Academia vs Industry

Rekha Singhal (TCS Research, Mumbai)
Rijurekha Sen (CSE, IIT Delhi)

Rekha Singhal

Mtech and PhD in Computer Science from IIT Delhi

Academic Experience: NITIE, TISS, ITM, Bhartiya Vidyapeeth

Industry Research experience: TRDDC, CDAC, TCS

PhD & Mtech Guide at- Mukesh Patel of NMIMS, JJTU of Rajasthan.

Rijurekha Sen

PhD in Computer Science from IIT Bombay

Academic Experience: post-docs at SMU and MPI, Assistant Professor at CSE, IITD

Industry Research experience – Microsoft Research India, consultancy with automotive/transport sector companies Vehant, Altigreen, Zendrive

Research Opportunities during/after undergrad/masters

- Join a PhD program in India or abroad
- Try out research as a project staff in an Indian university
- TCS Niche hires as Researcher
- Microsoft Research India hires Research Fellows
- IBM Research India has a Blue Scholar Program

Outside PhD Research and Financial Support Opportunities during PhD

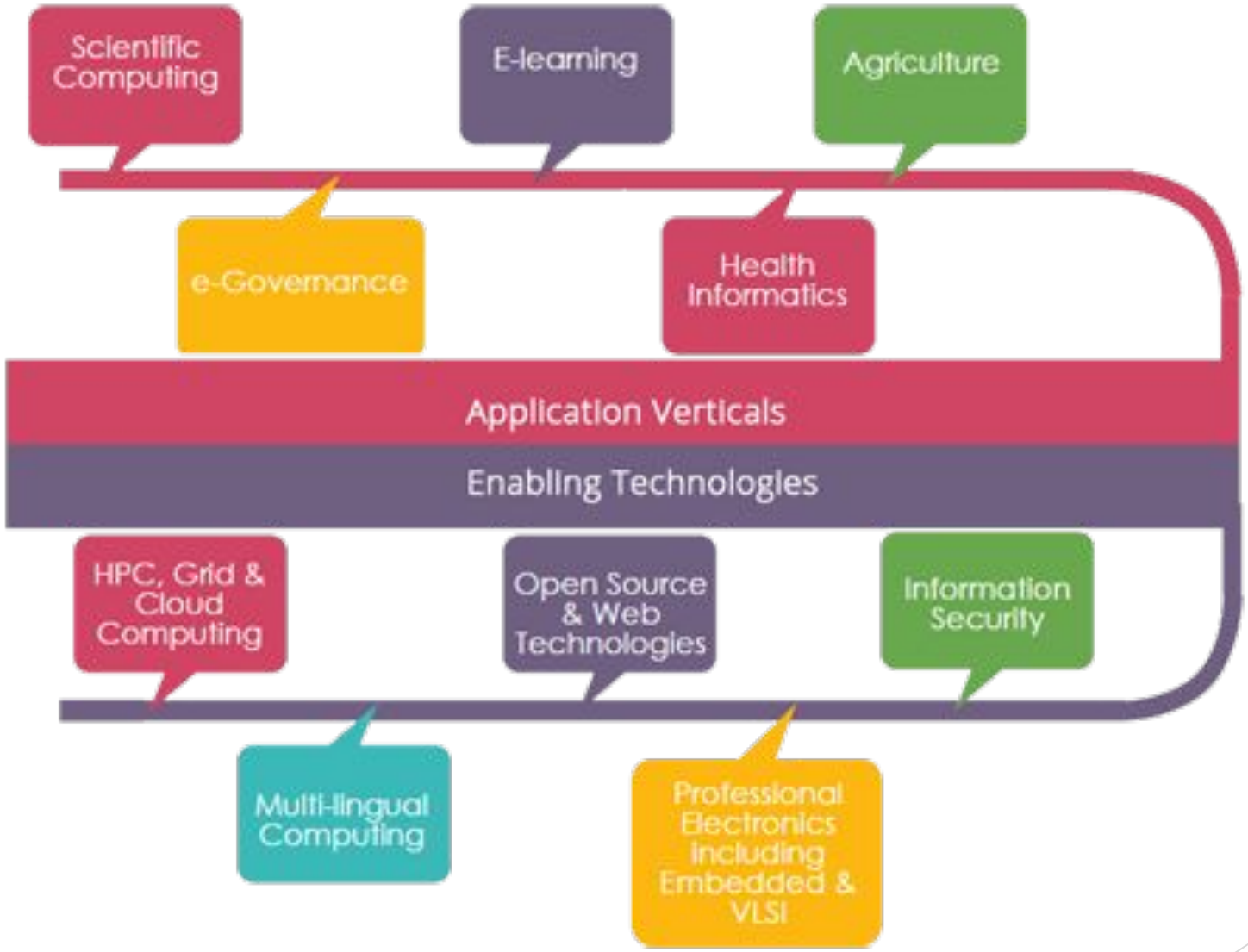
- Internship for 2-6 months during or after PhD
  - in university or industry
- Part –time PhD can work in Research labs
- PhD fellowships from Google, TCS, Intel, Qualcomm
- Scholarships (limited cash support) during PhD
  - Google Anita Borg
  - Microsoft Research Women scholarship
  - Adobe Woman research scholarship
  - Scholarships to attend top-tier conferences

Opportunities after PhD

University Grants Commission (UGC) and the All India Council for Technical Education (AICTE) and replace them with one higher education regulator, tentatively christened Higher Education Empowerment Regulation Agency (HEERA).

Public Sector Positions (CDAC/DIT/CSIR/CDOT….)

- Visiting Scientist (adhoc)
- Technical Officer /Scientist B
- Senior Technical Officer/Scientist C
- Principal Technical Officer/Scientist D
- Joint Director /Scientist E
- Associate Director /Scientist F
- Director /Scientist G


Scientific Computing
E-learning
Agriculture
e-Governance
Health Informatics
Application Verticals
Enabling Technologies
HPC, Grid & Cloud Computing
Open Source & Web Technologies
Information Security
Multi-lingual Computing
Professional Electronics including Embedded & VLSI

Private Sector Positions (India) (TCS/IBM/Microsoft/Amazon/Flipkart/ LinkedIN/Numerous startups ……..)

- Scientist
  - Work on a research problem, apply to business problem through POC, publish papers and patent the idea. Member of many research forums through PC etc.
- Senior Scientist
  - Work on multiple related research problems relevant to business use cases, publish the papers and patent the ideas. Member of many research forums through PC etc.
- Principal Scientist
  - Manage research area having a team. Create multiple research problems and manage progress of each of them. Guide writing of papers, patenting ideas. Member of many research forums through PC etc.
- Chief Scientist
  - Manage multiple teams of different research areas (e.g. data science will have teams on robotics, sensor analytics, chat bots etc..). Member of national & international bodies in its area.

TCS Research &Innovation – A Snapshot

Sameer Sabharwal
Principal Innovation Evangelist, TCS Research & Innovation
Shivaraman G
Innovation Evangelist, TCS Research & Innovation

June 19th, 2018

Strategic Message to Market: BUSINESS 4.0

INDUSTRY 1.0
Steam Age Mechanization

BUSINESS 1.0
Mass Production

INDUSTRY 2.0
Age of Electricity & Air Transport

BUSINESS 2.0
Distributed mfg. & Extended Supply Chains

INDUSTRY 3.0
Computer Age

BUSINESS 3.0
Age of Productivity

INDUSTRY4.0
Digital Age

Business 4.0
Intelligent, Agile, Automated, and on the Cloud

TCS RESEARCH & INNOVATION

TATA CONSULTANCY SERVICES

How Research and Innovation Works at TCS

TCS RESEARCH & INNOVATION

1970's – 1980's
University Alliances, Systems Engineering

1970's
Offshore Model Alliances with Major IT Player

1981
Creation of TRDDC – India's first Industrial R&D Lab in IT

1987
S/W Tools-Casepec Migration Engg

1991
Mastercraft, Revine, Quartz Program

1998
Industry & Services Practices Setup

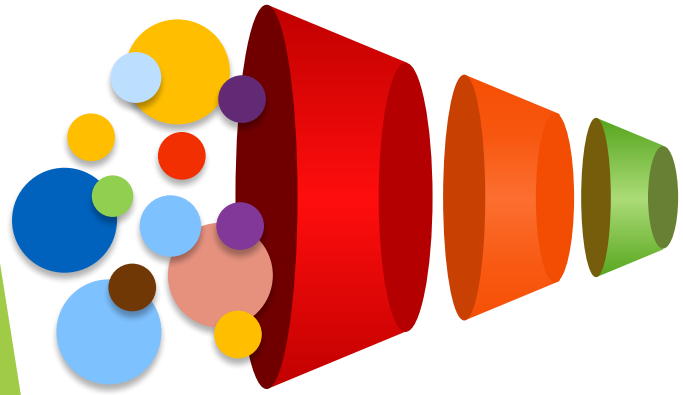
2000 - 2005
Advanced Tech C. Embedded Sys COE, Telecom Lab, …

2006
Corporate Technology Office Setup

2009-2018…
19 Innovation Labs, TCS Co-Innovation Network (COIN)™ inaugurated

1970 1975 1980 1985 1990 1995 2000 2005

Idea Funnel & Filter – Innovation Labs, Idea Storm,, COIN™ – 100's of Ideas



Filtered set if options for 3 Innovation Categories – 10's of projects

Opportunity Screens & categorization – few funded initiatives

01 Derivative

02 Platform

03 Breakthrough

Commercialization and scales up – 4-5 per year

Project Planning

TCS Research and Innovation Overview

TCS RESEARCH & INNOVATION

Data and Decision Sciences

Deep Learning & AI

Software Systems & Services

Cyber Security & Privacy

Life Sciences

Embedded Systems and Robotics

Behavioral, Business and Social Sciences

Computing Systems

Physical Sciences

TCS Research and Innovation Agenda

9 Research Areas

- Embedded Systems and Robotics
- Physical Sciences
- Life Sciences
- Cybersecurity and Privacy
- Data and Decision Sciences
- Behavioral, Social and Business Sciences
- Software Systems and Services
- Computing Systems
- Deep Learning and Artificial Intelligence

Fundamental Research Focus

9 Research & Innovation Programs

- Semantic Systems and Knowledge Synthesis
- Smart Machines and Autonomous Infrastructure
- Verification and Validation
- Electricity Value Ecosystem
- Blockchain
- Data Protection and Privacy
- Process and Equipment Analytics for Optimization and Control
- Integrated Computational Materials Engineering
- Personalized Medicine

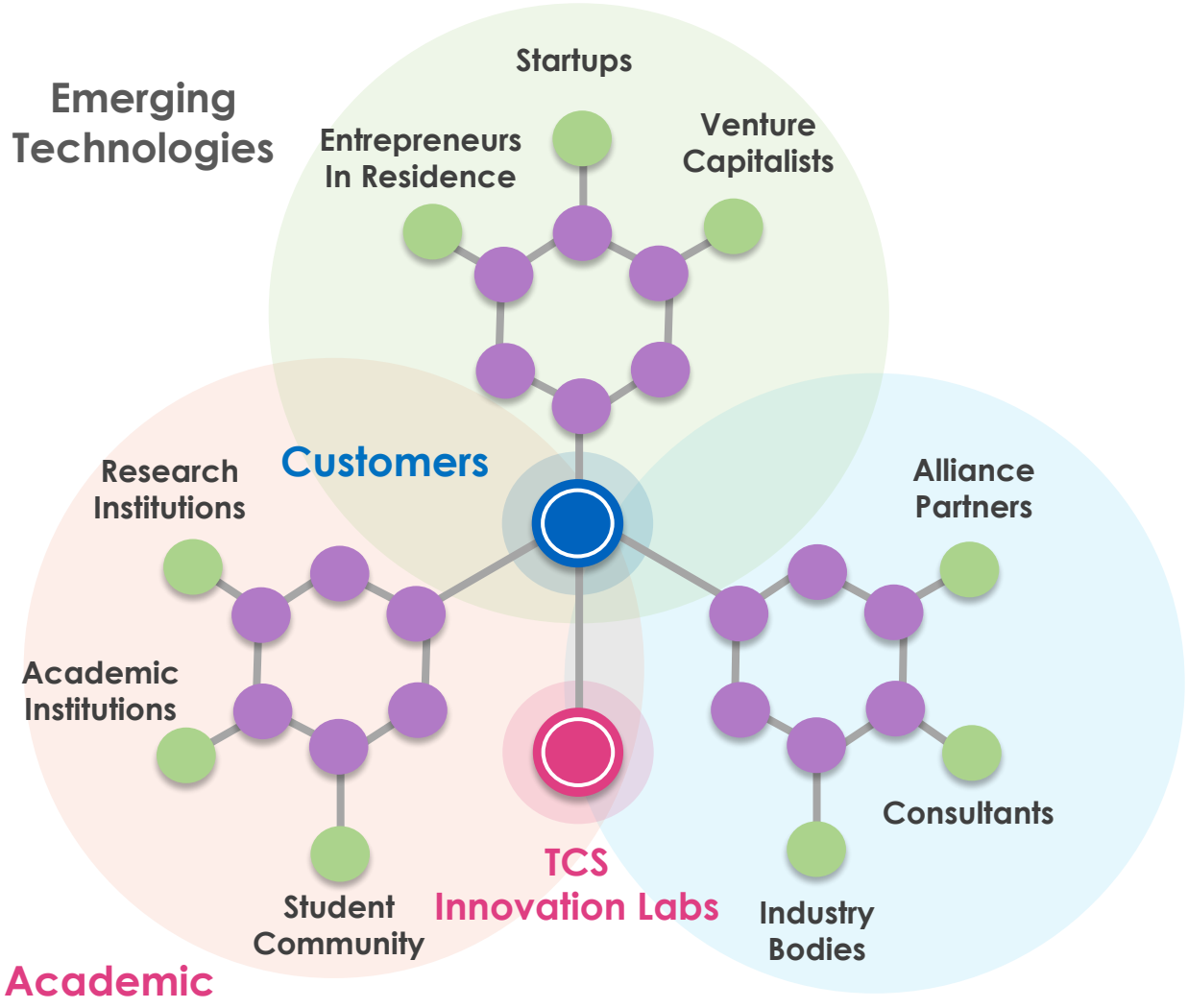
Theme and Outcome Oriented Research Programs

Incubation Programs

- Entrepreneurship Initiatives

Rapid Idea Conversion

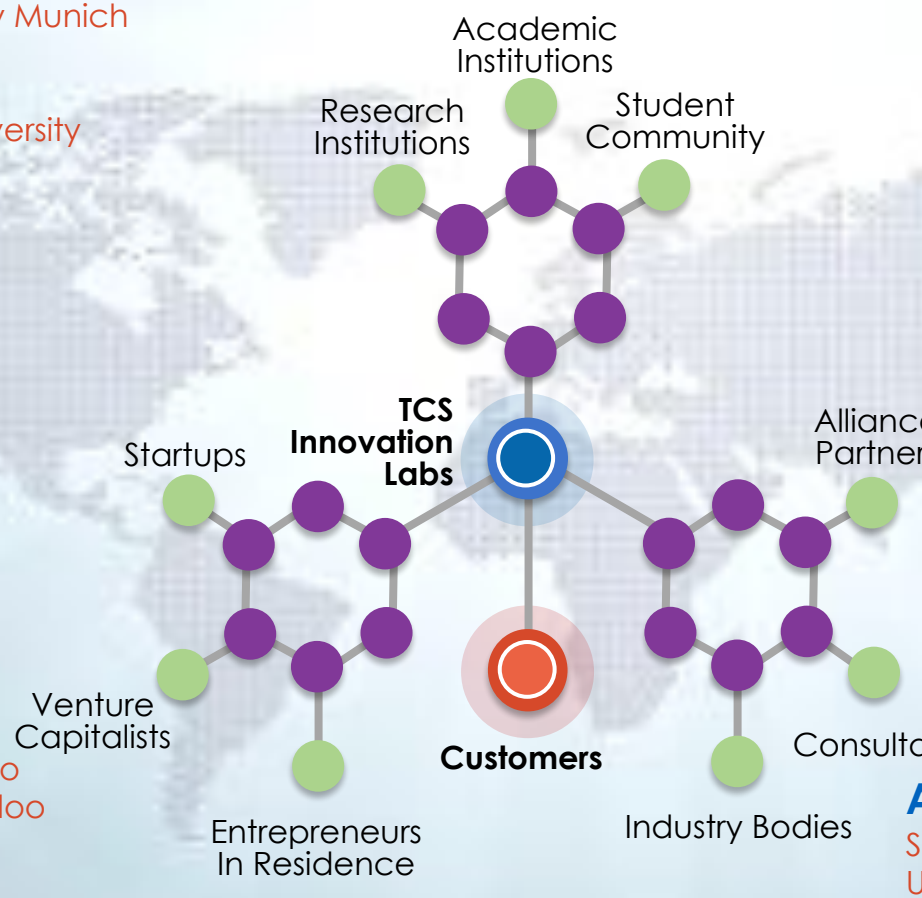
TCS Co-Innovation Network (COIN™)



Key Technologies

- Analytics, AI and ML
- Alternative Lending
- IoT and Telematics
- Social, Customer Experience, E-commerce
- Block Chain
- Augmented Reality
- Cyber Security
- Cloud & Omni-channel Solutions
- Digital Platforms & Enablement

TCS Co-Innovation Network (COIN™)



Conor Ventures
Inventure VC
Industriefonden
Vinnova
UKTI
Business Sweden
Invest in Denmark
Greater Helsinki
Promotion Limited
TestPlant
Veryday
Scalgo
TheySay
ARRIA
Hoxton Analytics

UK & EUROPE
RCA London
Technical University Munich
Univ of Edinburgh
Fraunhofer IESE
Imperial, Aalto University

INDIA
IIT Bombay , ISI Kolkata , IIT G,IIIT D, NID, IIT J, IIT Gn, IISc BLR , IIT Madras, IIT Kanpur, CMI, IIT D, IIT Kgp

NASSCOM
Helion Venture Partners
Smart Kapital
Avhan
iKen
ESQ
Maples
Perpetuuiti
Seclore
SmartConnect

ISRAEL
Tel Aviv University
Ben Gurion University

Jerusalem Venture Partners
Carmel Ventures
Glilot Capital
Viola Private Equity
Magma Venture Partners
Israeli Foreign trade Administration
Jacada
Kaltura
Nemesysco

Andreessen Horowitz
Sierra Venture
New Enterprise Associates
Novak Biddle
Norwest Venture Partners
Blumberg Capital
Fenox
Invest Ottawa
Attensity
Clarabridge
Inbenta
Knoahsoft
LogMein
Neospeech
Openspan

NORTH AMERICA
MIT Media Labs
U C Berkeley
Stanford
Purdue
Columbia
IRI
University of Toronto
University of Waterloo
Vanderbilt Univ
USC
Viterbi School of Engg
CMU

MEA
WITS
UAEU

APAC
SMU, Singapore
University of Technology, Sydney
University of Western Sydney
University of Melbourne
University of New South Wales

Singapore Trade Body
Australian Trade Body
Pottinger

International Research Positions

What CS areas do these professors/ companies work in? How can one find that out?

- PostDoc positions in foreign universities
  - Whether to go for a post-doc or not
  - How to search and apply for post-doc positions
  - Post-doc fellowships (e.g. Humboldt in Germany, Marie Curie in Europe)

- Microsoft (Karthik Ramachandran, IIT Bombay), also post-doc positions
- Google Deepmind (Ankit Anand, IIT Delhi)
- Facebook London (Yashoteja Prabhu, IIT Delhi)

Academia ~~vs~~ Industry

unless you have very strong reason to be in one of them, keep an open mind and explore both as much as you can before taking up a job

Strong reasons to be in academia

- You are genuinely interested in understanding WHY things work a certain way and wish to push the boundaries of human knowledge in your small way for that
- You want to ask questions where the economic incentives are not directly observable - individual privacy vs. advertising profits, fairness of machine learning algorithms, quantification of media bias etc. -- maybe your work and associated publications will create awareness and bring in new laws and legislations
- You want to work on problems where a lot of different public sector and private entities are involved and a non-money making academic badge makes you a trusted interface - e.g. environment, clean energy etc.
- You want to have the feeling of value addition to society through teaching and mentoring the younger generations (I consider my industrial mentors to have been as effective as my academic mentors)

…….

Strong reasons to be in industry

- You work in a field where industry might have much more resources to offer, e.g. computer architecture
- You want to see the effects of your work directly going into the next product cycle that a large number of people will use, your work directly affects the society around you (even if in a fun way that they play the games you design)
- You like the sense of belonging among co-workers who are working on related things, you thrive better with the defined sense of hierarchy and a top-down approach of pre-defined problem space
- Practical reasons like you need more money than what the 7th Pay Commission has to offer, you don't want to prolong your post PhD phase typically needed for a good academic position

…….

Workshop Title: Scaling up Air Quality Monitoring in India

Goal: cooperate more and compete less while mapping pollution in India, getting a consistent picture of efforts in different institutes/organizations working/planning to work in this domain

9-10:30
A. Introductory remarks
B. Chairman, CPCB
C. Chief executive, IUSSTF
D. Hon Minister, MoEF&CC

(1) Sachi, IIT Kanpur - overview of efforts at IIT Kanpur and Delhi studies, low cost sensing and calibration, the overall status of pollution monitoring in India, comparison among different sensing methods
(2) Bharadwaj, IISc - overview of efforts at RBCCPS IISc, design of new sensor hardware and mechanisms, better accuracy at lower cost

coffee break - mutual introductions - 30 mins 10:30-11

11-1:00 faculty, startups/NGO 15 mins each

(1) Sagnik, IIT Delhi - overview of efforts at CERCA, IIT Delhi, long term satellite based aerosol monitoring
(2) Yogesh, IISc - server side high performance computing, big data analysis
(3) Ronak, atmos - low cost sensors, web based data APIs, data journalism
(4) Manohar Swaminathan, Microsoft Research India
(5) Nipun, IIT Gandhinagar - spatio-temporal predictions using ML, active learning to choose sensor deployment location
(6) Airveda.in - consumer devices and mobile apps(10,000+ downloads on google play) for pollution monitoring
(7) Riju, IIT Delhi - vehicle fleet based scalable monitoring, end-to-end robust system building with low cost hardware and intermittent cellular communication
(8) Sumit Sharma, TERI - modeling, information dissemination with easy infographics
(9) Zele, Gas sensors and Board design
(10) Navankant Bhat, IISc Sensor development

1-2 lunch

2-3 government, policy people
Hem Dholakia, CEEW 30 mins
Kishan, Shakti
Navaroj, CPR