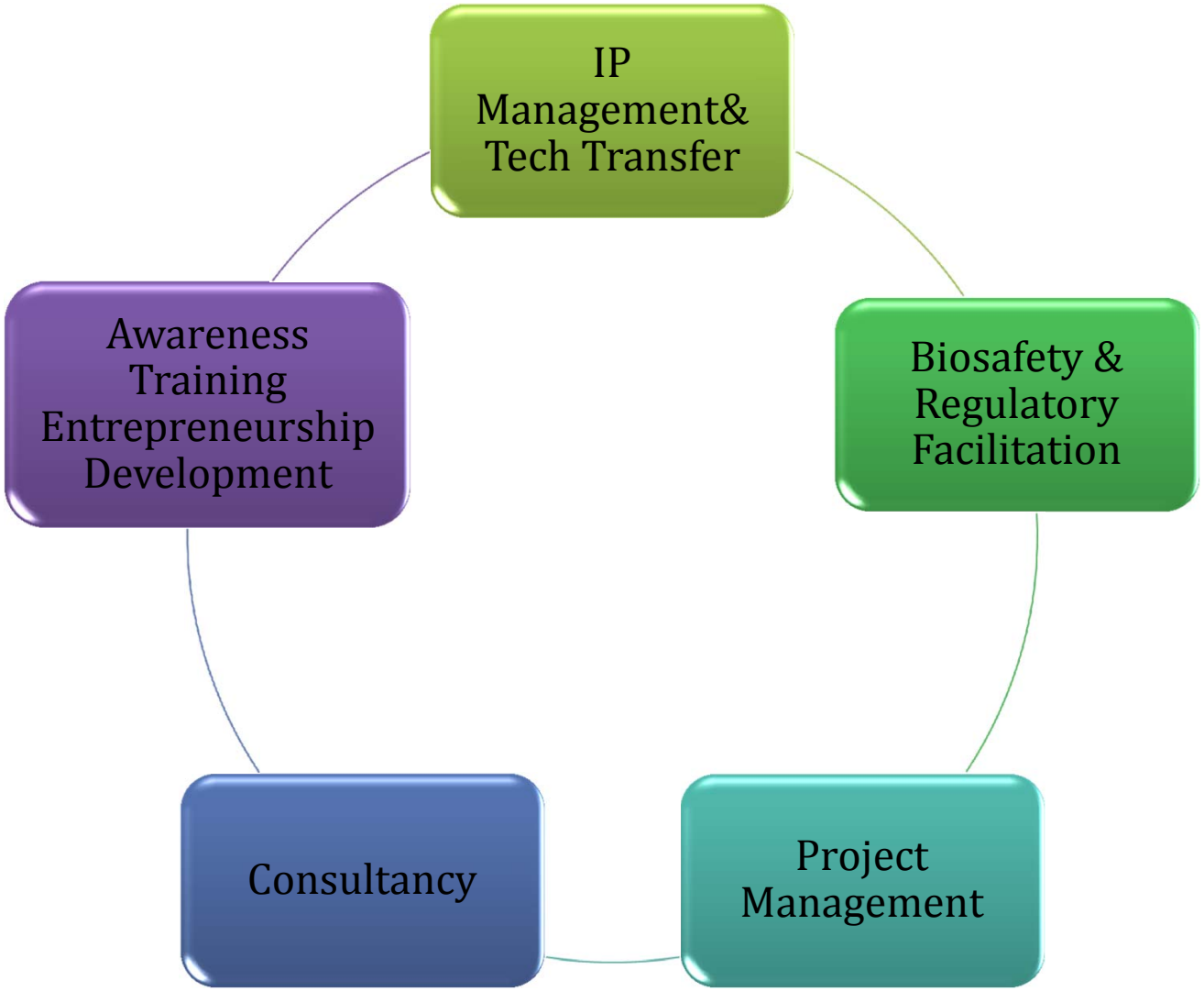
BOARD OF DIRECTORS

- **Secretary, Department of Biotechnology, Government of India/ Nominee.**
- **DG, Indian Council of Agricultural Research /Nominee.**
- **DG, Council of Scientific and Industrial Research/Nominee.**
- **Representatives of Financial Institutions (UTI, IFCI, IDBI).**
- **Individual Experts (Former Secretary DBT, Govt. of India & Former Director, CDRI, Lucknow).**
- **Directors from 2 Biotechnology companies.**

STRENGTHS OF BCIL

- Technically qualified team
- Extensive experience
- Equipped with latest Information Technology Tools
- State of the art patent and non-patent databases
- Extensive network with subject matter experts
- Extensive network with Biotechnology Industry

Services Offered by BCIL for Promoting Technologies & Innovation



BIRAC Vision-

"To Stimulate, foster and enhance the strategic research and innovation capabilities of the Indian biotech industry particularly SME's, to make India globally competitive in biotech innovation and entrepreneurship, for creation of affordable products addressing the needs of the largest section of society."

BIRAC Verticals

- **Fostering innovation and Enterprise Building:**
  - Fostering Innovation
  - Knowledge, Technology Mapping and Management
  - Technology Transfer, Licensing and Acquisition

- **Provide enabling services for promoting the innovation ecosystem**

- **Build Strategic Alliances – National & International**

How does BIRAC accomplish its Mission

Ensuring Entitlements

- Ignite new Ideas- Biotech Ignition Grant Scheme (BIG)
- Support early stage research for proof of concept validation – Small Business Innovation Research Initiative (SBIRI)
- Partnership with industry for high risk discovery led innovation research – Biotechnology Industry Partnership Programme (BIPP)
- Facilitating technology validation and development – Contract Research Scheme (CRS)

Empowering for Achieving Excellence

- Create world class quality Incubation space (Bio-incubators) for entrepreneurs and star-ups.
- Create common service facilities in public and private sector to serve the needs of Start Ups.
- Create Schemes that facilitate the acquisition or license of innovative technology and technology mapping for identifying patentable technology at national or international level.
- Create capacity in various fields required for successful Bio enterprises.

Biotechnology Ignition Grant (BIG) Scheme

Purpose:

Establish and validate of Proof of Concept

Encourage researchers to take technology closer to market through a Start Up

Target Groups:

Entrepreneurs from Academia or an Incubatee

(PhDs, Medical degree holders or Biomedical Engg. Graduates)

Support:

Grant-in-Aid limited up-to INR 50 Lakh
Mentoring and hand-holding

Supports up-to Proof-of-Concept stage

SBIRI

- **Launched: 2005**
- **Focus on SMEs and early stage R&D**
- **Funding available in Phases**
- **Phase-I easily extendable to Phase-II**
- **Provision for Grants and/or soft loans with easy repayment schedules**

SBIRI-
ELIGIBILITY REQUIREMENTS

- **An Indian Company**
  - Alone or
  - In collaboration with National Institutes/ Universities

- **JVs, Limited Partnership Firms**

•Registered under The Companies Act, 1956
•Minimum of 51% shareholding with Indians
•DSIR recognition/ IPR ownership on proposed work

SBIRI PHASE-I

Support for Early Stage Research Leads

PROJECT COST	SUPPORT	
	Grants –in-aid	Soft Loan (interest free)
Up to Rs 25 lakhs	80% of the project cost	---
Rs 25 to Rs 100 lakhs	50% of the project cost	---
Beyond Rs 100 lakhs	Rs 50 lakhs	Upto 50% of the amount by which the total project cost exceeds Rs 100 lakh (maximum Rs 50 lakh)

SBIRI PHASE-II

For Product & process development, validation studies, field trials, commercialization

Loan amount	Interest Rate (simple)
Upto Rs 100 lakhs	1%
up to Rs 10 crore	2%

SBIRI- PHASE I&II

- **If R&D and product development are simultaneously proposed**
- **Maximum of Rs 50 lakhs grant and soft loan up to 10 crores**

BIPP

- **Launched: December 2008**
- **An Advanced Technology Scheme**
- **Covers the entire spectrum of product development**
- **For all sizes of companies: Small, Medium and Large**

BIPP (Contd..)

- Regular and special/need based calls for proposals throughout the year
- Varying models of grant and/or loans offered
- IP rights vested with the company
- Repayment
  - Loan: 10 equal half yearly instalments
  - Grant: 5% royalty for 5 years capped to twice the amount

BIPP:
Categories & Type of Support

Category	Grant-in-aid	Loan (RoI)
I Products of high national and social relevance	√	√ (2-3%)*
II Products of high risk, high value IP	√	√ (2-3 %)
III Product evaluation & validation	√	√ (2-3%)
IV Major facilities around technology platforms	x	√ (5-6%)

**** 2% - Upto Rs. 10 crores, 3% - >Rs. 10 crores***

BIPP - Eligibility Issues

Primary Applicant

Eligible	Ineligibles
• For Profit Company registered under **Indian Companies Act 1956** • Minimum of **51%** shareholding with Indians and/or NRIs	• Any entities other than registered company: **Proprietorship, Partnership, NPOs, NGOs, Trust, Society, Educational Institutes/ Universities, Any other**

Collaborating Organizations:

- Another registered company
- Institute/University
- Trust/Society/NGO

DSIR Requirements

- DSIR recognition for the in-house R&D lab **mandatory** for the primary applicant as well as for all company type collaborators
- In case, DSIR is unavailable, it is mandatory to have **applied to DSIR** before proposal submission
- **For incubatees**:
  - DSIR recognition of the incubator is considered as sufficient
  - Tenure of Incubatee with the incubator should be more than the proposal duration

Contract Research Scheme- CRS

Purpose:

Academia-industry interaction
Industry to validate process or partner for specific research

Leads should be at a level which provides sufficient data for Scale up/Validation:

- Exploratory validation of technology
- Small scale contract research resulting in generating several batches of process or multiple prototypes
- Large scale validation of prototype to commercial design

Target Groups-

Research institutes, Universities, Public funded research Laboratories, Governmental organizations, Research foundations
AND
Companies / industries

Company partner should have DSIR recognized R&D/Service unit(s)

Support:

- Funds for validation of PoC
- IP Services and Management
- Legal support: MTA, NDA, IP protection contracts, Licensing agreements

Bio-incubator Support Scheme-BISS

Purpose:

Strengthening and Up-gradation of the existing Bio-incubators and also to establish New World Class Bio-incubators in certain strategic locations.

Target Groups:

- Existing Bio-incubators across the country
- New Bioincubators

Support:

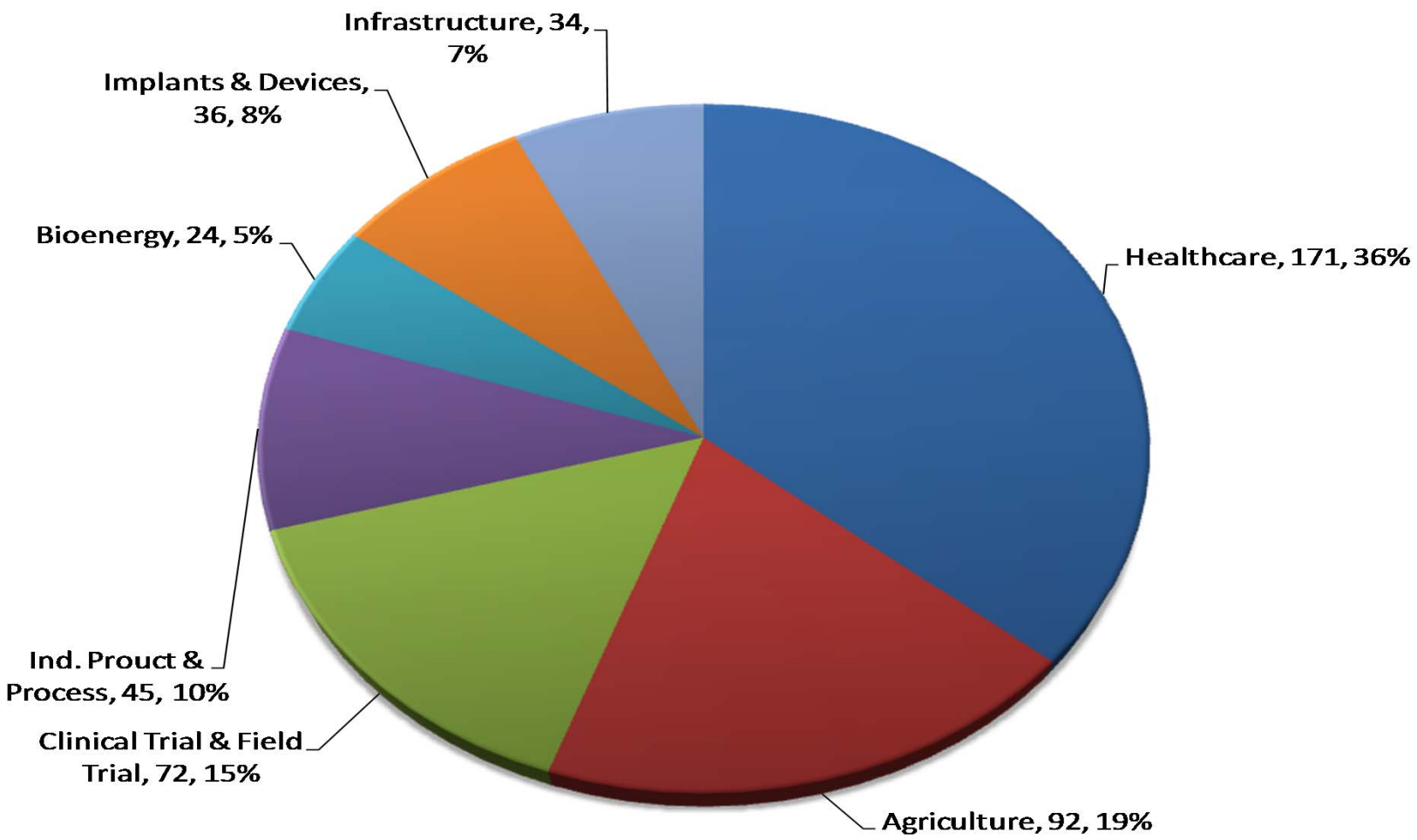
- Provide incubator space to Start-ups and Entrepreneurs.
- Provide access to a pool of special equipments in the Central Equipment Facility.
- Connect and facilitate Industry – Academia Interaction
- Provide enabling services and required mentorship for IP and Technology Management, Legal and Contract, resource mobilization and networking platform.
- Governance models would be cooperative or autonomous.

BIPP Overview and Key Elements of Effective Grant Writing

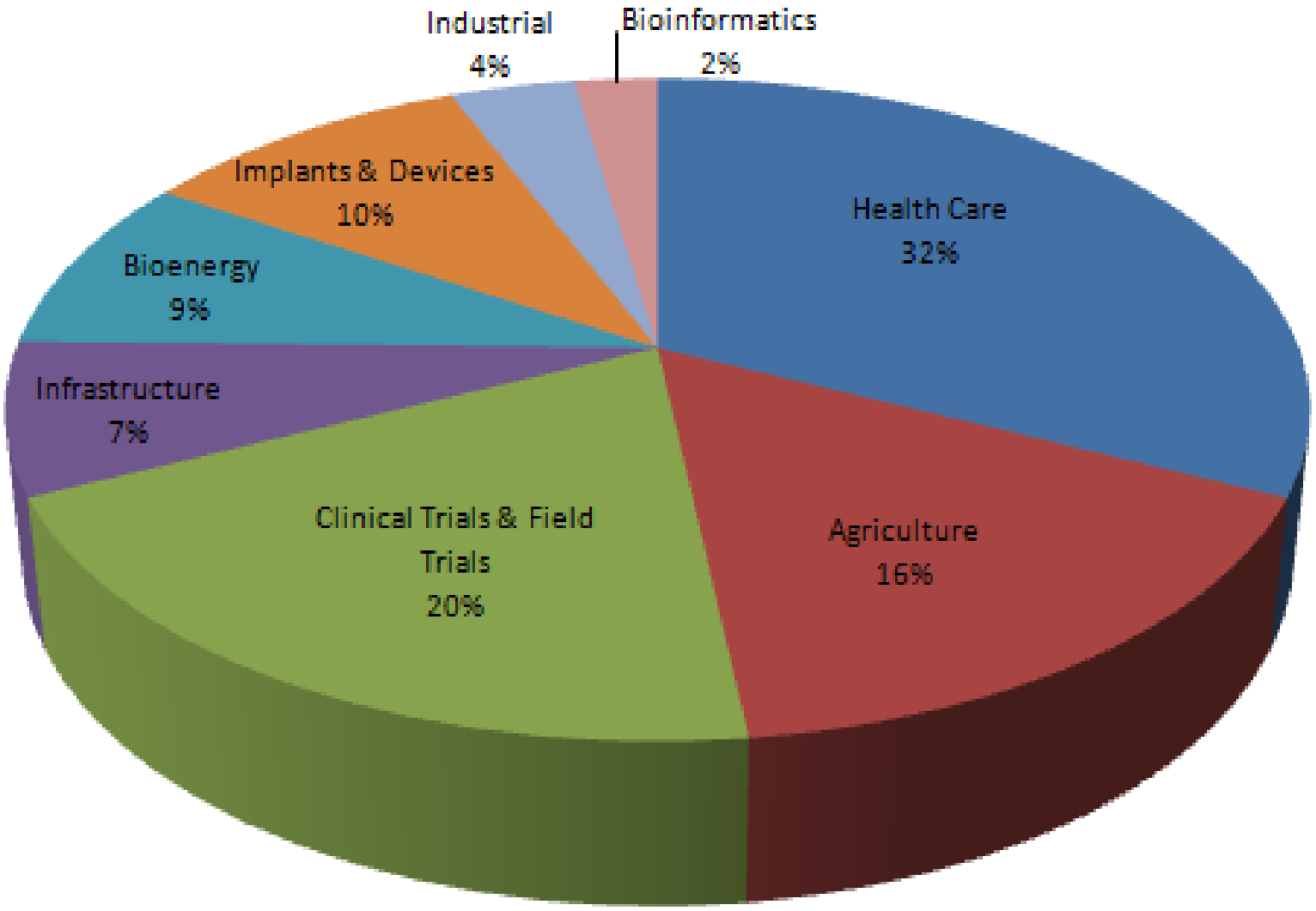
An Overview

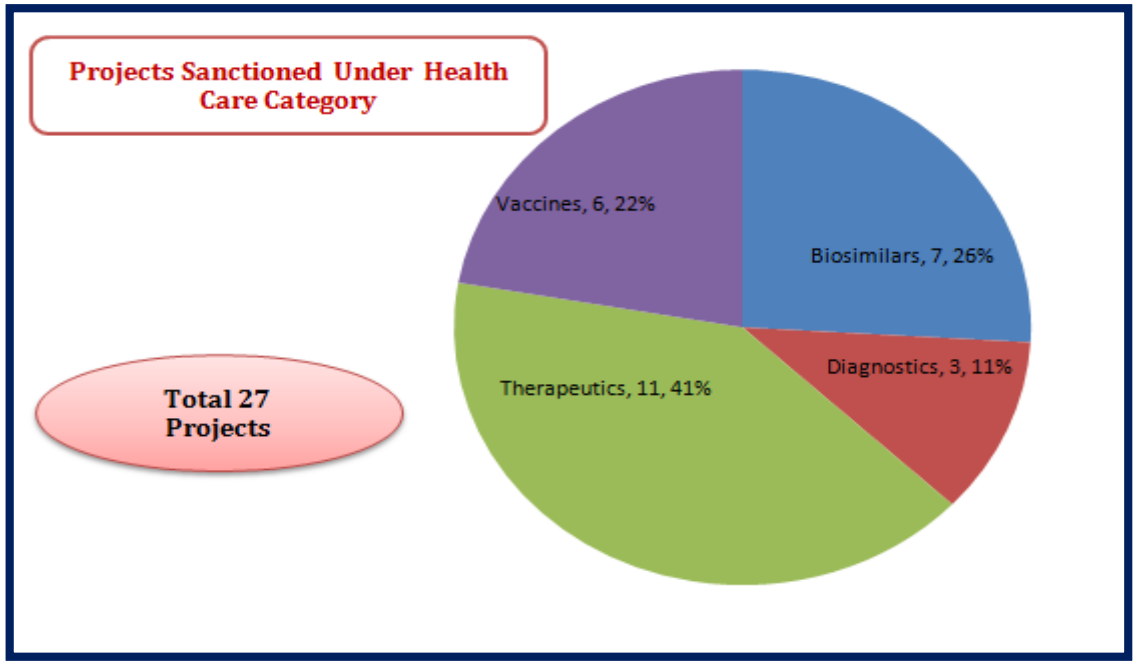
- Scheme Launched ---- **December 2008**
- Total Number of Calls--- **21 (till March 2012)**
  - Regular--- **10**
  - Special--- **11**
- Number of Projects Received --- **551**
- Number of Projects Approved --- **> 90**
- Total Budget Committed –-- **Approx Rs. 650 Crore**
  - Company Contribution–-- **Rs. 430 Crore**
  - BIPP Contribution--- **Rs. 220 Crore**

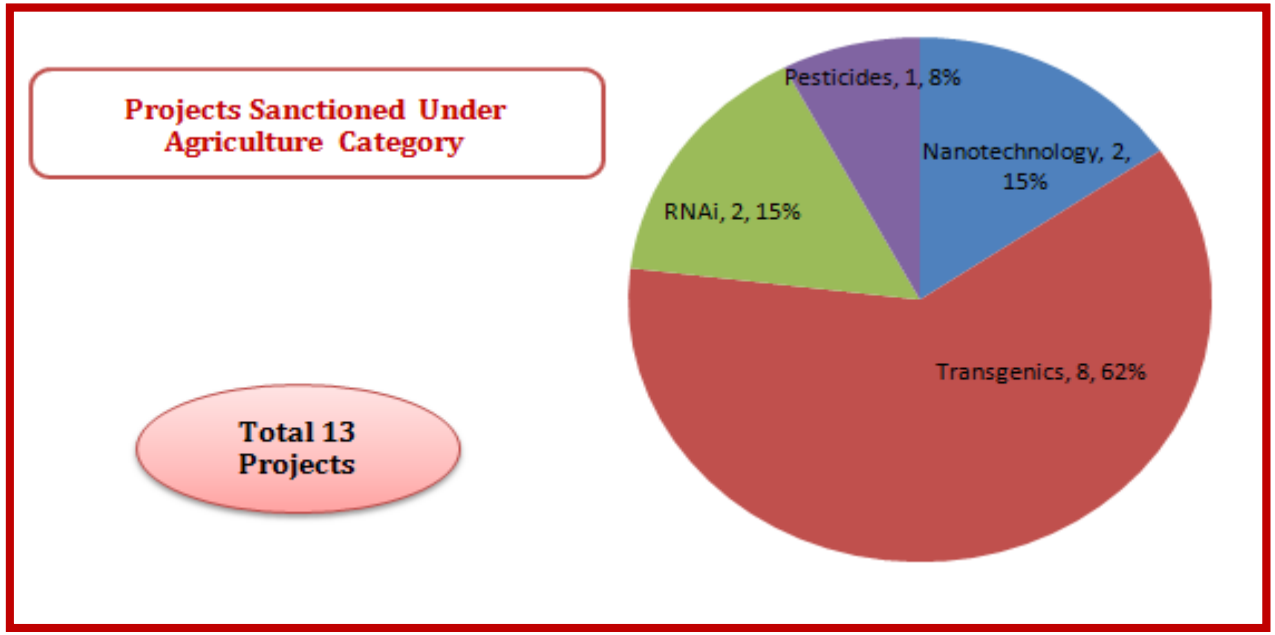
Total Proposals Received: 551

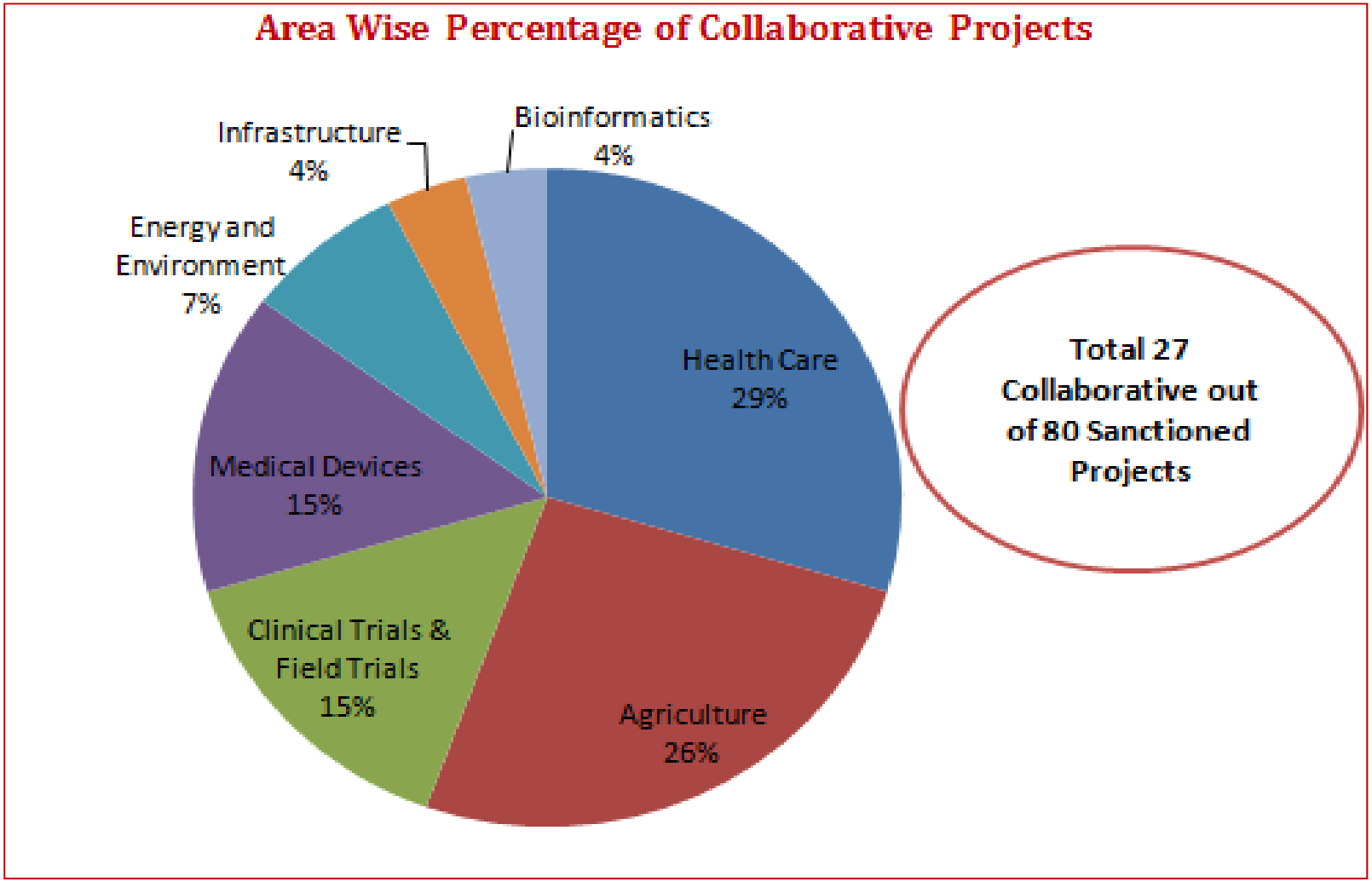


Area Wise Sanction of Projects Under BIPP




Projects Sanctioned Under Health Care Category
Vaccines, 6, 22%
Biosimilars, 7, 26%
Diagnostics, 3, 11%
Therapeutics, 11, 41%
Total 27 Projects


Projects Sanctioned Under Agriculture Category
Pesticides, 1, 8%
Nanotechnology, 2, 15%
RNAi, 2, 15%
Transgenics, 8, 62%
Total 13 Projects


Area Wise Percentage of Collaborative Projects
Infrastructure 4%
Bioinformatics 4%
Energy and Environment 7%
Health Care 29%
Medical Devices 15%
Clinical Trials & Field Trials 15%
Agriculture 26%
Total 27 Collaborative out of 80 Sanctioned Projects

Key Elements of Effective Grant Writing

Play According To The Rules

- ✓ Read the Guidelines
- ✓ Understand the Guidelines
- ✓ Follow the Guidelines

Following the Guidelines

- Make sure that you are eligible
- Read the instructions carefully
- Respond to all sections
- Cover all the topics
- Keep all preliminary & support data ready
- Use headings that correspond to guidelines

Next Step After Reading the Guidelines

Developing the Proposal : Points to be addressed

- Problem addressed
  Aim of the proposal

Relevance and importance of the proposed project

Status – Review

Scientific strategy & approach

Objectives

Plan of work

Expertise & infrastructure

Time lines

Outcome / deleverables

Regulatory Issues

- Clear understanding and conformity with regulatory requirements

- Approval from regulatory authorities
  - ✓ rDNA work
  - ✓ Clinical trials/ Field trials

7/20/2012

Technology Ownership

- License to the Technology
  - ✓ License to the main technology if in-licensed
  - ✓ License to components required for practicing technology
  - ✓ Clarity on terms of license
    - Use, Produce, Sell
    - Territory
    - IP ownership on improvements/ modifications

Ownership of IP for Technology

- With applicant company and not with employees
- Clarity on IP sharing among collaborators

7/20/2012

THANK YOU !

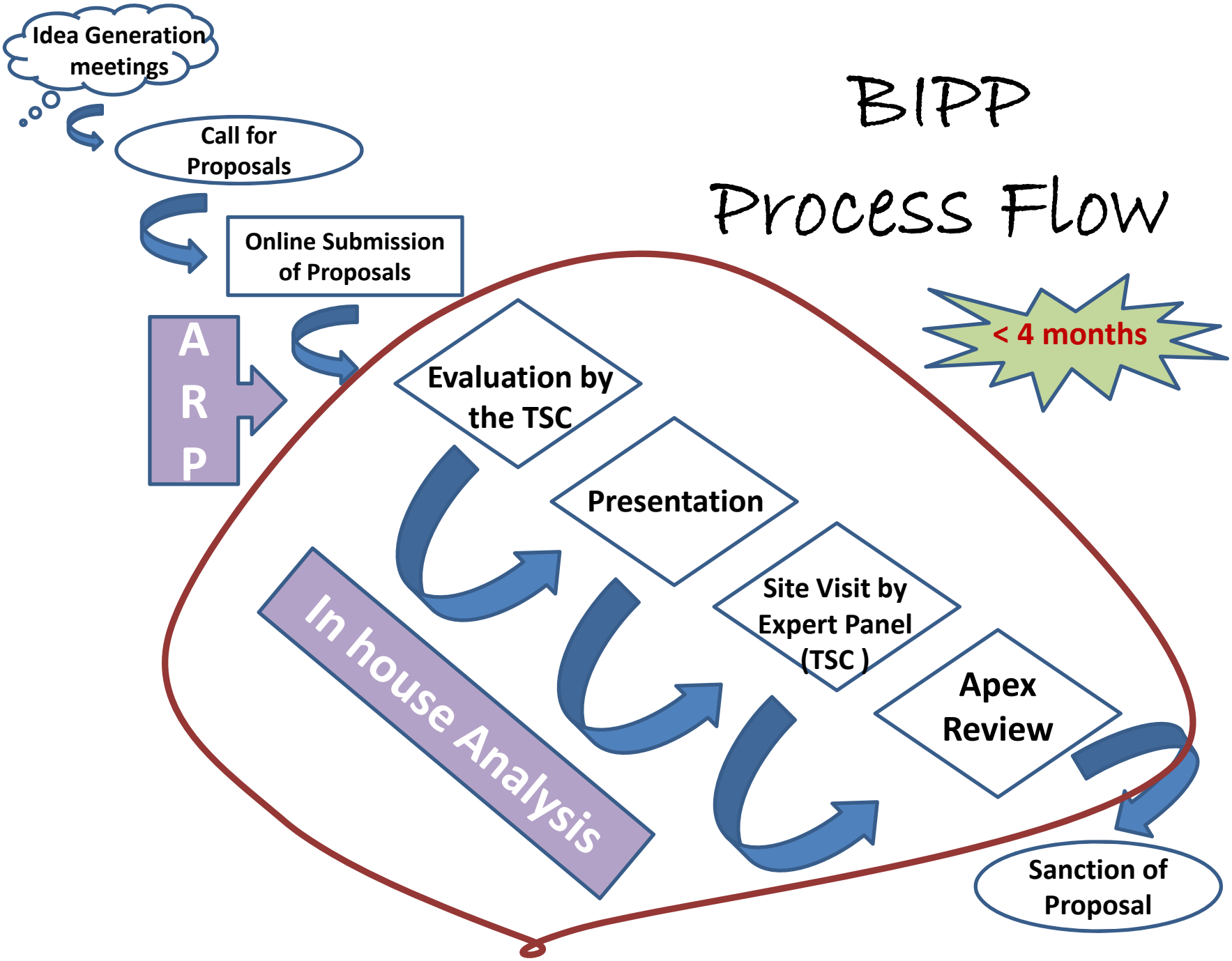
Mechanics of BIPP

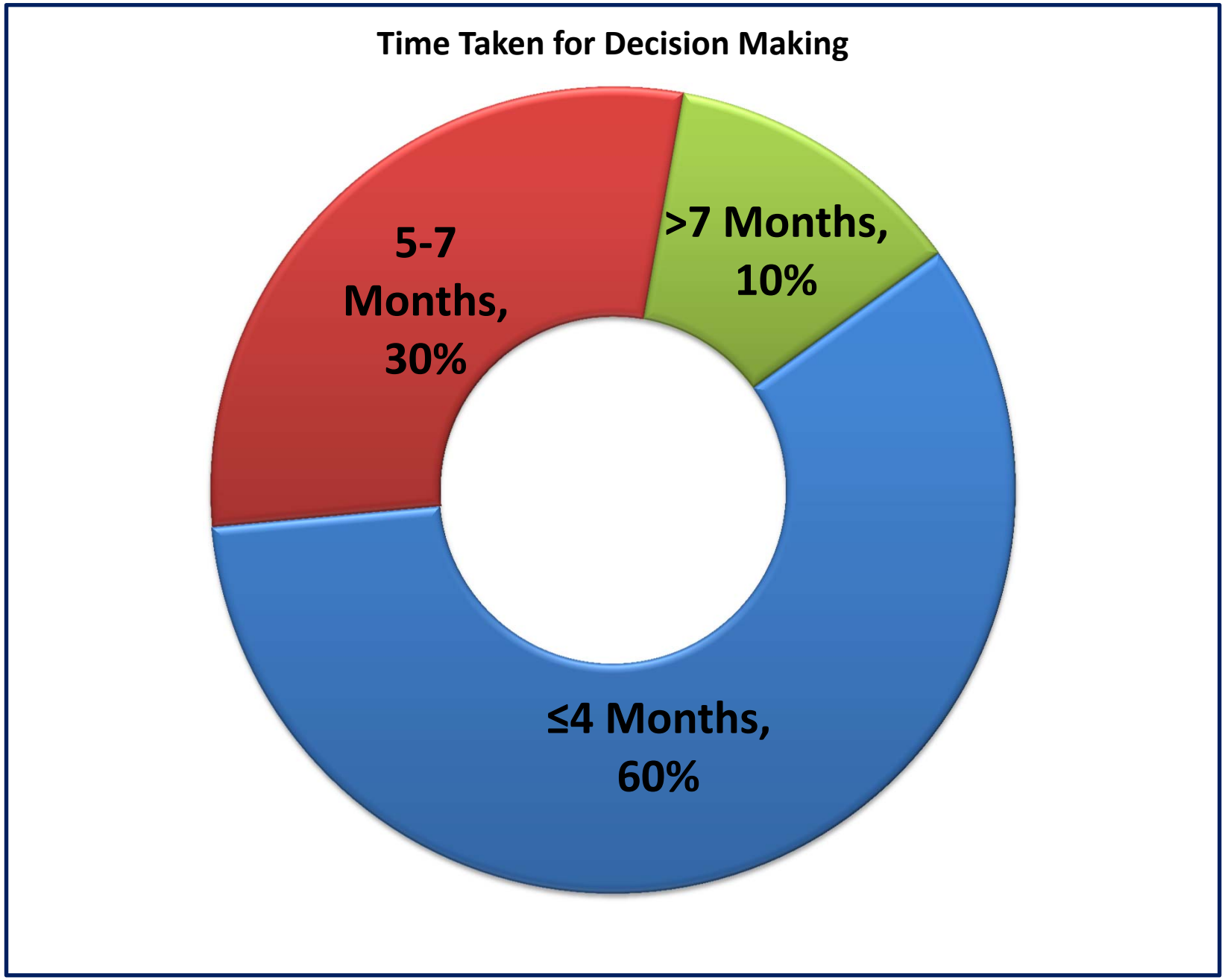
Ms. Shilpy Kochhar

Deputy Manager

Biotech Consortium India Limited (BCIL)

BIPP Process Flow




Time Taken for Decision Making
5-7 Months, 30%
>7 Months, 10%
≤4 Months, 60%

Expert Committee Meetings on priority areas

In house discussions

Discussions sessions chaired by Secretary, DBT

Idea Generation Meetings

Priority Agri Areas

H1N1 vaccine develop-ment

Secondary Agriculture

Biosimilars

Genesis of Special Calls

Antivirals

Affordable Health Care Technologies & Products

Call for Proposals

Regular Calls

thrice a year

- February
- June
- October

Special Calls

need based

21 Batches processed till date

10-Regular

11-Special

Regular Call is Currently Open Till 31st July, 2012

Duration of Call: 30 - 45 days

Information about an active call

- *Published in all national dailies*
- *Biotech magazines*
- *Can be accessed at any point of time from DBT/BIRAC /BCIL websites*

Submission of Proposals

Online only

www.birapdbt.nic.in

Register your company with BIRAP

- **Requires only minimum details**
- **No upper limit to the number of users with one company**

Choose the Relevant Call

- **In case of multiple active calls, relevant call needs to be chosen**
- **Begin proposal submission by filling in the *Basic Information Page.***

Final Submit

- **Submit all the Forms *(some forms follow a hierarchy and need to be submitted in a sequential manner only)***
- **Be careful about the information provided *(in particular for the milestones and financial data)***

Eligibility Issues

Primary Applicant

Eligible	Ineligibles
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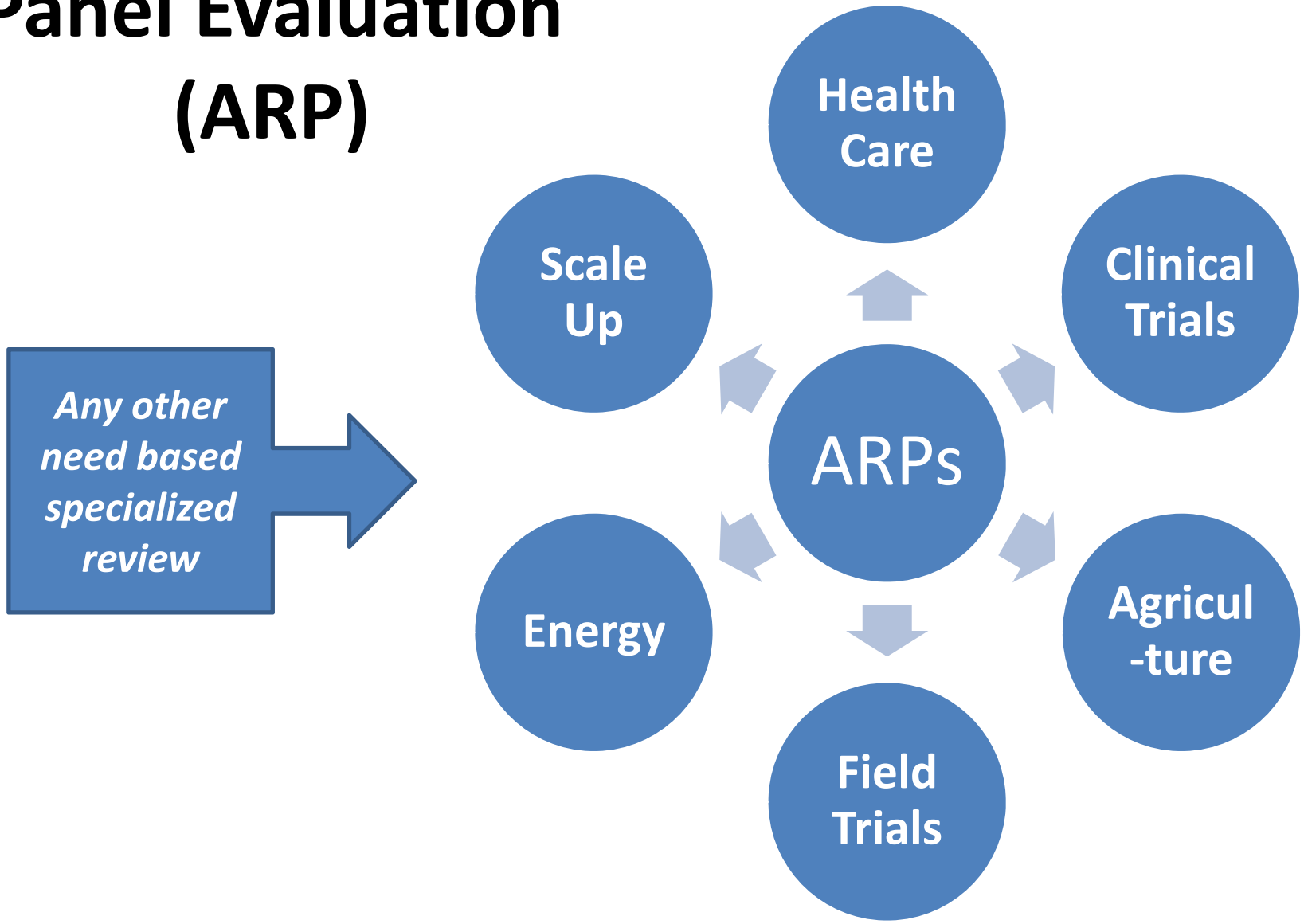
Submission of necessary documents is the key.

Area Review Panel Evaluation (ARP)

- *ARP evaluation is completely online*
- *First level of filtering based on scientific merit*



In house Expertise

- **Technical:**
  - A pool of scientists who prepare in-depth analysis reports/ SWOT Analysis for proposals

- **IP Issues:**
  - BIRAP-BCIL IP cell examines each and every proposal to identify the potential hiccups in the path of research/ commercialization

Due care of regulatory issues is taken and no project is sanctioned till regulatory requirements are met with

Technical Screening Committee (TSC)

TSC: Decision Making Body

TSC Review covers the following:

- Final decision on ARP Evaluation
- Review of Presentation by shortlisted ones
- Consideration of site visit reports
- Review of clarifications (as and when required)

TSC comprises eminent scientists from academic institutes and universities across the country

Site Visit:
Critical due diligence of the facts and figures

Technical

- Team of subject specific experts in the area
- Examination of facilities, manpower, budget, timelines, expertise…….

Financial

- An audit of the financial status of the company by a Chartered Accountant
- Examination of the key aspects: Liquidity, Profitability, Debts, Assets……..

Apex Committee:
Constitution and Review

- Final approving authority which recommends processing of a proposal for sanction by the DBT
- High level expert committee chaired by the Secretary, DBT
- Comprises members from different Ministries
- Consideration of Proposals recommended by TSC after exhaustive review process

Sanction and related processing

- Acceptance of Offer
- Finance Approval

Sanction Order Issuance

- Necessary Resolutions to be passed by the Board
- Signing by all parties

Agree-ment Signing

- No Lien Account
- Collateral in favor of DBT

Release of Install-ment

Standard templates can be downloaded from BIRAP website

Schedule for Release of Installments

Milestone based:

- 1st — 30% (Signing of Agreement)
- 2nd — 20%
- 3rd — 20%
- 4th — 20%
- 5th — 10% (Completion of the Project)

Monitoring of Sanctioned Projects

PMC Constitution

Submission of MCR by the Company
(including detailed technical report, financial documents, Statement of Expenditure)

Examination of Technical Report by the PMC and Financial Docs (incl. Bank statements, invoices etc.) by Financial Experts

In case of delays, interim report is obtained from company, examined by the PMC and extension order issued

Clarifications on the queries raised by PMC Members/FE

Release of Installment due upon satisfactory report from the PMC and FE

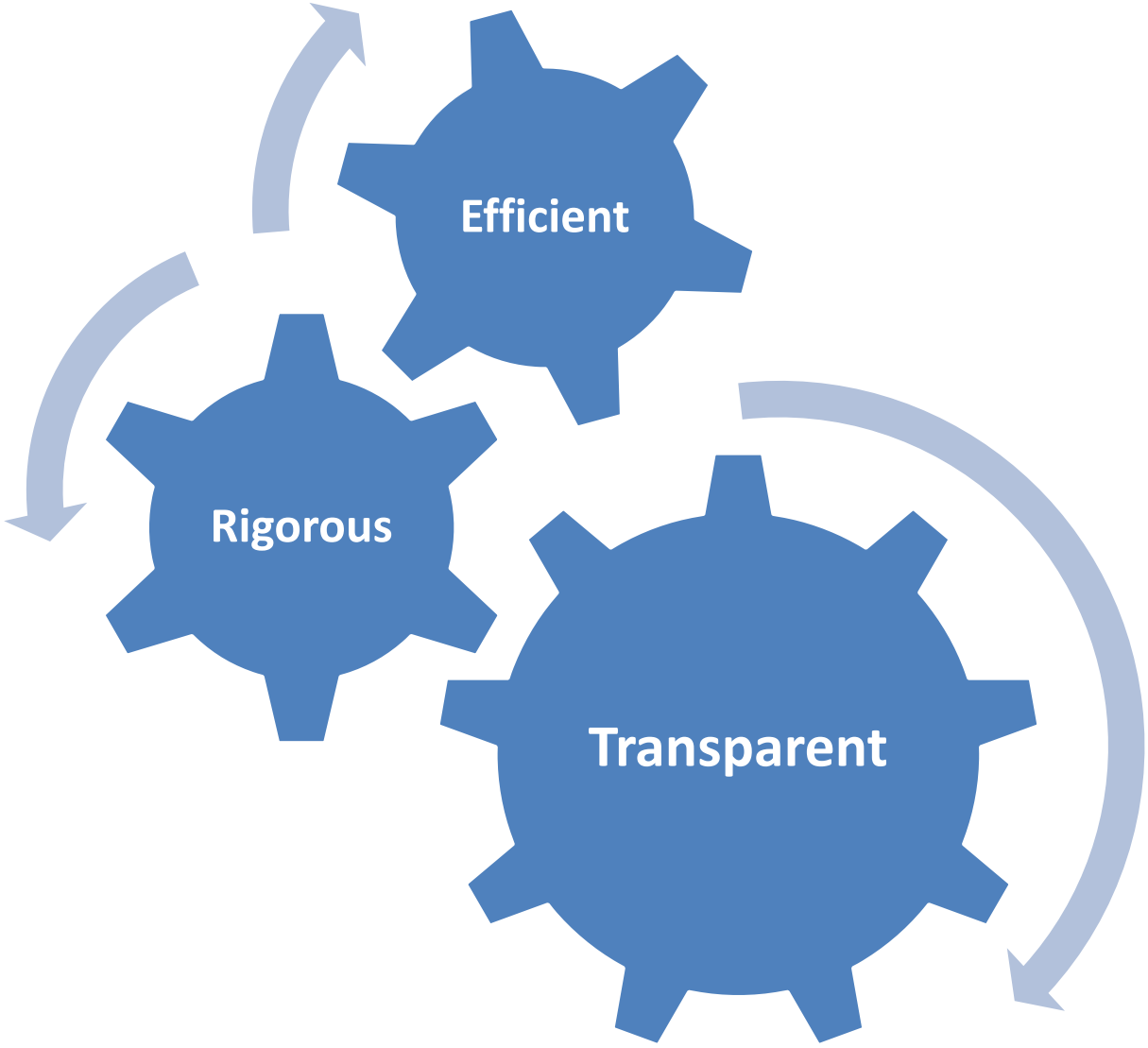
In case of short term projects, at least one site visit is ensured.

Site Visit prior to 3rd and Final Installment

Presentation before TSC sometime between 3rd and Final installment

PMC members are also assigned the role of mentors, wherever felt necessary

To Conclude: BIPP is



THANK YOU

QUERIES, IF ANY ?????

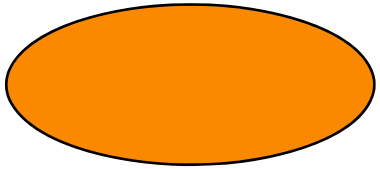
Enabling Biotechnology Innovation Regime in the Country

Dr Jitendra Kumar
Vice President, Life Science Incubator, IKP Knowledge Park, Hyderabad

July 10, 2012

Role of Various Agencies in Boosting Innovation

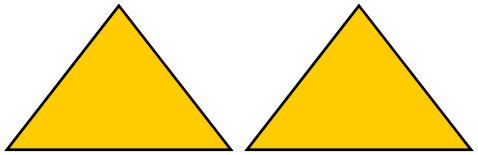
National Innovation Systems



Focus on

- **Developing a congenial macro- environment with enabling legal, fiscal, regulatory, IPR, R&D, education and industrial policies**
- **National R&D Infrastructure**
- **Capacity Building**

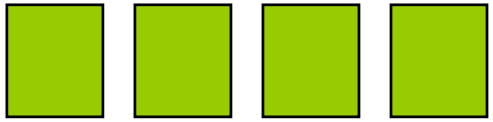
Regional Innovation Systems



Focus on

- **Regional/state level policies**
- **Specializations and locational strengths**
- **Knowledge infrastructure- Universities & R&D institutions**

Local Innovation Systems



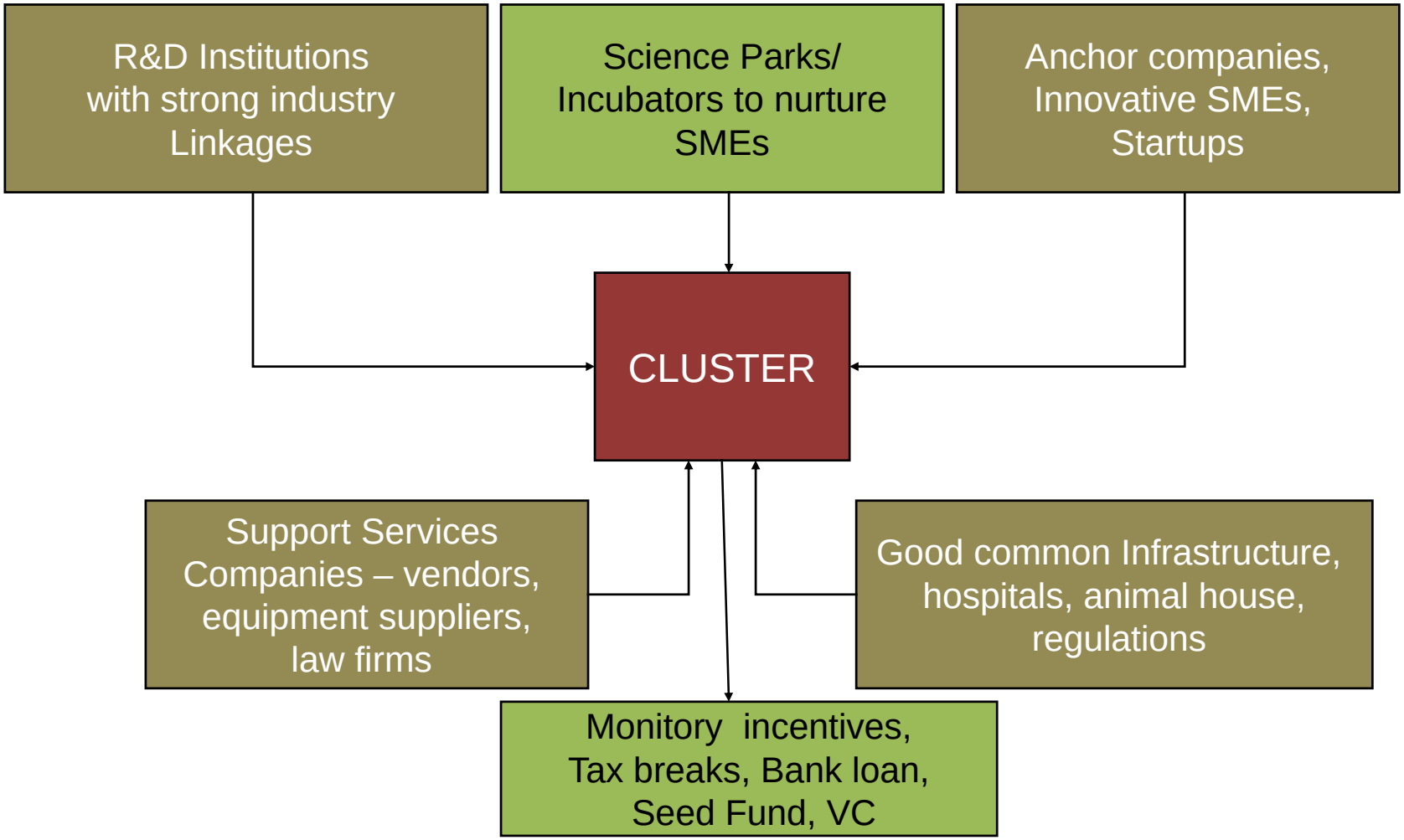
Focus on

- **Innovation clusters /S&T Parks, Incubators**
- **Common infrastructure – power, communication, transportation, healthcare, education, recreation**

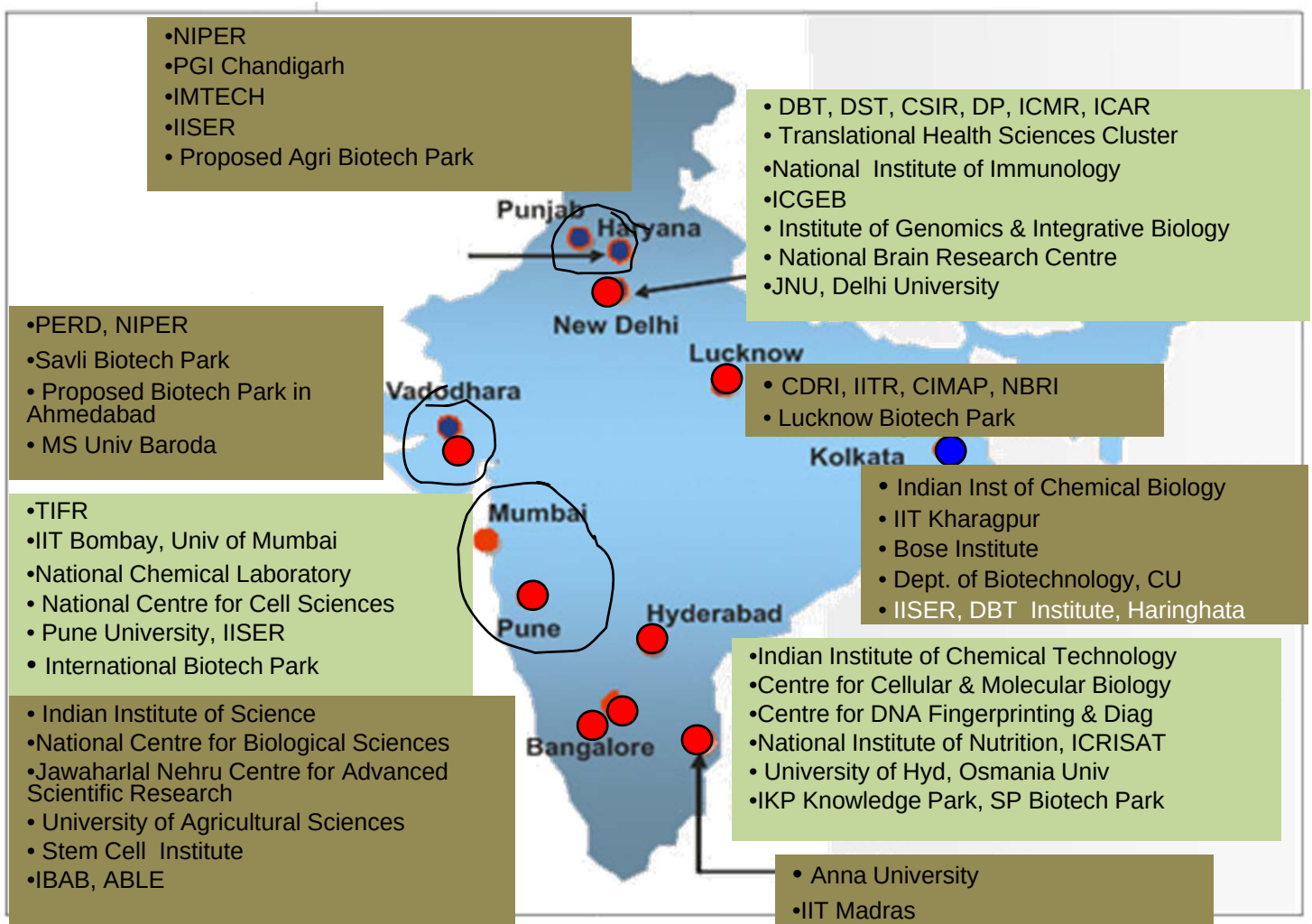
Role of Incubators & Science Parks

- **Tool for regional development – goals to be aligned with aspirations, growth strategy, available resources**
- **STPs manage the regional innovation ecosystem by promoting innovative companies through high end infrastructure and knowledge flow between industry and academia**
- **Incubators help start high risk - high potential enterprises that need support to maximize chance of success**
  - **80% of incubated cos in US survive for at least 3 years compared to around 35% for non-incubated companies (source: NBIA, USA)**
  - **Provides early stage companies with enabling**
    - **Infrastructure, space and facilities**
    - **Technology/IP**
    - **Business and management tools and training, mentoring**
    - **Finance**
  - **These functions can be in-house or in partnership**
- **Set up near university/R&D Institution /innovation cluster**

Elements of an Innovation Cluster



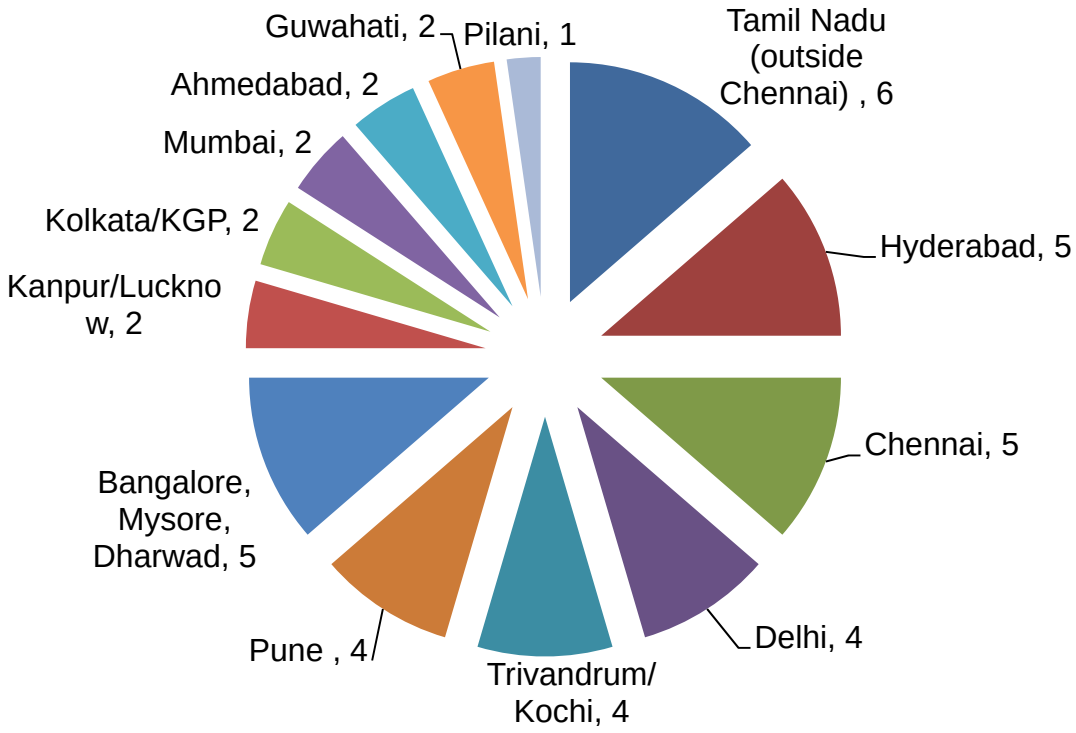
Indian Life Science Clusters



IKP KNOWLEDGE PARK

Life Science Incubation Landscape in India

- **Around 150 Incubators and Science & Technology Parks in India**
- **~44 incubate life sciences startups; 16 dedicated to life sciences**
- **~ 200 LS Incubatees**
- **Access to Govt Seed Fund – Rs 5 lacs to Rs 50 lacs – USD 10K to 100K**



Role of STPs in Emerging Economies

- **Apart from being regional high tech growth drivers, STPs in emerging economies can play a proactive role in**
  - **Selecting the direction of technology development**
    - **Ensuring that it is inclusive and sustainable**
  - **Integrating the technologies with emerging markets and societal needs**
  - **Promoting inclusive innovation**
    - **Encouraging commercialization of grassroots innovation and indigenous knowledge**
    - **Ensuring that incentives flow to innovator and rural community**
  - **Capacity building**
  - **Raising seed fund for promoting early stage ventures**
  - **Forming global partnerships with STPs of other countries to**
    - **Disseminate information on technology development, adoption and use**
    - **Share good practices**
    - **Help set up proven structures for success**

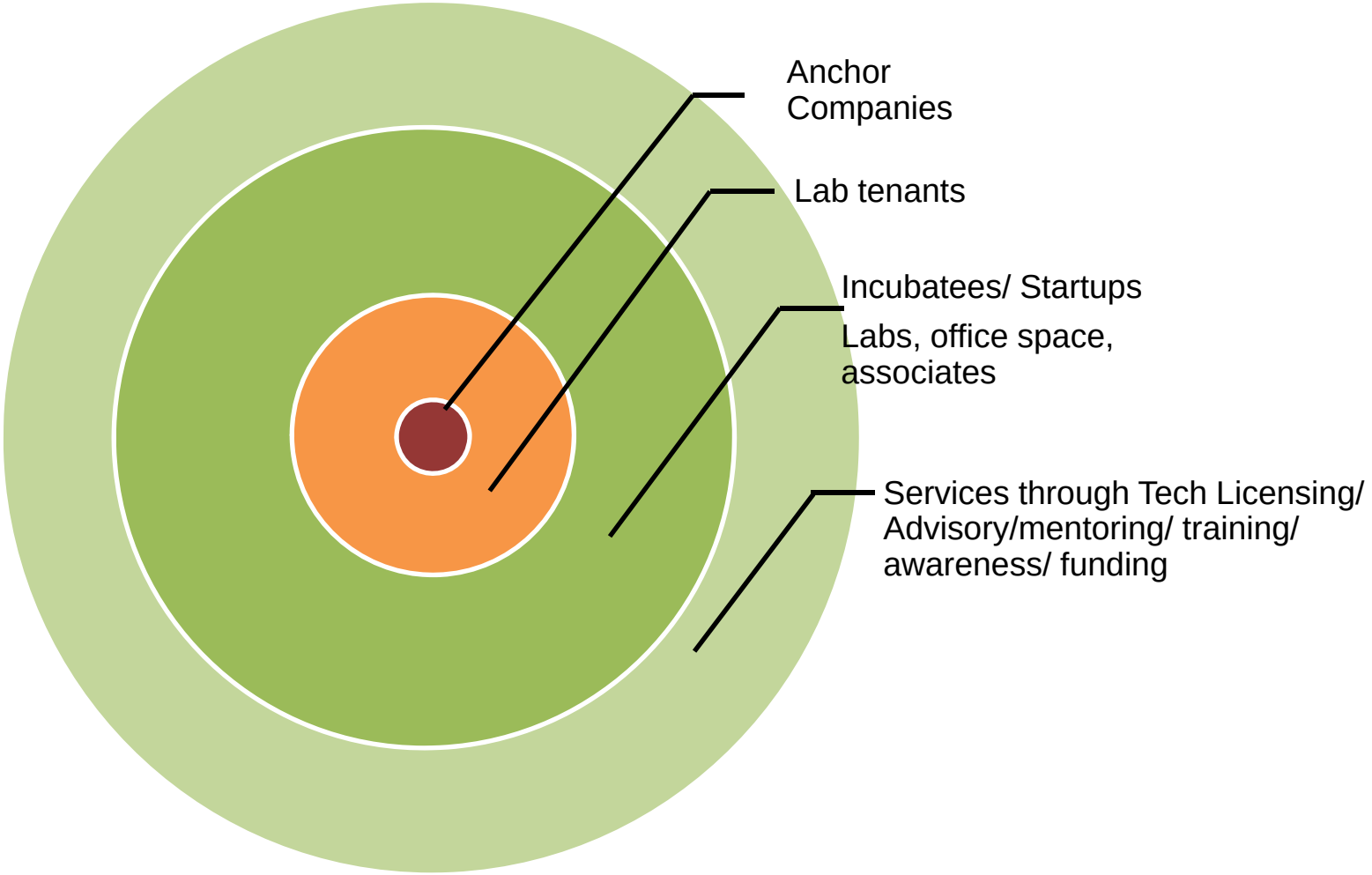
Some Focus Areas for Biotech Innovation

- **Information & Communication Technologies for Biotech**
  - **Web based, mobile platforms**
- **Pharma, Healthcare**
  - **Affordable rapid diagnostics, point-of-care diagnostics, devices that can be used with low skill and training**
  - **ICT based health delivery solutions for underserved /remote areas**
  - **Vaccines and medicines for diseases of the poor**
  - **Orphan drugs**
  - **Nutraceuticals, fortified food, functional food**
  - **Herbal medicine**
  - **Clean drinking water**
  - **Animal health technologies**
- **Clean energy technologies**
  - **Renewable energy, storage, local distribution networks**
- **Eco-environment protection**
  - **Waste treatment, remediation, recycling**
- **Green processes – clean, water efficient**
- **Agriculture, food processing**

IKP Knowledge Park

- **India's first Wet Lab Research Park in Hyderabad**
- **Mission : To create a world-class centre for leading-edge business-driven research**
- **Objective : To encourage and nurture an environment for innovation by developing a life science park**
- **Focus areas : biotechnology, pharmaceuticals, new materials and telecommunications**
- **Founders : ICICI Bank & Govt Andhra Pradesh**
- **Structure : Not for profit**
- **Ownership : 100% by IKP Trust**
- **Operational : Since June 2000**
- **On Offer : Leased land, Lab space, Incubator labs /office space (dedicated equipped lab and or office space, shared equipment, mentorship, seed fund)**

IKP Knowledge Park eco-system

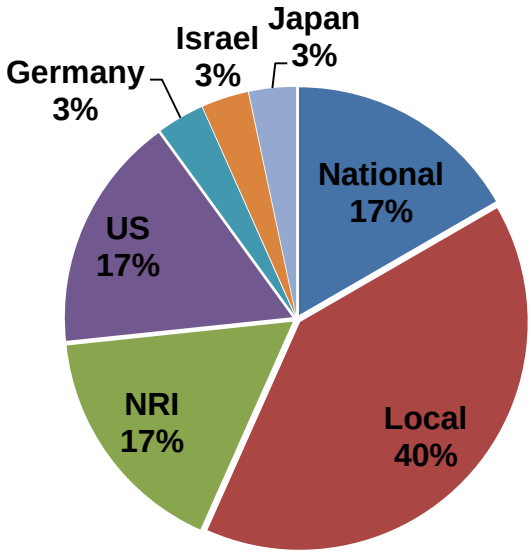


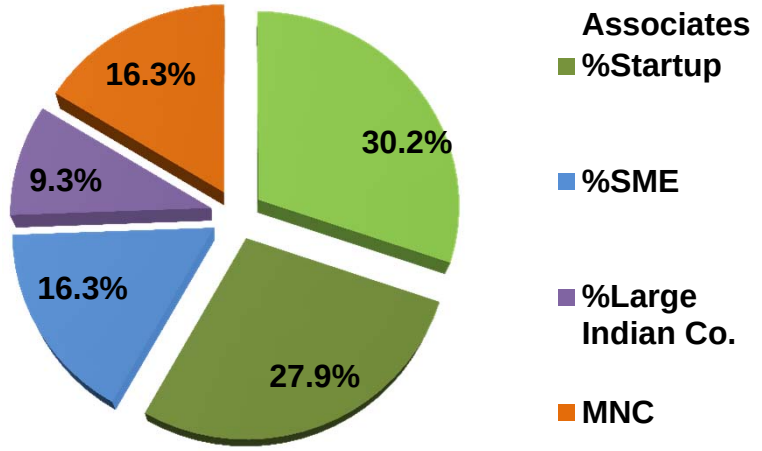
What IKP Offers

- **Ready-to-use modular wet laboratories**
  - **Core, Shell & Utilities and fully furnished options**
  - **84,000 sq ft of lab space in 140,000 sq ft of building operational**
- **Developed land to create custom-built research centres**
  - **Around 80 acres for 51 years lease**
- **Incubation Facility and mentorship for Start ups**

Profile of Companies at IKP

- **64 companies/organisations so far**
  - **17 Graduated**
  - **47 Present – 24 companies with labs, 11 have office space, 2 R&D Centres taken land, 10 associates**





Companies at IKP

Life Science Incubator (LSI)

- **Objective**
  - ***To nurture innovative startup R&D companies, spin offs and scientist entrepreneurs in life sciences and thereby increase the competitiveness of the region and the country***
- **Thrust Areas**
  - **Pharmaceuticals, biotechnology, medical diagnostics, chemistry**
- **Partly funded by DST and DBT**
- **Operational since January 2006**
- **What we offer**
  - **Ready to use lab space, shared equipment, office space, mentoring and networking services, seed fund**

High Opportunity for Startups & SMEs

- **28 startups, 7 SMEs**
  - **12 have Seed Funding**
  - **5 received SBIRI /BIPP**
  - **1 Wellcome Trust Funding**
  - **2 SMEs received VC funding**
- **Moving from a classical “Space+” Incubator concept to “Mentoring & Funding+” Incubation**
  - **Able to attract 19 companies /innovators in 2011-12 compared to around 4 companies in each of the previous years**
    - **Possible due to change of incubation model**
    - **Providing office space to startup having labs elsewhere**
    - **Mentoring companies not located in the same city**

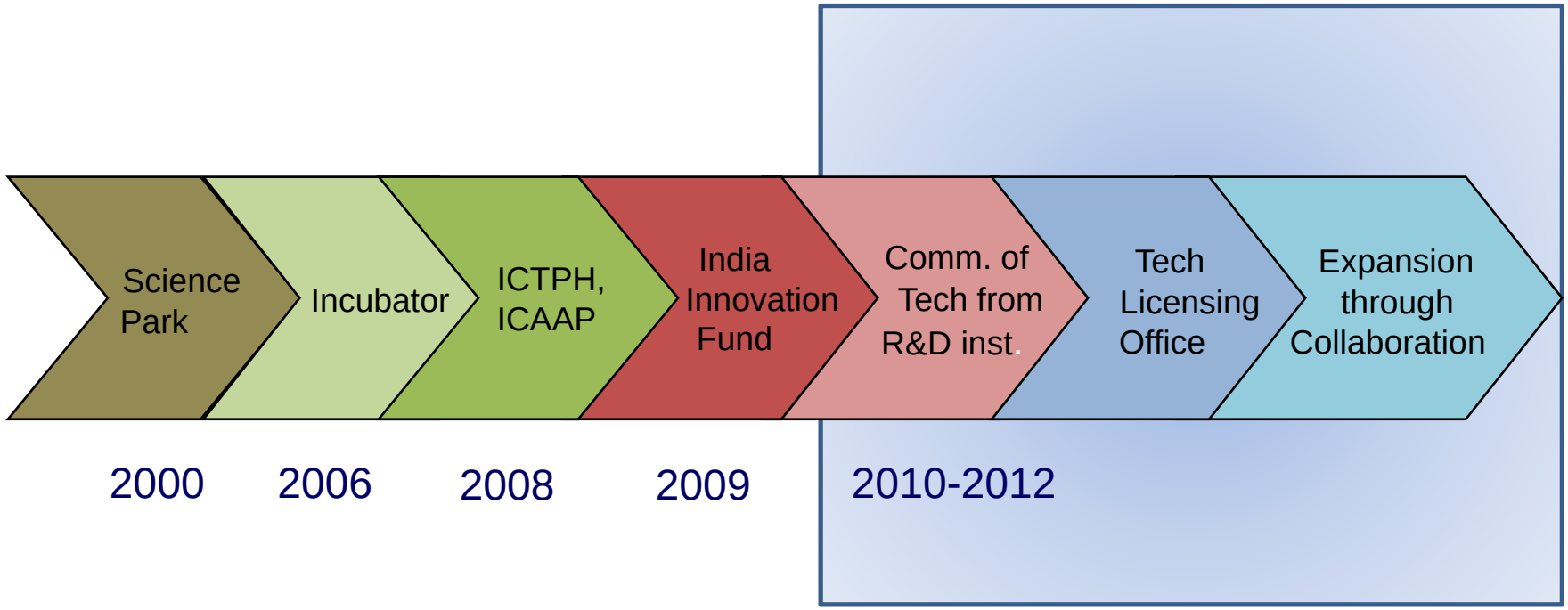
IKP Technology Licensing Office

- **Preparing database of IP available in institutions in India and some outside for technology transfer**
- **Preparing database on IP needs of Indian SMEs**
- **Partnering with R&D Institutions in identifying potential technologies for commercialization through licensing or spin outs**
- **Partnering with institutions for technology identification and technology shows**

Garden of Life

National Award for best Incubator- 2007

IKP Innovation and Growth Strategy



Thank You

EFFECTIVE GRANT WRITING SKILLS

Dr S Chandrasekhar,
FASc., FNASc.,
Chief Scientist and Head
Division of Natural Products Chemistry
CSIR-Indian Institute of Chemical Technology
July 10th 2012

Funding agencies Govt. of India

- All India Council for Technical Education (ACTE)
- Council for Scientific and Industrial Research (CSIR)
- Dept of Ayurvedic, Yoga & Naturopathy, Unani, Siddha and Homeopathy (AYUSH)
- Dept of Biotechnology (DBT)
  - Biotechnology Industry Research Assistance Programme (BIRAP)
  - Biotechnology Industry Partnership Programme (BIPP)
  - Small Business Innovative Research Initiative (SBIRI)
  - Biotechnology Ignition Grant (BIG)
- Dept of Science and Technology (DST)
- Dept of Scientific & Industrial Research (DSIR)
- Indian Council of Medical Research (ICMR)

Do keep looking for calls in newspapers and websites of these agencies for submitting proposals

Basis of proposal

- A Good idea
  - Idea which is novel and significant
  - Idea which is relevant
  - Idea which is in news
  - Idea which can bring together industry and academic institutions
  - Idea which has reached a stage of maturity

Salient features for impressive proposal

- Significance and importance of work
- Specific and well defined aim
- Well researched and presented proposal
- Appropriate credentials
  - Company credentials
  - Bio-sketch of team matching proposal requirements
- Relevant preliminary data
- Clarity of the proposed work
- All the required documents in format
- Proposal to meet agency priorities
- Utilize the expertise of academicians, as consultants, working in relevant areas

Contents critical to submitting proposal

- Title of the Project
- Proposal duration
- Company details
- Project coordinator and team details
- Proposal summary
- IP
- Current status of research
- Anticipated outcome/deliverables
- Proposal milestones/Gantt chart
- Budget

Never include any confidential information as the proposal is circulated among experts for comments

Title and duration of proposal

- Title
  - Should be precise and interesting
  - Should not be too long nor too short (one or two words)
  - Should convey the work proposed
- Duration
  - Should be justified for the study proposed
  - Should contain goals which are achievable

Company and team details

- Company
  - All relevant documents
- Project Coordinator
  - Expertise
  - Training
  - Accomplishments
- Team
  - Compatibility
  - Complimentarity
- Government recognitions
  - DSIR recognition for facility
  - Pollution board clearance for operations
  - Ethical committee approvals for animal studies
  - Any other relevant approvals

Proposal

- Novelty
  - Solution to an existing problem
  - New idea
- Inventive step
  - New methodology
  - Application with lesser steps involved
- Scope of industrial application
  - Feasible process
  - Scale-up potential for a manufacturing process
  - Cost-effectiveness
  - Applicability

Proposal

- National/international importance
  - Update on the available literature
  - Targeted section of society
- Social relevance
  - How proposal plans to help society
- Market potential
  - National
  - International
  - Market survey of the product(s) to be launched/ included in the proposal is very essential
- Risk factors
  - Chances of failure
  - Chances of not meeting timelines

IP issues

- Expected new IP
- Who owns the new IP
- How existing IP avoided?
- Outcome of the project
  - Patents expected
  - Publications expected
- How collaborators plan to share IP?

Literature

- Basis of proposal
- Related literature
- Gaps in available literature that can be filled
- How the proposal is different from existing literature
- Current status

Deliverables

- SIMPLE
  - **S**pecific-What to expect
  - **I**mmediate-time frame for each goal
  - **M**easureable-what will be used to measure success
  - **P**ractical-how proposal plans to provide solution to a problem
  - **L**ogical-how each step in proposal helps achieve the final goal
  - **E**valuable-what changes can make proposal effective

Timelines

- Realistic goals
  - What can be achieved in 6 months, 1 year and so on
- Time specific measurable goals
- Based on what can be achieved in the defined period

Budget

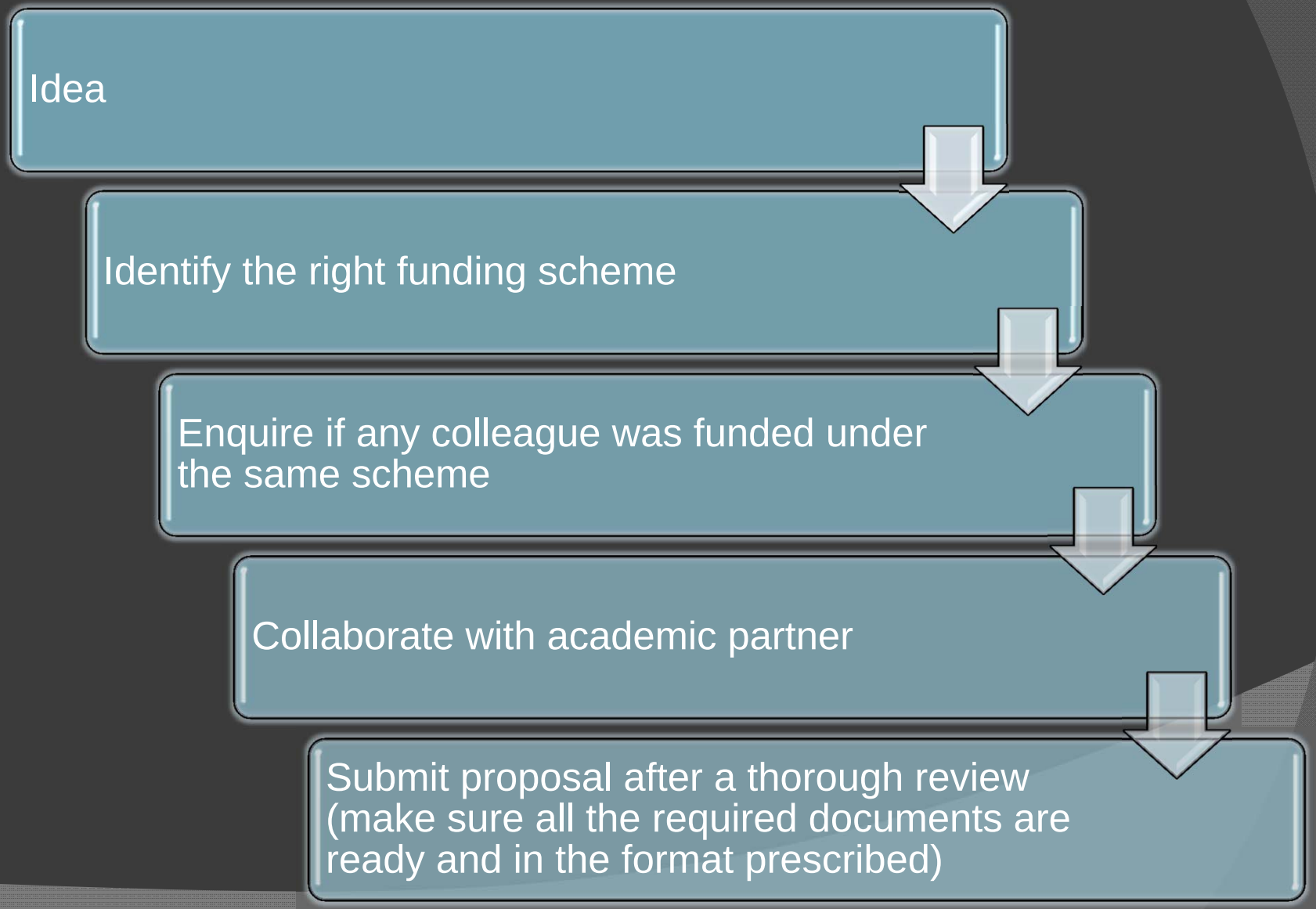
- Equipment
  - Include only those which donot exist with the company
  - Include those that are essential and justified for the proposal
  - In case of costly equipment which can be outsourced from a national institute, include the cost of outsourcing
- Manpower
  - Account for salaries as per government guidelines
- Consumables
  - Enlist only those required for proposal
- Outsourcing
  - Ask only for what is not available/feasible with you
- Travel and other expenditures
  - Only if required
- Explain and justify every item

Ask for a budget which can be justified rather than asking for a higher budget and then accepting for cutting costs

Tips before submission

- Read proposal critically
- Take help in proof reading to avoid spelling mistakes
- Ask for help from peers/ co-workers to comment on the overall proposal
- Try to find answers for the questions/points raised
- Check if all the documents/ supporting information is as per specification
- Incubation centres have more visibility, company can plan to invest in laboratories/ smaller facilities in these

Flow-chart


Idea
Identify the right funding scheme
Enquire if any colleague was funded under the same scheme
Collaborate with academic partner
Submit proposal after a thorough review (make sure all the required documents are ready and in the format prescribed)


Thank You

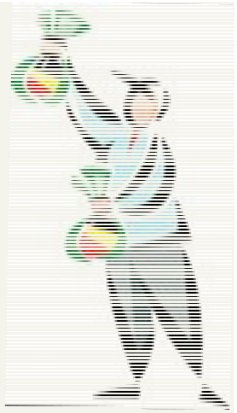
Funds for innovation

- Grant proposal

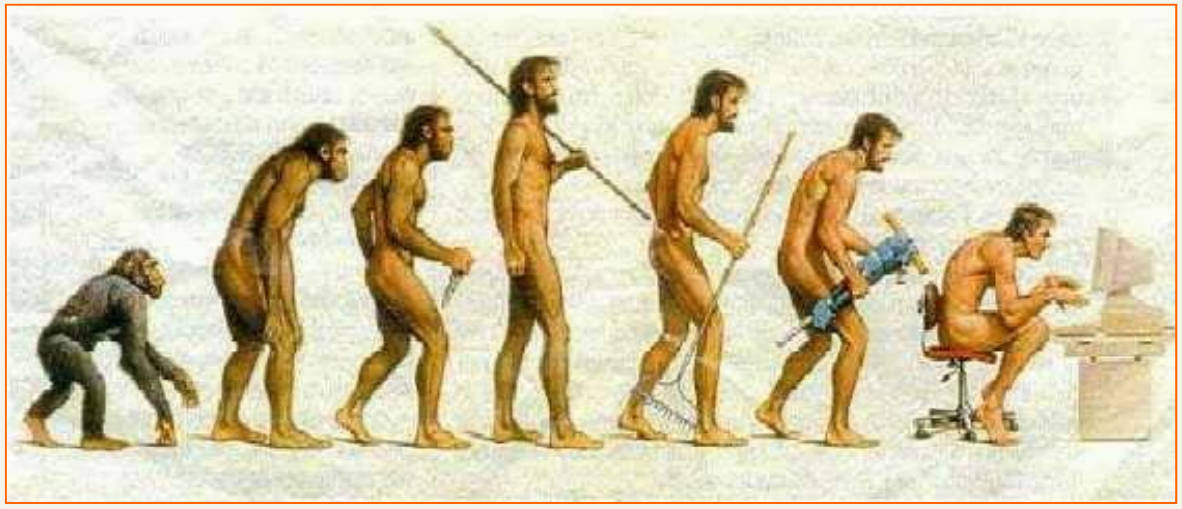
Prof. M. UDAYAKUMAR
Department of Crop Physiology
UAS, GKVK, Bangalore 560 065

10-07-2012

Funds for Innovation

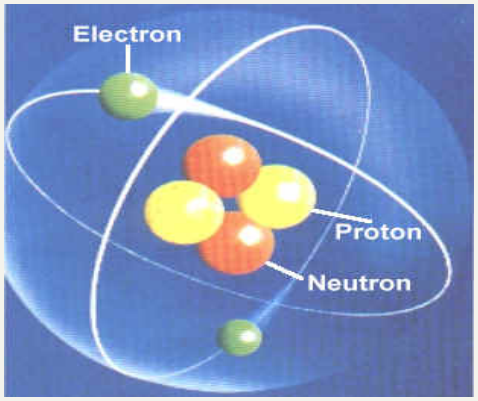


- **Innovation has been the steering force for progress**

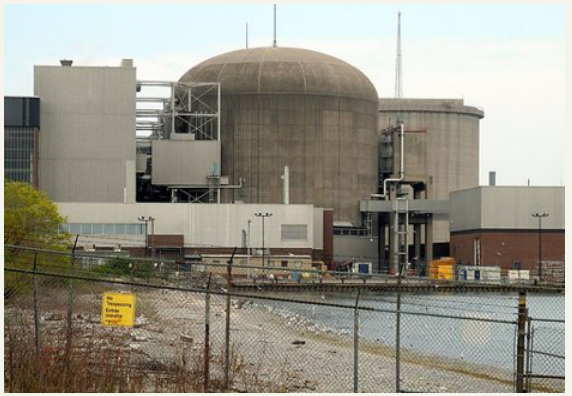


Civilized society always excited with

Discovery

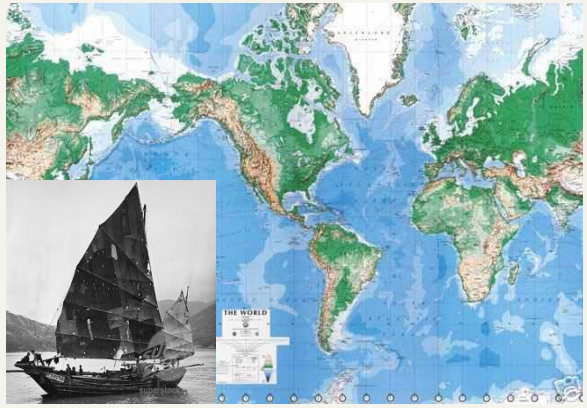


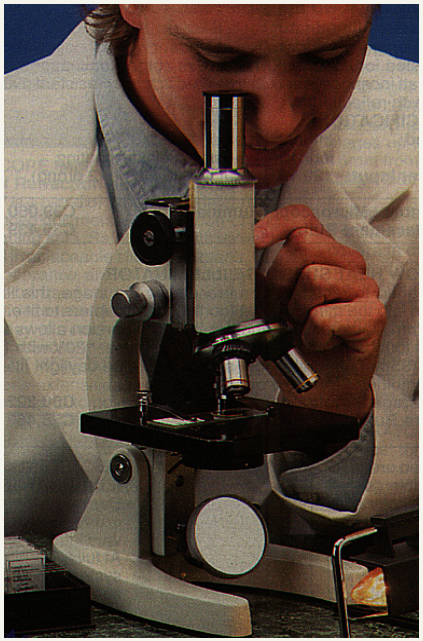
Invention

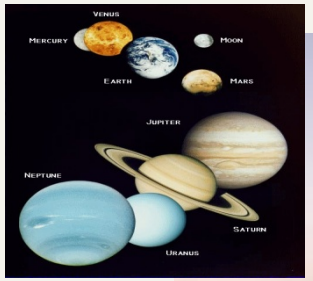


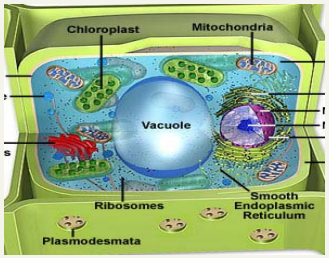
Innovation

Discoveries are always exciting ! !









Invention

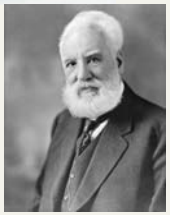
A creation (a new device or process) resulting from experimentation / discovery

Steam engine

James Watt

Windmill

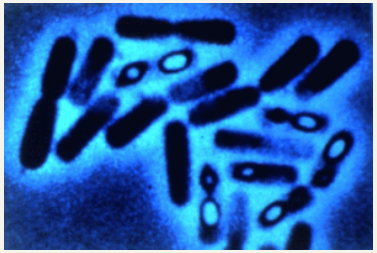
Phone

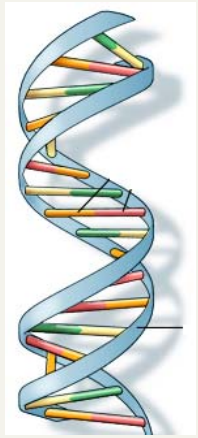


Graham Bell

Innovation

Invention when improves some product, process or service for the public, then that invention transforms into an innovation.





Bt cotton

Modern era

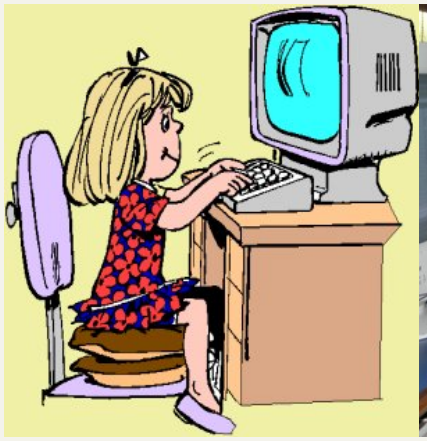
Discovery, inventions

&

innovation

Driven by knowledge






Quest for knowledge

Research and development is no more for inquisitiveness

R & D is for societal benefit

It is need driven

Need

Ideas
&
Approaches

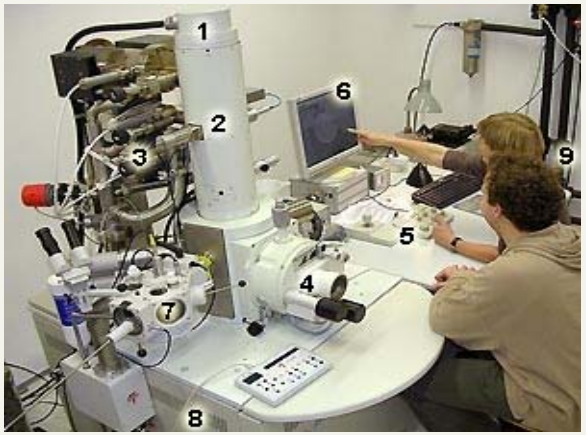
Funding

Drives the Invention and Innovation

Why funding ?

Infrastructure

Man power



Instruments

Knowledge acquisition

Interaction

Where the funds come from ?

Is the modern society

keen to promote science ?

Innovation ?

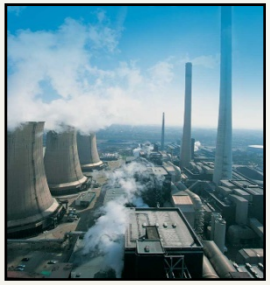
YES

At whom we look for funding?

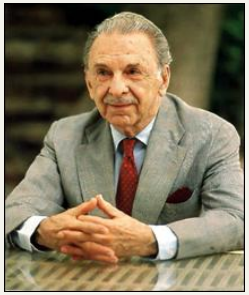
Funding Agencies in India

- Central Govt. Agencies

- State agencies



- Industries



- Foundations / private trust

Government proposed to double the financial allocation for science and technology from the present 1% (Rs. 252 billion) of the GDP to 2%

December 3rd, 2008

INSPIRE: Innovative Initiative

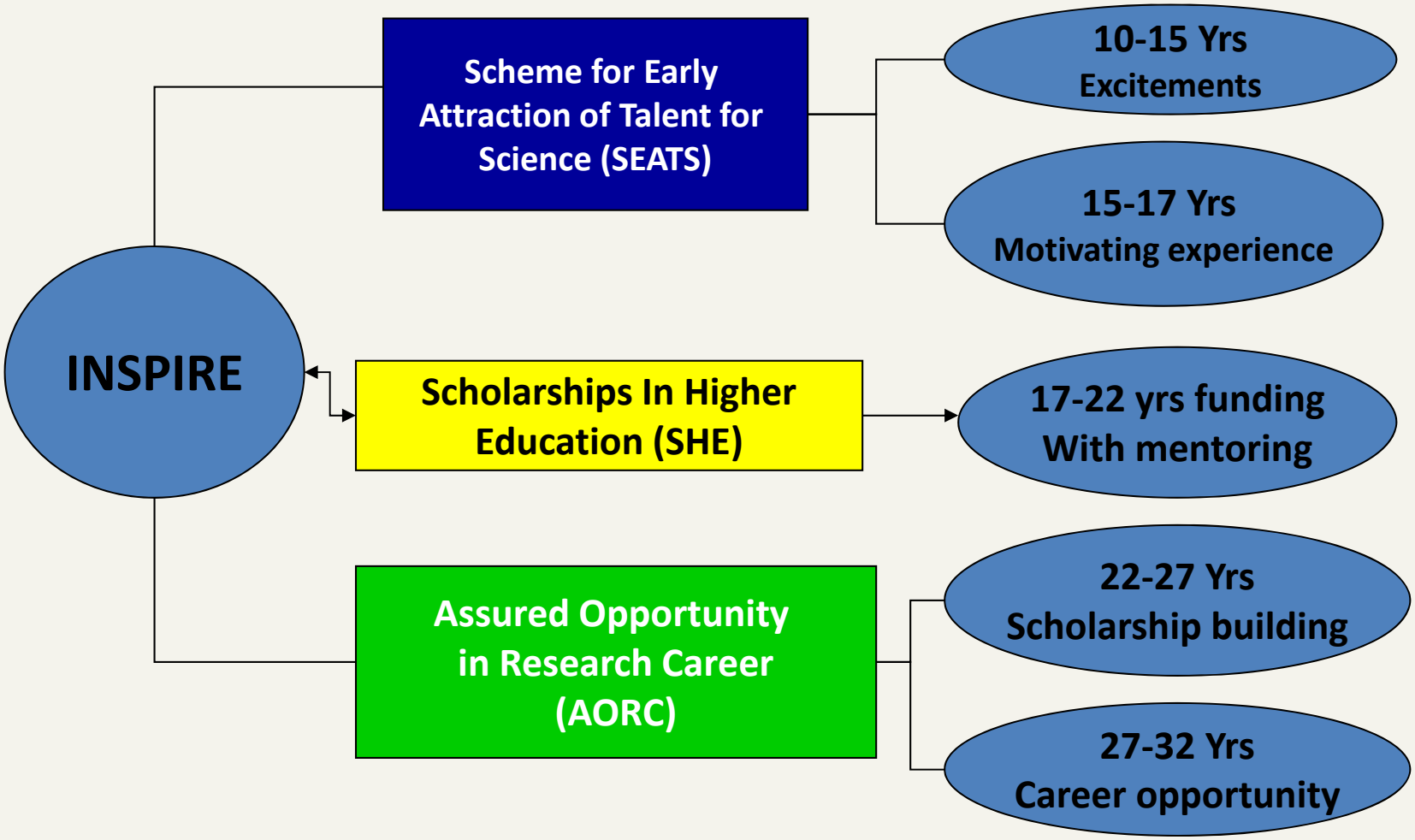
Innovation in Science Pursuit for Inspired Research

Science and Innovation Scholarship to One Million people

Attract talent to Science at an early stage

Commitment for 20 years

Up-stream End Interventions through INSPIRE for Motivation of Youth in Science



R & D organizations

mainly public sectors

(Institutions/universities)

University of Agricultural Sciences

- **Made significant contribution in knowledge generation and discovery and to some extent inventions**

Translating the discovery/inventions to innovative product/process For social benefit is the missing link

Industry

Drives the innovations to develop products / processes

Biocon

Several funding agencies to promote science

DST,
DBT,
DAE,
MOES,
ICMR,
UGC

Discovery, ….
Invention

Do we have agencies to promote invention / innovations by private sectors?

Innovation

leading to product / process development

Has phenomenal impact on economy & social benefit

Innovation by industry

needs to be nurtured & supported

What are funding agencies supporting this cause

- **TDB – DST**
  (Mandate is different)

- **Are there any others?**

BIRAC

Biotechnology Industry Research Assistant Council

A unique initiative to promote growth of Indian biotech industry

BIPP (Biotechnology industry partnership programme) is a crucial component of BIRAC

Biotechnology Industry Research Assistance Council
A Government of India Enterprise

Vision

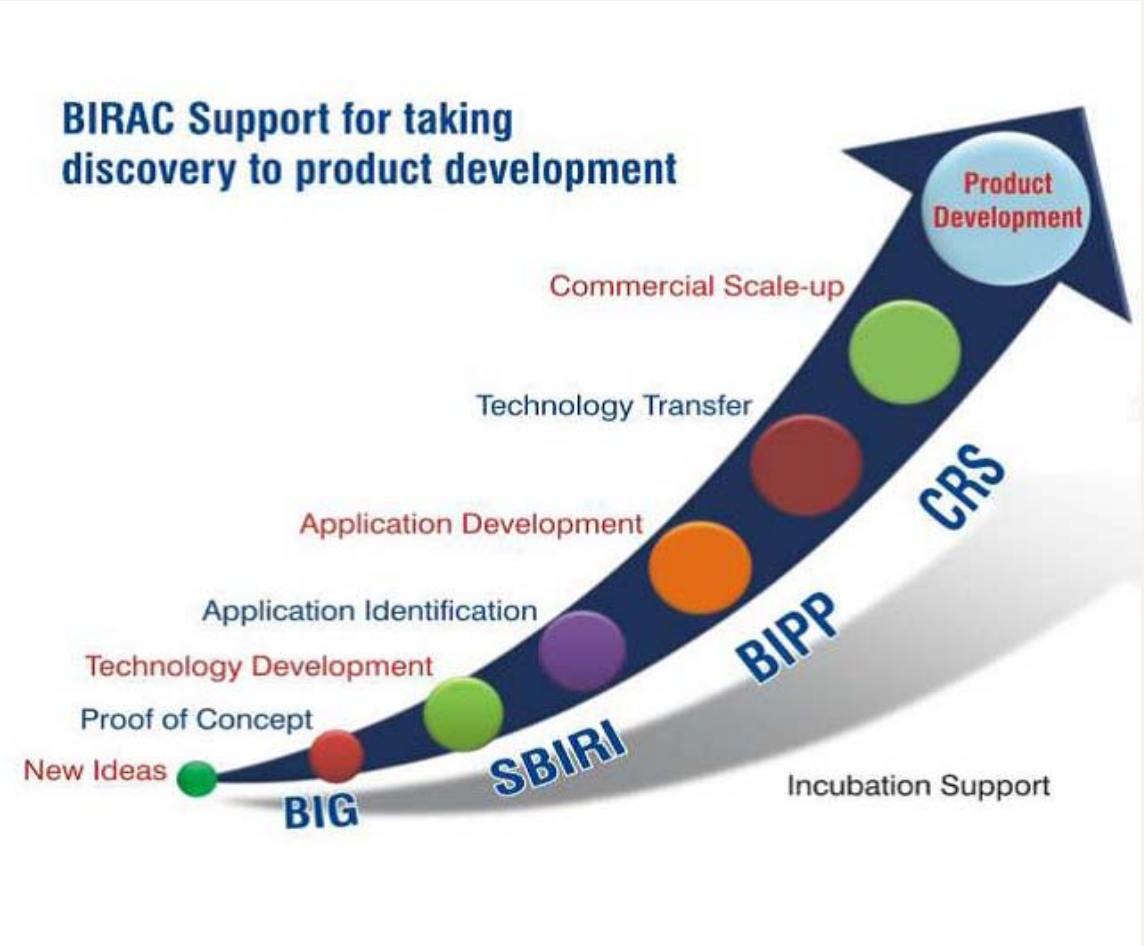
To Stimulate, foster and enhance the strategic research and innovation capabilities of the Indian biotech industry particularly SME's

BIG-
Biotech Ignition Grant schemes

SBIRI-
Small Business Innovation Research Initiative

BIPP-
Biotechnology Industry Partnership Programme

CRS-
Contract Research Scheme



BIPP

Biotech industry partnership programme

Provides support to innovative programme of the industry

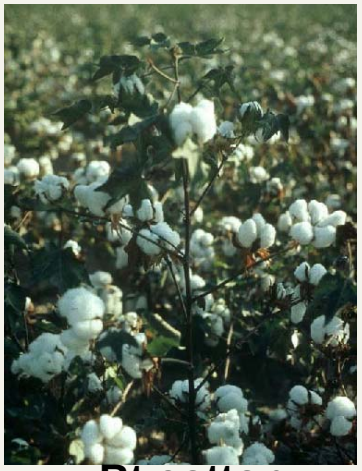
To get the support from any funding agency

It is crucial

a) **Areas of funding by the agency**

b) **Problem identified should meet the aim /goal (philosophy) of the agency**

BIPP - Categories of Programmes



Bt cotton

BRL-1

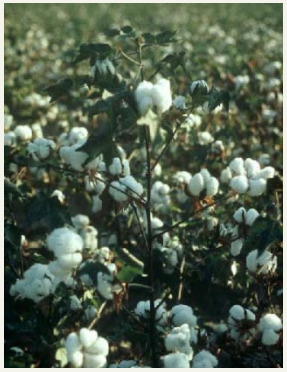
Containment facilities

- **Category I – Areas with major social relevance but having uncertainty**
- **Category II – High risk discovery innovation research**
- **Category III – Evaluation and validation of already existing products of high national importance**
- **Category IV – Shared cost major facilities**

Bt

Cry

To transform a discovery / invention to a product



Bt cotton

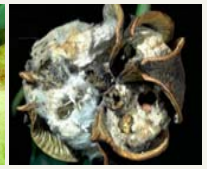
The first step of the inventor

is

a) Problem identification and steps to achieve the goal

b) Develop project proposal for funding to achieve the goal

Grant proposal writing and its presentation has phenomenal significance

Proposal needs to address

-Problem addressed

Aim of the proposal

Relevance and importance of the proposed project

Status – Review

Scientific strategy & approach

Objectives

Plan of work

Expertise infrastructure

Time lines

Outcome / deleverables


The proposal need to be developed

Keeping in view the evaluation criteria of the project

- **Significance / Scientific Merit**
- **Approach and Methodology**
- **Innovativeness**
- **Intellectual Property**
- **Commercial Potential/ Societal Relevance**
- **Investigators credentials**
- **Adequacy of Research Infrastructure**

Identification of the problem

- It should be relevant
- There must be innovative approach to address the problem

Case study:

Major constraints to realize the potential yields of cotton

Yield losses due to

- ***H.armigera*** **(20 – 60%)**
- **sucking pest (22 -35 %)**
- **weeds (15 – 30%)**

Improving Bt-cotton

for sucking pests and effective control of weeds is useful

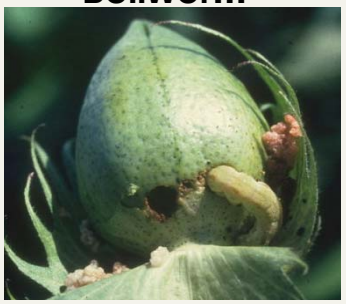
Criteria - Significance

Relevance and significance of the proposed project

- The problem is of great concern
- Addressing the problem will have economic benefits to the society
- out come of the project solve the problem

Case study:

Bollworm



Sucking pest

Weeds

- Reduce yield loss
- ↓ Cost of cultivation

Insect resistant plant

Improving insect tolerance and effective control of weeds has phenomenal significance

Criteria – commercial potential / societal relevance

How to address the problem
review the status/options
justify the approach proposed

Case study:

What are the options to improve the tolerance ? …

- Identifying resistant genotypes
- Integrated pest management (IPM)
- Genetic improvement
  - Transgenics
  - Molecular breeding

What is the status in the literature on these aspects

a) Present status of IPM
b) relevant resistant sources/ constraints
c) Are there validated insecticidal proteins / genes
d) Which is the effective herbicide – do we have options to improve resistance to herbicide

Scientific strategy

What is the scientific strategy to address the problem

- **Based on the existing scientific options**
- **Should be noval / innovative**
- **Implementable in time lines**

Case study:

- **There is no known sources of resistance**
- **Improving insect and herbicide resistance by transgenic approach is relevant**
- **Identify/relevant genes coding for insecticidal proteins**
- **(*Cry1Ac* & Garlic Lectin) and**
- **herbicide tolerant genes (*igrA*)**
- **co expressing by multigene constructs**

Criteria –scientific merit

Two options

✓**Stack the genes by crossing**
by developing individual transgenics

- **Bt cotton**
- **lectin cotton**
- **herbicide tolerance cotton**

✓**Transfer a cotton genotype**
- with multigene cassette with all the three genes

Multigene Construct is advantages
because
“one locus” no segregation

Criteria –innovativeness

Novelty of the scientific strategy

New approaches to achieve the goal using already validated approach

What is the novelty….?

- **Simultaneously developing resistance to both *H.armigera* and sucking pests**
- **Value addition by managing the weeds**
- **Avoid antibiotic marker for selection**
- **All the genes is in single locus**
- **Cost effective / time saving**

Criteria –innovativeness

What is the invention step in the project

Develop a new approach / process to exploit the existing scientific knowledge

Case study:

The function of cry1Ac, Lectin and igrA is known

a) **Developing a strategy for developing multigene construct for co expression of *cry1Ac*, Garlic lectin and *igrA***

b) **Approach for transforming the multigene construct**

c) **Suitable protocols for characterization of transgenics**

Preliminary work done

- ✓ **Are they any initial studies by the group (collaborative groups)**
- ✓ Are they any **In-house - Experiments**

Case study:

- ➢ **Relevance of the proposed study**
- ➢ **Proof to support abilities to develop multigene constructs**
- ➢ **Proof for abilities to do transformation in target crop**
- ➢ **Proof to demonstrate the availability and ability to study bioeffecacy**

Goal & objectives

Goal – To develop a product/process by addressing a constraint

Case study:

Goal - " Improving resistance to insect pest and herbicide"

Objectives:

What is proposed to achieve adapting a well defined plan of work or methodology

Case study:

-**Development of multigene construct with *Cry1AC, GL (Garlic lectin)* and *IgrA***

-**Development of transgenics with multigene construct and characterization of putative transformants**

-**Evaluation of transgenics for better performance based on bio-efficacy**

Criteria –approach

Plan of work should address

a. Conceptual frame work

b. Design of the experiments

c. Methodologies

a) To generate product/ process

b) Test the product process

d. Components to be outsourced

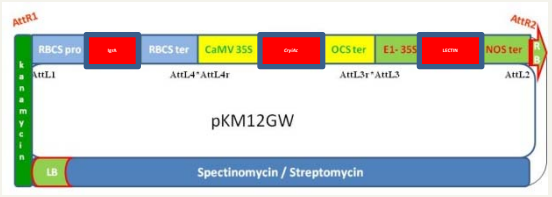
Conceptual frame work

Genes

AGTCAAGGCACATACAC
TTCAGTCCGGTACTACTGT
TGTTAGAGGACCCGGATT
CACGGGAGGAGACATT
CTTCGTCGTACAAGTGGA
GGACCCTTTGCTTACACT
ATCGTTAACATCAATG

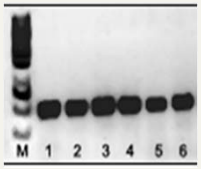
Transformation

Characterization



Gene construct

Transformants



Characterization

Events

Field evaluation

Criteria –approach

Work plan

Elements of work to be implemented as per the proposed objectives

It is desirable to plan for work elements as objective wise

Case study:

transgenic development and evaluation

Objective: multigene construct

- Method and steps to develop construct

Objective: development of transgenics and their characterization

- Protocols to be adapted and proposed selection
- number of events to be generated
- Evaluation of trasngenics
  - Molecular characteristion
  - Insect infestation / ex[poser

Objective: evaluation of the Bio-effecacy of transgenics

- Bioassays against insects
- Bioassay against herbicide

Criteria –approach & methodology

Expertise and infrastructure

Crucial to implement the objectives

- **Critical assessment**
- **To bring in expertise by hiring**
- **Develop required infrastructure as the essential component of the project budget**

- **likely collaborators**

Collaboration and public private partnership

In-spite of focused objectives and approaches often projects are not considered

Because of lack of expertise and infrastructure in proposed / specified area

We need to find collaborators for facilities and expertise

– we should work together

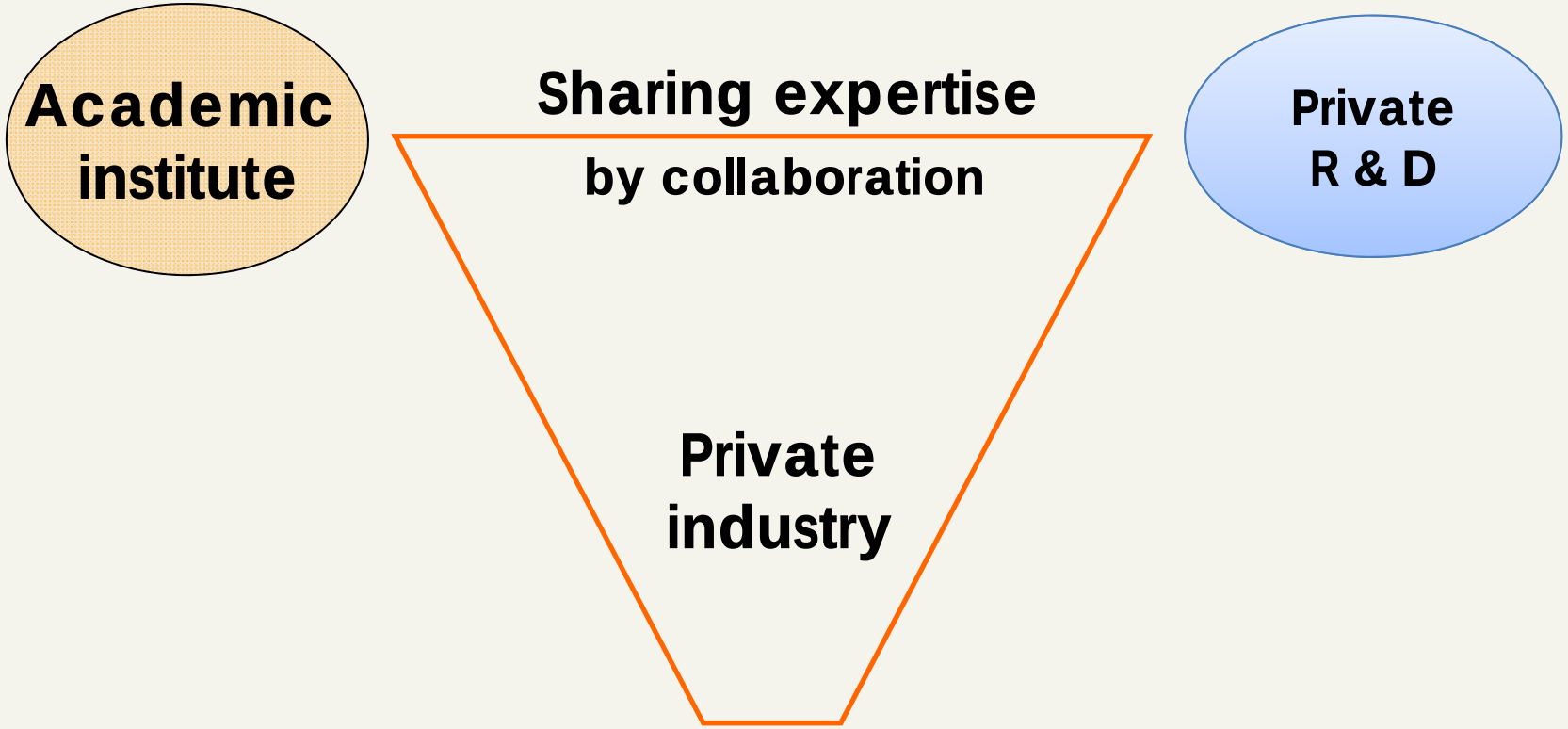
Diverse expertise is needed

to address the research programmes

collaboration is the key

Recent concept is

Knowledge economy partnership



Time lines

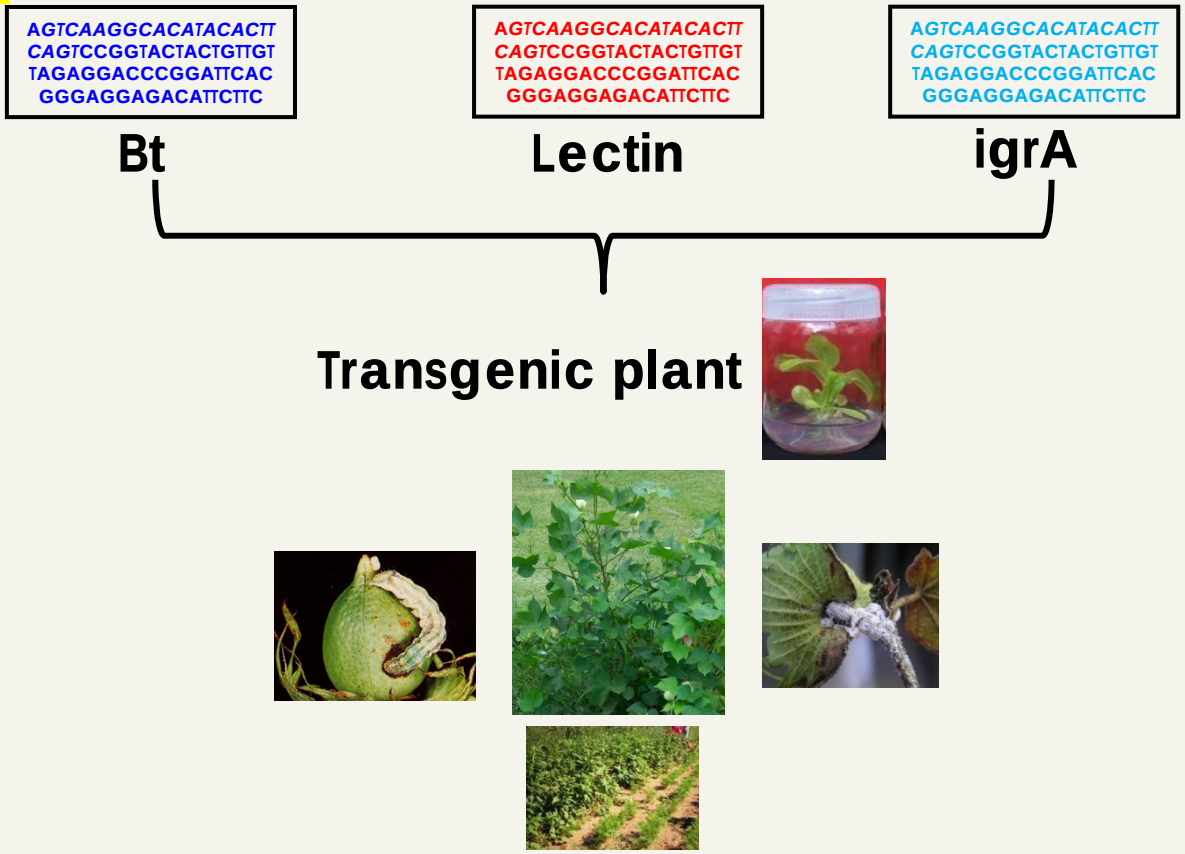
- It is crucial to be realistic
- Transformation and development of transformants is species specific
- Bio-efficacy tests involves rising the plant material
- Number of transformants/events that needs to be evaluated in confinement facility

Innovativeness of the project

Does the project generate noval concept?

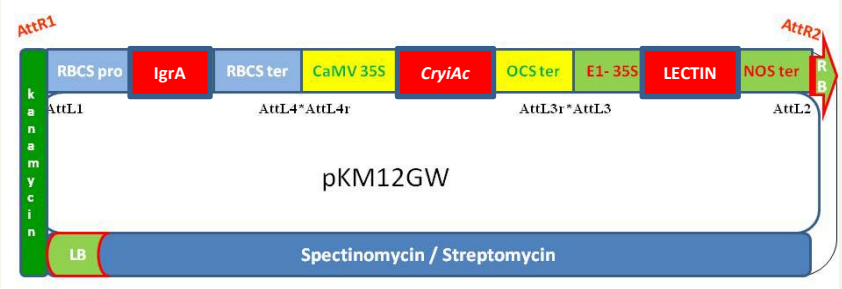
From the existing scientific knowledge / inventions developing a product

Case study:

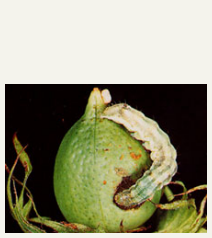


Out come/ deliverables

✓ **Multigene expressing cassettes with specific genes**



✓ **Transgenic events with multiple stress tolerant**



Cotton transgenic event with Improved productivity

TITLE of PROPOSAL

- The project title should be short, concise, and preferably refer to a certain key project result or the project activity

- Project titles that are too long or too general fail to give the reader an effective snapshot of what is inside

- It should be explanatory and define the essence of the Project

Example:

✗ **Multi technological interventions to develop various biotic stress tolerant cotton for International markets" - Title is diffused**

✓ **"co-expression of insecticidal protein cry1Ac, lectin and herbicide resistance gene igra to improve multiple biotic stress tolerance" – Title is more specific**

It is clear from the title that simultaneous expression of specific genes is the focus to improve biotic stress tolerance in cotton. And thus, to address important constraint from insect and weeds.

Other aspects

Budget

Man power

Should match

the work elements

Equipments

Infrastructure

} Required for the project experiments

Consumables

contingency

} Justify based on the planned programme

IP

Important for transgenic work
even for the molecular breeding

FTO – for

- genes / construct etc

- QTL , QTL donors

Abstract / summary

Most important component

Should be concise **Should be one page**

It should cover

- **Need / relevance / importance**
- **Brief description of strategy / approaches**
- **Goals & objectives**
- **The amount of funding that is being sought**
- **Expected out come and also success indicators**

Funds for innovation

In-summary

- **Industry drives the innovations to develop products / process**
- **Besides noval ideas**

  Funding drives the innovations
- **BIRAC - BIPP**

  Initiative to promote biotech industry
- **Grant proposal and its presentation has phenomenal significance**
- **A comprehensive proposal – needs to be developed**

  - Problem / relevance

  - Approach to inplement

  - Out come / deliverables

Thank you