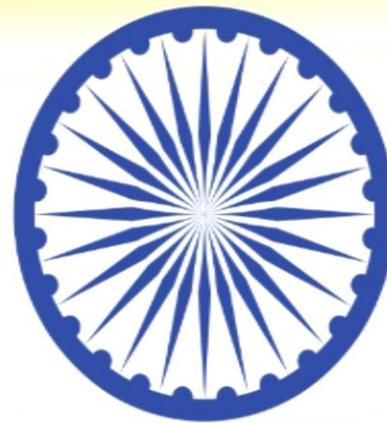


STI Policy of India: Instruments for Supporting International Cooperation in Higher Education, Research and Innovation



Rama Swami Bansal, Counsellor (S&T)

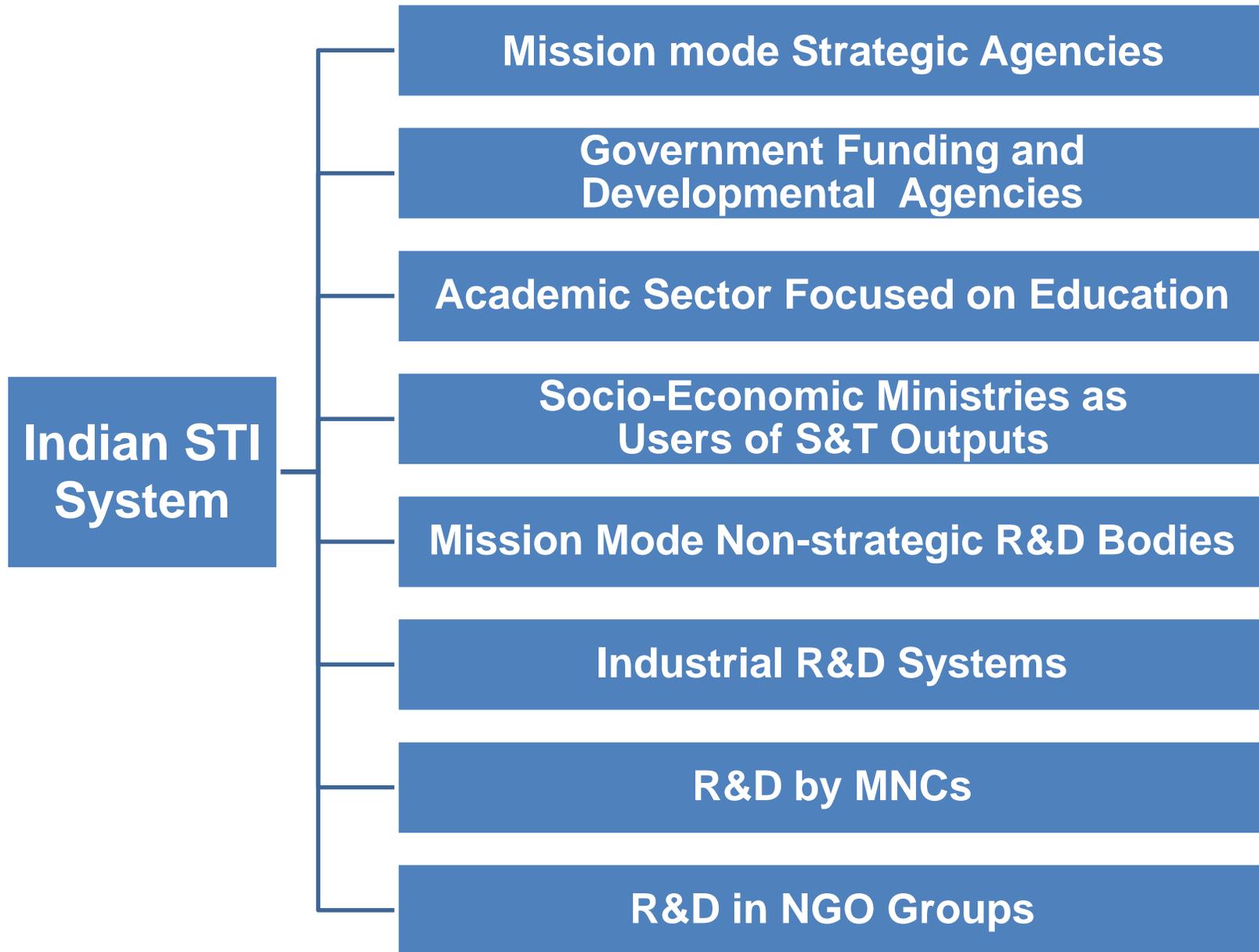
Workshop Session on “Instruments of State Policy Supporting Cross –border Cooperation in Research, Education and Innovation – Country Examples”
Mechanisms of Commercialization of Scientific Research:

9th April 2015, HSE, Moscow

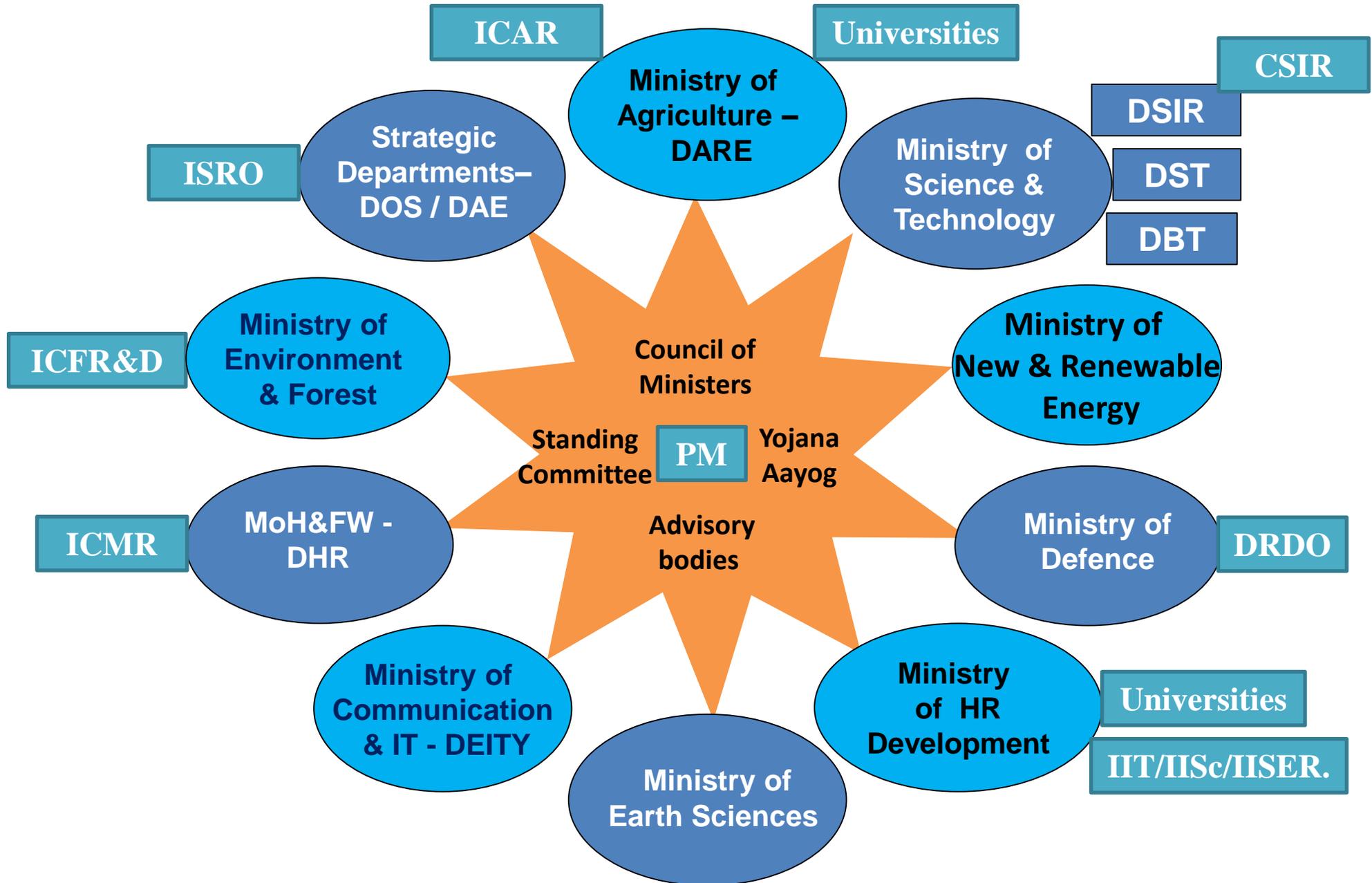


**Embassy of India,
Moscow**

Science, Technology and Innovation System of India



Central S&T Departments and Ministries



Present STI Infrastructure

HIGHER EDUCATION SECTOR

712 Universities

068 Institutes of National Importance

36671 Colleges

CENTRAL GOVERNMENT

611 Research Institutions / Laboratories

144 Public sector industries

STATE GOVERNMENT

917 Agriculture Universities/Research Stations/Departments

049 Public sector industries

PRIVATE SECTOR

1035 In-house R&D Units

489 Scientific & Industrial Research Organisations (SIRO)

591 Industry from D/B of Central Monitoring of Indian Economy & Multi Nationals

Some Steps to Boost Education and STI

- + Attracting talent to Science (10-32 yrs) through Initiative on *Innovation in Science Pursuit for Inspired Research (INSPIRE)* to build critical HR to strengthen and expand STI base**
- + Expanding educational infrastructure at all levels to increase Gross Enrollment Ratio including setting up of new institutions of excellence (8 new IITs, 5 IISERs, 14 new national universities....)**
- + TDB - technology support system in private sector**
- + National Entrepreneurship Board to support S&T entrepreneurship and technology business incubation parks**
- + National Innovation Council; 2010-20 : Decade of Innovation**
- + Science, Technology & Innovation Policy (2013): accelerate the pace of discovery and delivery of science led solutions for faster, sustainable and inclusive growth**

STI Policy - What do we want to achieve and how?

Aspirations

- Placing India among the world's top five global scientific powers by 2020
- Increasing R&D expenditure from current ~ 1% of GDP to 2% by 2020.
- Increasing number of Full Time Equivalent of R&D personnel by min. 66% of the present strength in 5 yrs.
- Increasing accessibility, availability, affordability of innovations, especially for women, differently-abled and disadvantaged sections of society.

Mechanisms

- Boosting R&D through private sector investments
- Gearing Public private participation models for addressing social problems
- Aligning venture capital
- closing gaps in translation of new findings at the grassroots and the commercial space.
- **Promoting International (Bilateral & Multilateral) STI cooperation**

Guiding Principles in STI

- ✦ Science with a human face that serves common man
- ✦ Creating ecosystem for basic research for tech development & innovation; and for international / inter-disciplinary collaborative research and establishing IPR regime that maximizes incentive for generation and protection of innovation
- ✦ Leveraging S&T to bridge disparities between urban and rural divide with focus on technologies for rural development & employment
- ✦ Encouraging research and innovation through interaction between private and public institutions in areas of societal and economic relevance
- ✦ Harnessing, attracting and providing opportunities to the best brains for undertaking scientific research and innovation as career choice
- ✦ Establishing Institutes for Rural Technology Development, Himalayan Technology and Institute for Big data analytics for predictive science
- ✦ According priority to Agriculture, Water Management, Health, Education, Energy, Communication and Transportation Technologies
- ✦ Promoting research and applications of ICT, BT, Material Sciences in Manufacturing and of Nuclear Science in Medicine, Industry and Agriculture
- ✦ Building centers of research excellence in fields of Nanotechnology, Material Sciences, Thorium Technology and Brain Research

State Policy on Cross-Border Cooperation

- ✦ **Engaging in value based international partnerships & collaborations to be globally competitive and relevant**
- ✦ **Establishing strategic partnerships and alliances with other nations for value addition to national programs and missions**
- ✦ **Incentivizing domestic & foreign private sector investments in high end R&D to foster innovation and techno-entrepreneurship**

International Partnerships & Alliances for STI

Mandate: Identification, facilitation and promotion of India's international cooperation in frontier and emerging areas of STI under bilateral and multilateral programs

Guiding Principles

Technology Synergy

- Parity based international relations based on mutuality, co-funding, complementarity and reciprocity

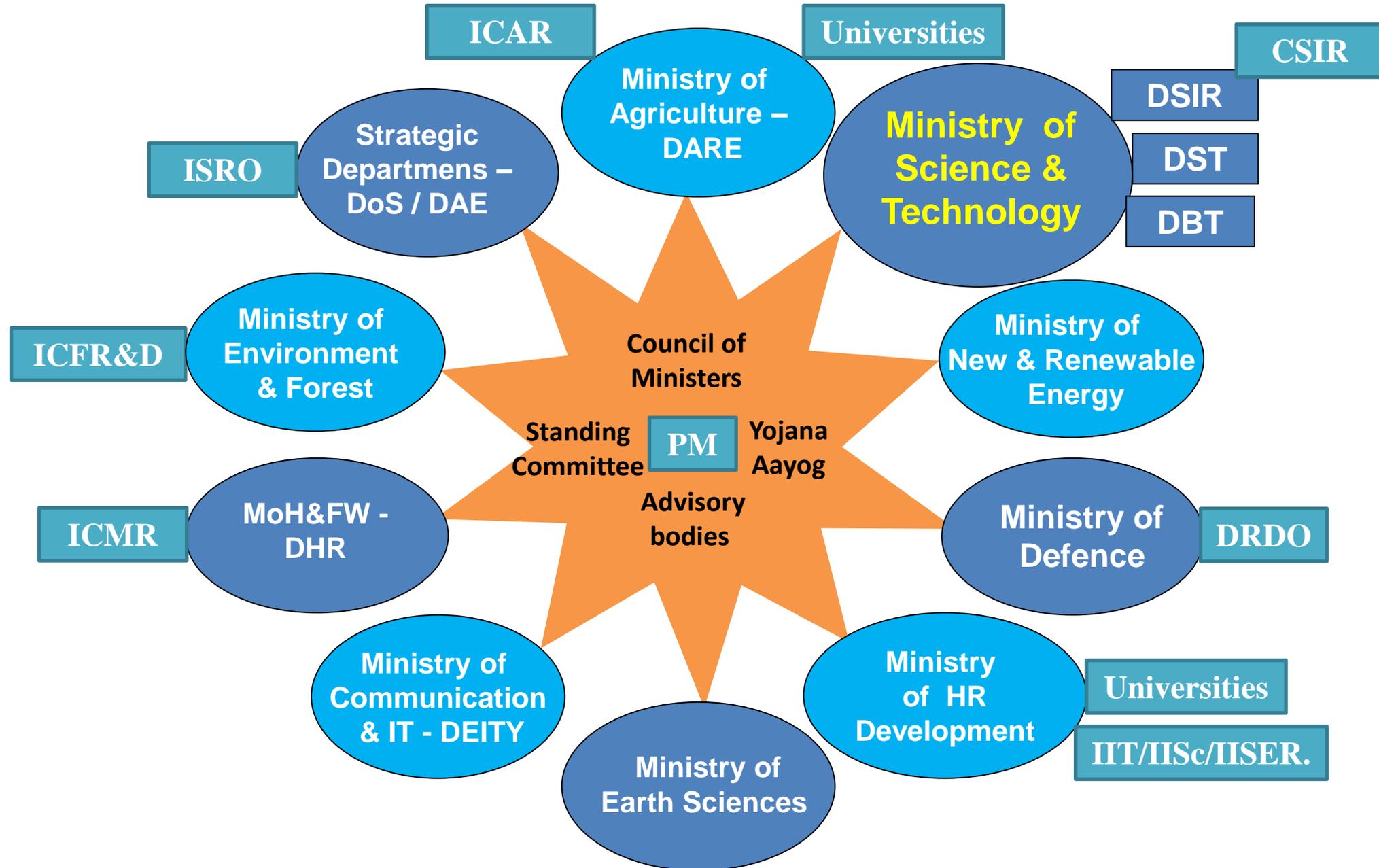
Technology Development

- Industrial & applied R&D through academia-industry connect in fostering innovation and techno-entrepreneurship

Technology Support

- Investing into promoting S&T base and capacity building for developing countries

Coordination of International Cooperation



International S&T Engagements through DST

Asia

- Bangladesh
- China
- Israel
- Japan
- Korea South
- Myanmar
- Singapore
- Sri Lanka
- Thailand
- Vietnam

Africa

- India Africa Initiative
- Egypt
- Mauritius
- South Africa
- Tunisia

Oceania

- Australia
- New Zealand

North America

- Canada
- Mexico
- USA

South America

- Argentina
- Brazil
- Chile

Europe

- Austria
- Belarus
- Belgium
- Bulgaria
- Czech Republic
- Finland
- France
- Germany
- Hungary
- Italy
- Netherlands
- Norway
- Portugal
- Poland
- Romania
- Russia
- Slovenia
- Spain
- Sweden
- Switzerland
- Ukraine
- UK



Multilateral / Regional

ASEAN
BRICS
EU
IBSA

NAM
TWAS
SAARC
UNESCO

Modalities of International Cooperation

Supporting Contact Building through

- Joint Workshops/ Seminars/Frontiers Symposia/Exhibitions
- Visitation, Fellowships & Internships
- Exploratory visits
- Lectures by Eminent Scientists
- Fielding young researchers scholars to international meets with Peers

Supporting for

- Joint R&D Projects of mutual interest
- Project mode mobility based exchanges
- Training and Advanced Schools
- Access to Advanced Facilities
- Participation in Mega-science projects

Facilitating and Promoting

- Joint R&D Clusters
- Virtual Networked Centres
- Multi - institutional R&D projects
- Catalyzing creation of Joint Ventures

Modalities of International Cooperation

Promoting pre-commercial R&D and Innovation

- Academia – Industry Projects for Applied R&D
- PPP for Industrial R&D and Entrepreneurship through
GITA platform: Canada, Israel, Finland, Spain, S. Korea & UK
- Facilitate Technology Development & Technology Transfer
- Indo-US Endowment Fund for Innovation
- Annual Technology Summit with partner country

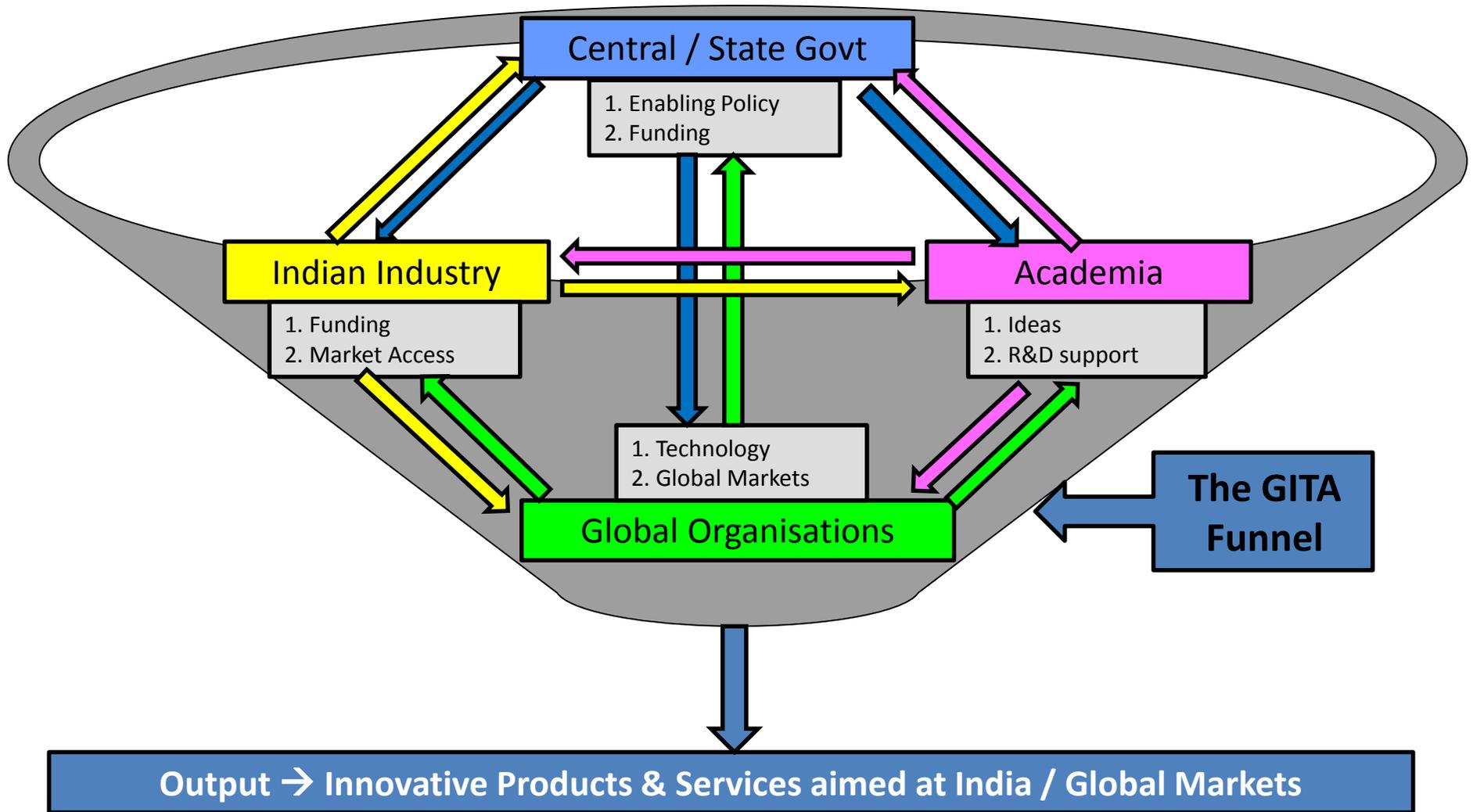
Exclusive Bi-national S&T Bodies

- Indo-French Centre for Promotion of Advanced Research
- Indo-US Science & Technology Forum
- Indo-German Science & Technology Centre (Industrial & Applied R&D)
- Indo-Russian Scientific & Technological Centre (Technology Transfer)

Global Innovation & Technology Alliance (GITA)

- + Section 25 Company between TDB & CII to provide demand-driven technology solutions through Institutional & Global alliances on competitive basis.**
- + A platform for forging frontline Global technological alliances for Indian companies for achieving R&D leadership in global & domestic markets (Israel, Canada, Finland, S. Korea, Spain & UK).**
- + An Innovative PPP mechanism for attracting Indian industry's investment in technology by**
 - Mapping technology gaps;**
 - Evaluating global technology offers from techno-economic perspective;**
 - Connecting amongst technology developers, providers, commercializes;**
 - Funding last phase of technology development that connects the market; and**
 - Demonstrating technology solutions.**

The GITA Innovation Ecosystem



Instruments for Cooperation in Higher Education

- + Educational Exchange Programmes of MHRD (41 countries), individual universities and HEIs**
- + Global Initiative of Academic Networks (GIAN) for engaging international scientists and entrepreneurs with HEIs through MHRD schemes**
- + Advanced Research fellowships of Indian government departments and agencies**
- + Joint Support Programmes from school level to higher education level**
 - Max Plank Partnership Group**
 - Lindau's programme**
- + Advanced training fellowships by foreign agencies**

Capacity Building in R&D: 2012-17

Building critical research mass in select areas

- *Computer & Mathematical Sciences, Earth & Environmental Sciences, Glaciology, Clinical Medicine, Cognitive Sciences, etc.*

Expanding Human capacity base in R&D & Gender Parity

- *Overseas doctoral & post doctoral fellowships & Re-entry schemes for expats & foreign researchers;*

Strengthening University Research

- *Special schemes like FIST, CURIE, Promotion of University Research and Scientific Excellence (PURSE), etc.*

Competitive grants for decadal institutional R&D programs in areas

- *Climate change, new energy and sustainability science- IRPHA*

National Action Plan for Climate Change Research

- *Sustaining Himalayan Eco System*
- *Enhancing Strategic Knowledge base on Climate Change*

Participation in Global Mega-Science R&D Projects

- *Off shore (CERN, FAIR, DESY, TMT, SKA, KEK, ELECTRA, ISIS)*
- *In-country Experiments (INDIGO, INO, NLST)*

Capacity Building in R&D: 2012-17

Stepping up Nano Mission

- *With focus on applications, technology development, nano-lithography, nano-toxicology*

Establishment of Centers for Advanced Research

- *Water Technologies, Advanced Manufacturing, Robotics, Sensors & Integrated Systems, Geospatial Technologies, Super computing*

Investments into solution science through PPP model

- *In Solar Energy, Water, Health, Security Technologies etc.*

Developing Technology Platforms through PPP model

- *Membrane Technologies for Sensors, Computational Materials Engineering, Next-Generation Wireless Systems, distributed off grid power systems, etc.*

National and Bi-national R&D centers

- *Clean Energy, Automotive Research, Biomedical Devices & Diagnostic Technologies etc.*

A close-up photograph of a bouquet of flowers. The bouquet features several large white daisies with bright yellow centers, interspersed with vibrant purple flowers. The background is filled with more flowers, including some blue and red ones, creating a colorful and textured scene. The text "Thank you" is overlaid in the center in a bold, blue, sans-serif font.

**Thank
you**

Some Highlights of Indian S&T Scenario

- ✦ Public investments into Indian science sector have maintained a near 20-22% growth annually from 2005-2012
- ✦ Relative position of India in scientific publications and patents improved considerably since 2005 (from 13th to 7th and 16th to 11th)
- ✦ Average annual growth of publication has been 14% with 3.8% of world share and average citation impact of 0.68
- ✦ 81% increase in no. of publications in top 1% impact making journals in world
- ✦ Engg Science publications grown by 89% with citation impact of 1.0 – highest density & high impact with global share of 4.2 %
- ✦ Of the total 66,557 publications in 2013, 42.88% with foreign authors
- ✦ Publication share of University increased from 15 to 39% since 2006
- ✦ New institutions established for expanding R&D base with FTEs in R&D estimated as 170,000
- ✦ Pvt sector investment in R&D increased from 24% to 33% of net investments