



Annexure-IX

Science in Translation



Good Science Needs Good Data

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India is on track to be among the world's top three economies, yet our scientific output does not reflect our scale or capability. In cancer research, diabetes research, and even social-science work with nano-entrepreneurs, we still depend heavily on Western research because we lack the high-quality, large-scale datasets needed for modern science. Jim Grey's "Fourth Paradigm" predicted this shift to data-intensive scientific discovery; with AI now central to research, the need for good data is even more urgent. Good AI needs good data. From my work with cancer and diabetes researchers, it is clear that building curated datasets in India is both essential and challenging. Our population diversity and the long-term nature of these diseases require data collected consistently across institutions, over many years, with discipline and agreed standards. Yet data creation is still treated as a side activity within short-duration projects. Scientists are rewarded for publications, not for building datasets. Funding structures rarely support shared, long-term data platforms. As a result, whatever data is collected remains narrow, fragmented, and inaccessible to the broader research community. The same gaps appear in the social sciences as well; the scale of our challenges demands much better data. In this talk, I will share my observations and argue that as India invests through ANRF and other national programmes, we must commit to building curated, long-duration data platforms that serve the entire scientific community. Astronomy shows what becomes possible when a field aligns around shared datasets and open access. If India wants to lead in science, we must start by investing in data—because good data powers good AI, and good AI will shape the future of discovery.

Speaker's Profile

Anand Deshpande is the Founder and Chairman of Persistent Systems, a global technology services company he established in 1990. His entrepreneurial journey transformed a small startup into an industry leader with a market capitalisation of nearly \$10 billion and a workforce of 24,000 employees spanning 18 countries worldwide. Dr. Deshpande holds a B.Tech in Computer Science from IIT Kharagpur and advanced degrees (M.S. and Ph.D.) in Computer Science from Indiana University, Bloomington. His alma maters have recognised his extraordinary contributions with the IIT Kharagpur Distinguished Alumnus Award in 2012 and the Indiana University School of Informatics Career Achievement Award in 2007. A respected technology leader, Dr. Deshpande has been inducted as a Fellow of the Computer Society of India and the prestigious Indian National Academy of Engineering. He served as the Founding President of ACM India (Association for Computing Machinery) and was honoured with the ACM Presidential Award in 2024 for his significant contributions to computing. Dr. Deshpande's commitment to education is evident through his service as Chairman of several premier technical institutions, including IIT Patna, IIIT Allahabad, and VJTI Mumbai. His expertise was also leveraged at the national level as a part-time board member of UIDAI (Unique Identification Authority of India) from 2016 to 2022. His passion for entrepreneurship extends beyond his own success through two impactful initiatives. The deAsra Foundation, founded by Dr. Deshpande, has supported nearly 400,000 nano entrepreneurs across India, creating sustainable livelihoods and economic opportunities. Through Second Orbit, he has mentored and accelerated the growth of more than 1,000 companies, sharing his wealth of experience and business acumen. Currently, Dr. Deshpande serves as the co-chair of the Biotechnology Research Innovation Council (BRIC), where he is developing strategic programs to advance India's bioeconomy, bringing his technological expertise to the field of biotechnology innovation. Through his multifaceted contributions as a technology pioneer, institution builder, mentor, and thought leader, Anand Deshpande continues to shape India's digital future while creating global impact through innovation and entrepreneurship.

Radiopharmaceuticals for Nuclear Medicines

A. K. Mohanty

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At the heart of India's isotope program stands the Bhabha Atomic Research Centre Mumbai where the research reactors like Apsara-U and Dhruva produce a wide range of radioisotopes both for cancer diagnosis and therapy. Radioisotopes such as Technetium-99m and Fluorine-18 (produced by medical cyclotron) are used in imaging organs and detecting diseases at an early stage. Isotopes like Iodine-131, Yttrium-90, and Lutetium-177 are used to treat thyroid, liver, prostate & neuroendocrine cancers, respectively, with precision. The talk will cover the Department of Atomic Energy (DAE)'s program on radioisotope productions using research reactors, accelerators and reprocessing of nuclear spent fuel. The high level waste generated from reprocessing the spent nuclear fuel discharged from the reactor contains many useful radioisotopes in significant quantities like Cs-137, Ru-106, Sr-90 as produced during the fission of U-235. DAE has developed reprocessing technologies to extract these radioactive fission products and has produced Brachytherapy plaque based on Ru-106 isotope for treatment of eye cancers and Cs-137 pencil for blood irradiation. Several important radioisotopes such as ^{18}F , ^{68}Ga and ^{201}Tl are produced using the Medical Cyclotron Facility at VECC, Kolkata. On an average 40,000 to 45,000 Ci of various radioisotopes are annually produced at Dhruva reactor to supply over 5000 consignments to more than 1900 user institutions in India and abroad on monthly basis including Ir-192 and Co-60. Still, we have to import several isotopes to meet the domestic demand. Now BARC is proposing a dedicated Isotope Producing Reactor which is expected to be the largest Isotope producing Reactor in the world in terms of volume of isotope production. It will fully meet country's demand and rest about 75% can be exported.

Speaker's Profile

Dr. A.K. Mohanty born in 1959 at Odisha is a well-known nuclear physicist, completed his bachelor's degree in 1979 from MPC College, Baripada and master's degree in Physics in 1981 from Ravenshaw College, Cuttack which was at that time under Utkal University, Bhubaneswar. Dr. Mohanty graduated from the 26th batch of the BARC Training School and joined Nuclear Physics Division of Bhabha Atomic Research Centre in 1983 and got his PhD degree from Bombay University later on. He has taken over as Secretary, Department of Atomic Energy (DAE), Government of India, and Chairman of Atomic Energy Commission (AEC) in May 2023. Before his appointment as Secretary, DAE, Dr. Mohanty has held the position of Director of Bhabha Atomic Research Centre (BARC) from March 2019 to September 2023, Director of Saha Institute of Nuclear Physics (SINP), Kolkata from June 2015 to March 2019 and director of Physics group, BARC from July 2018 to March 2019. During the past four decades, Dr. Mohanty has worked in several areas of nuclear physics covering collision energy from sub-Coulomb barrier to relativistic regime. It includes experiment using Pelletron accelerator at TIFR, PHENIX and CMS experiments at Brookhaven National Laboratory (BNL), USA and CERN, Geneva respectively. Dr. Mohanty has held several honorary positions. To name a few, he served as Secretary and Member Secretary of BRNS Basic Science Committee from 2004-2010, General Secretary of India Physics Association (IPA) 2012-2016 and later on President of IPA 2018-2020, India-CMS Spokesperson (CMS Experiment at CERN Geneva) 2013-2015, Dean, Academic, Physical & Mathematical Sciences, BARC, Homi Bhabha National Institute. Dr. Mohanty has been recipient of several awards and recognitions during his illustrious career. Some of Dr. Mohanty's awards and recognitions are Gold Medal in Graduation (1979, Radha Gobinda Trust, Mayurbhanj), Young Scientists Award of Indian Physical Society (IPS, Kolkata, 1988), Young Physicist Award by Indian National Science Academy (INSA, New Delhi 1991) and DAE Homi Bhabha Science & Technology Award (2001) by Department of Atomic Energy, Mumbai. He was also conferred the CERN Scientific Associate position at CERN, Geneva from 2002-2004 and thereafter again from 2010-2011. He has received Doctor of Science (Honoris Causa) from several Universities. Dr. Mohanty is a fellow of National Academy of Sciences and Indian National Academy of Engineering.



Science for Society



From rationality to relationality: rethinking the scientific temper in the 21st century

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India's constitutional commitment to the development of a "scientific temper" was envisioned as a national ethos of critical inquiry and rational thought. Yet, in the complex, networked world of the twenty-first century, this vision requires profound renewal. A shift is proposed from a purely rational model of science to one grounded in relationality with an understanding that all knowledge arises from interconnection, mutual dependence, and ethical awareness. Rationality, when isolated from empathy and context, risks producing knowledge that is technically advanced but socially alienating. Drawing on the intersections of psychology, philosophy of science, and Indian epistemology, this approach explores how relational thinking can overcome the crisis of alienation by restoring the moral and cultural dimensions of inquiry. Compassion, dialogue, and rootedness are presented not as sentimental detours from objectivity but as scientific virtues that enhance understanding and resilience. Relational science emphasises shared cognition, cross-disciplinary dialogue, and ecological awareness as essential to human progress. In this framework, "Science for Society" becomes inseparable from the "Science of Society," an ecology of thought where rational precision and human sensitivity evolve together, reaffirming science as a profoundly moral and civilizational pursuit.

Speaker's Profile

Prof. Naima Khatoon, Vice-Chancellor of Aligarh Muslim University, is an eminent scholar, educationist, and psychologist whose leadership marks a historic milestone as the first woman to head the institution since its inception in 1920. A distinguished academic with decades of experience in teaching and research, she has made significant contributions to educational psychology, gender studies, and institutional development. Before becoming Vice-Chancellor, she served with distinction as Principal of the Women's College, AMU, where she strengthened academic standards, research culture, and women's leadership in higher education. Her intellectual work explores the intersections of spiritual psychology, cognition, ethics, and social responsibility, demonstrating how education and science can work together to nurture sustainable and humane futures.

Prof. Khatoon's vision of education combines moral insight with scientific temper by encouraging innovation rooted in compassion, inclusivity, and civic engagement. She has delivered numerous lectures in India and abroad on themes such as the psychology of trust in science, environmental consciousness, and the role of women in knowledge creation. Recipient of several awards and recognitions for her academic and administrative excellence, Prof. Khatoon continues to inspire a new generation of scholars to view knowledge not merely as accumulation, but as a transformative force for society and the nation.

Commercialisation of Indian Science is critical for India to achieve strategic autonomy in key technologies. Collaboration between Industry, Government, Academia is essential for this

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The global landscape is undergoing a profound transformation. Geopolitical alliances are being redrawn, economic borders are tightening and tariffs, technologies, and entire supply chains are being weaponized with impunity. In this New World Order, national sovereignty has become synonymous with technology sovereignty. India already has a stronger scientific and institutional base than many realise. Our leading institutions, particularly the IITs and IISc, now produce more postgraduate scholars than undergraduates. The scale and quality of R&D at these institutions has also risen sharply and we hear some great examples every day. But we now need Government, Industry and Academia to come together, restore the country's self confidence and faith in Indian Science and make India a key centre of critical technologies that the world needs. Government has made the first move by reducing the bureaucracy in Research and creating ANRF and the RDI Fund. Indian industry has significantly underinvested in R&D but it has the financial and organizational muscle to take cutting-edge research from lab to market. They must invest more in R&D, collaborate with academia, acquire or fund promising startups and place more faith in Indian science. Our startups are already showing the way. Creating a vibrant environment for Indian Science and Commercialisation of Indian technologies has been my focus for the last few years. This has involved advising different arms of government, brainstorming with like minded professionals in Industry and Academia, and deeply involving myself in the startup and investment ecosystem has been to take forward this goal.

Speaker's Profile

Mr. Saurabh Srivastava did his mechanical engineering from IIT Kanpur in 1968 and went on to pursue his master's degree at Harvard University. He started his career with IBM in the US and later worked at Tata Unisys in India before embarking on his entrepreneurial career. He co-founded and Chaired key institutions of modern India focussed on entrepreneurship: NASSCOM; Indian Venture Capital Association; TiE New Delhi NCR; Indian Angel Network. After working for IBM and Tata Unisys in the US and India, Mr. Srivastava became a highly successful serial entrepreneur, founding several successful IT companies. One was ranked amongst the top 20 Indian software companies and, post merger, listed as Xansa on the London Stock Exchange with revenues of approx. US \$ 800 mill till it was acquired by Steria. He now Chairs Steria in India. Mr. Srivastava is a doyen of entrepreneurship and angel/VC investments. He has been involved in investing in around 100 start-ups and has personally mentored hundreds of entrepreneurs. He founded and chaired India's first private sector VC Fund- Infinity, which created companies like, India Bulls, India Games and Avendus. He was adjunct Professor of Entrepreneurship at IIT Bombay, on the board of Incubation Cell of IIT Delhi and is on the board of the Entrepreneurship/ Innovation Cell at IIT Kanpur. At the forefront of public service, constantly striving to help create a positive environment for startups and entrepreneurship in India, he has served on virtually every Committee set up by government to look at different aspects of startups and entrepreneurship in India : The National Innovation Council, SEBI Committee on Alternative Investment Funds, , Investment Committee of the Government's India Aspiration Fund of Funds Committee to Examine the Financial Structure of the MSME Sector, Bombay Stock Exchange Hi-Tech Advisory Panel ,Telecom Centre of Excellence and the National Expert Advisory Committee on Innovation, Incubation and Technology Entrepreneurship. Mr. Srivastava is a co-founder of Ashoka University and serves on the Advisory Boards of Imperial College Business School, London and Uttarakhand and Himachal Universities in India.

Achievements and Honors: Padma Shri, Govt. of India, 2016. Distinguished Alumnus Award, IIT Kanpur, 1999. Lifetime Achievement Award, Dataquest, 2015. IT Excellence Award by the Prime Minister of India.





Scaling Innovations: Transforming ideas to solutions impacting society

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Indias Science, Technology and Innovation policies since inception have given special impetus to building a strong scientific foundation, advancing scientific temper and integration of technology and innovation with the sustainable development missions. The emphasis has been on developing affordable and accessible products and technologies impacting society and addressing the national and global challenges. From the Space Mission to the Green Revolution, to the White revolution, to Polio eradication and then Biotech driven Bioeconomy, we have seen technology impacting all spheres of life from health to agriculture to climate change importantly targeting welfare of human kind. Science has continuously evolved and new emerging and disruptive technologies have given us the confidence of science solving major problems. The Pandemic war was won by humanity with a very well-articulated scientific response. From vaccines to diagnostics and other medical counter measures - new technology developed on an accelerated pace. We have today developed important Platform technologies and globally a very robust research and translational ecosystem has been built. We are now prepared for a rapid response to future emergencies. The importance of Science & Technology for delivering affordable innovative solutions to complex societal challenges was very well recognised by the world in the pandemic response. It is however important to remember that it is not just the pandemic or health priorities which need science led innovations to bring out innovative products, this is an urgent need in all sectors from agriculture to energy to industrial products. There are a number of new emerging and disruptive technologies which need special attention if we as a country have to cater to our societal needs and also make a global impact .Some key areas of focus are AI ,ML ,Big data, Precision Medicine and Agriculture ,Cell and regenerative medicine ,the Omics technologies ,synthetic biology etc to name a few which have the potential to deliver innovative solutions, allowing us to accomplish our Sustainable Development Goals specially, Food and Nutrition, Health for all, Clean energy and climate . It is therefore imperative that we focus on encouraging cutting edge discovery research ,innovative technology and process development for affordable products ,and create an enabling ecosystem which allows translational research to move across the value chain .This requires intense engagement between Academia ,industry, start ups and society .Science ,technology and innovation have clearly exhibited that these are the three pillars contributing to economic and societal growth and development to achieve the goals of a Sustainable Universe . .

Speaker's Profile

Dr Renu Swarup, is the Former Secretary, Department of Biotechnology (DBT), Government of India. Having served in Department of Biotechnology for over 30 years, she was also the Chairperson of Biotechnology Industry Research Assistance Council (BIRAC). She also held the Additional Charge of Secretary Department of Science & Technology for a short period. A PhD in Genetics and Plant Breeding, She did her Post Doctoral Research at The John Innes Centre, Norwich UK, Dr. Renu Swarup has been instrumental in the planning and implementation of some major National programmes. As a Science Manager issues related to policy planning and implementation were a part of her assignment. She was actively engaged in the formulation of National Biotechnology Vision and Strategy in 2001, 2007 and 2015 and 2021. She was also a member of the Task Force on Women in Science constituted by the Scientific Advisory Committee to the Prime Minister. As the Secretary of Government of India, Department of Biotechnology, she led a Network of 16 Autonomous Research Institutes, 2 Public Sector Undertaking and a R&D Network of more than 5000 projects across more than 100 research institutes, Universities and Laboratories. In the recent COVID Pandemic situation she led the COVID Vaccine, Diagnostic and Genome sequencing Mission. The Public Sector BIRAC, for which she was the founding Managing Director and then Chairperson, had supported more than 10000 Startups and over 100 Incubators. She is a Fellow of the National Academy of Sciences (NASI) India, A Life Member of Trust for Advancement of Agricultural Sciences (TAAS) and a Member of the Organization for Women in Science for the Developing World (OWSD). She has received many awards, NASI PSheel Memorial Award, TWAS Regional Science Diplomacy Award, and the YB Chavan National Award 2021 for Public Service. She is currently the Vice Chair of the International Centre for Antimicrobial Resistance Solutions (ICARS) Copenhagen ,Denmark and also a Member of the Scientific Expert Group of the International Pandemic Preparedness Secretariat, Govt of UK, a Member of the Advisory Board of WHO for the National R&D Framework and the Advisory Board of the Hiroshima G7 Global Health Follow up initiative .She is a Member of the Board of Trustees of the M S Swaminathan Research Foundation ,and of the Board of Trustees of the Trust for Advancement of Agriculture Sciences. She is currently the Chair of the Governing Body of the Indian Association for Cultivation of Science, an Autonomous Institute of Department of Science & Technology, Govt of India and a Member of the Board of Governors of ICMR, AsCIR and IBEF. She was the Chair of the Niti Aayog Expert Committee on Emergency Response and Preparedness for Future Pandemics. She was also a Member of the Rashtrapati Bhavan Visitors Award Committee and is also a member of the National Start up Advisory Council, Govt of India. She is a Chair of various committees of Niti Aayog, Ministry of Health and Family Welfare, ICMR ,Ministry of Textiles and State Governments of Uttar Pradesh and Madhya Pradesh .She is also a Member of many Committees of Office of PSA ,DST ,DPIIT and other Central Departments



Ecology-Inclusive Economy: A Challenge for Future Science and Technology

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Science needs to overcome Ecological crisis. Ecological crisis cannot be overlooked anymore. The past experience revealed that science and technology have been more focused on the development needs of various products, and are said to be responsible for the changes in the environmental behaviour, including Global warming and climate change. Current challenges cannot be understood and analysed without knowing the science of nature. This is the time we need to focus on nature-related science issues and solutions that can help to develop an ecology-inclusive economy. This is a well-known fact that the major challenge of the last decades has been devoted to addressing economic crises, and Science and Technology played a major role in overcoming the same. Ecological crisis is prevalent and pervasive now. It is time that we need to review role of our science, technology, and its products that do not match to nature's needs. We should target to discover knowledge related to the science of nature that can ultimately help us restore nature and overcome the ecological crisis. Thus, the ecology-inclusive economy can address both which hitherto were biased for economic growth.

Speaker's Profile :

Dr. Anil Prakash Joshi is an environmentalist, green activist, and the founder of Himalayan Environmental Studies and Conservation Organization (HESCO), a Dehradun -based voluntary organization. He has coined GEP (gross environmental product), an ecological growth measure parallel to GDP. GEP has been accepted as a growth measure by the state of Uttarakhand on 5 June 2021. Under the aegis of HESCO, Joshi promoted research and development of new environment-friendly technologies for the agricultural sector, tapping the local resources. He has authored over 100 research papers and ten books dealing with sustainable development of the Himalayas through various means.

His one of the major contributions has been to rejuvenate streams and springs. His tool to regenerate these water bodies have essentially been through understanding science of Nature. Today hundreds of springs and streams are recharged by various organizations through protocol developed by Dr. Joshi. Dr. Joshi has launched several social programmes, based on resource-based rural development, such as Women Technology Park, Technology Intervention for Mountain-Eco System, Ecological Food Mission in Mountain and Women's Initiative for Self Employment (WISE) and has been reported to be successful in providing the villages with water mills, composting pits, toilets, plant-based drugs and herbal pesticides and rainwater harvesting techniques.

Ashoka, the social entrepreneurial network, elected him as their Fellow in 1993. The Indian Science Congress awarded him the Jawaharlal Nehru Award in 1999 and The Week magazine selected him as the Man of the Year in 2002. The Government of India included him in the 2006 Republic Day Honours list for the civilian award of the Padma Shri and the same year, he received the Jamnalal Bajaj Award for his efforts in the application of science and technology for rural development. For his passionate contributions, Dr. Prakash has been awarded with Mother Teresa Memorial Award 2021, Passion Vista, Most Admired Global Indians Award 2021, Uttarakhand State Gaurav Samman, 2021, and Padma Bhushan Award, 2020.

Sumant Sinha

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Energy transition is India's defining national opportunity - that can propel an increasingly affluent, better skilled, younger, and aspirational India on the path to Viksit Bharat by 2047. As 2025 marks 15 years of Sumant Sinha founding ReNew, this speech highlights three core messages: 1) India has already begun capturing the economic gains of the energy transition - creating 1 million jobs, fostering entrepreneurship, and building competitiveness. But the real opportunity ahead is far greater: to scale self-reliance and innovation for a sustainable, prosperous future. 2) Science without commercialization and competitiveness is just expensive research. To truly lead, India must accelerate the commercialization of clean-tech innovations and leapfrog into next-generation technologies - with minimal dependence on China across the manufacturing ecosystem. This demands a robust investment framework and comprehensive industrial policy support to turn breakthroughs into scalable solutions. This is a \$5 trillion opportunity for the next decade. 3) Today's right skill set for the clean energy transition is a blend: deep functional expertise and the ability to harness AI for maximum productivity. One without the other is incomplete—and increasingly irrelevant.

Speaker's Profile :

Sumant Sinha is the Founder, Chairman, and CEO of ReNew, one of India's largest clean energy companies. A global entrepreneur and internationally recognised thought leader on energy and climate change, Sumant founded ReNew in 2011 with a vision to drive a just and inclusive transition to net-zero energy. Under his leadership, ReNew has developed a diverse clean energy portfolio, including solar, wind, and battery solutions, with an overall pipeline of ~28 GW. The company offers comprehensive solutions across the entire decarbonisation spectrum, from clean energy to solar manufacturing to green fuels. Sumant co-chairs the World Economic Forum's Alliance of CEO Climate Leaders, the largest CEO-led alliance on climate change globally. Sumant is a Fellow of the Indian National Academy of Engineering and is also a member of the board of the US-India Strategic Partnership Forum (USISPF). Formerly, Sumant was the Chair of the board of the Rocky Mountain Institute (RMI), one of the world's foremost think tanks on the clean energy transition.

Sumant is a board member at IIT Delhi and has served on the boards of IIM Calcutta and Columbia University's School of International and Public Affairs (SIPA). He has been recognised as a distinguished alumnus by each of these institutions. He is the author of 'Fossil Free', a book focusing on India's clean energy transition. For his pioneering work, Sumant has been the recipient of several recognitions, including the Forbes Top 50 Climate Leaders 2025 and TIME100 Most Influential Climate Leaders 2024. Other notable recognitions include the 2022 USISPF Global Leadership Award, ET Energy's Chief Executive of the Year 2022, the Economic Times Entrepreneur of the Year Award 2018, and EY Entrepreneur of the Year 2017. He is the first Indian business leader to be recognised as an SDG pioneer by the United Nations.



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Speaker's Profile :

Dr. Devi P. Shetty is a renowned cardiac surgeon, entrepreneur, and founder of Narayana Health, a large Indian hospital network. He is known for performing India's first neonatal heart surgery, implementing low-cost healthcare models like the Yashaswini micro-health insurance scheme, and earning the nickname "Henry Ford of Heart Surgery". His work focuses on making quality healthcare accessible and affordable, a strategy that has been studied globally. He is the Chairman and Senior Consultant Cardiac Surgeon at Narayana Health and has completed over 100,000 heart surgeries. He trained under the National Health Service in the UK and is also a Professor of International Health at the University of Minnesota Medical School. He is widely respected for his innovative approach to healthcare delivery, which has been recognized by institutions like Harvard and The Economist. He has received prestigious awards, including the Padma Bhushan, the third-highest civilian award in India. He has received honorary doctorates from the University of Mysore and the University of Minnesota.

