

**BOOK OF ABSTRACTS OF TALKS AND PRESENTATIONS**

*made in the conference*

**Dialogues at the Science-Society interface:  
*Some contemporary issues and themes.***

**A Conference in memory of Prof C V Seshadri**

**8-10 Feb. 2018, IIT Madras Research Park, Taramani, Chennai - 600113**

*Held under the aegis of the*

**C V Seshadri Endowment Anna University Chennai**

*Sponsored by*

**Shri A M M Murugappa Chettiar Research Centre (MCRC) Chennai**

*With academic & intellectual inputs from the*

**PPST and Vidya Ashram Communities**

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## PREFACE

There are 29 abstracts in this collection, authored by 27 speakers or presenters, spread over 6 sessions and two and half days. The contributors come from varied backgrounds such as Modern S&T, Traditional Sciences, Arts, Social Sciences, Philosophy, Activism, etc., and their contributions reflect these diverse backgrounds, interests, perspectives and concerns. In this sense, what is happening in this conference is not a classical "Science-Society Dialogue", but a broader and evolving dialogue on knowledge itself, reflecting the reality that Science is no more the only knowledge that is considered valid and valuable for humanity. In the context of this conference, such a dialogue had indeed started and developed among its organisers over the email starting from around September 2017, most of which have been captured and are available at the conference website <http://au-kbc.org/cvsconf.html>. That the questions and concerns that Prof. C V Seshadri had raised over a quarter of a century ago are still the ones at the core of these dialogues just goes to show the visionary thinker that he was, and we are happy that this conference is being held in his memory.

We are grateful to the authors for making these contributions in time enabling us to produce this Book of Abstracts by the time of the Conference. Particular mention must be made of the cooperation and support of the members of the erstwhile PPST group as well as the Vidya Ashram group which provided the direction and content of this event. The support and guidance by the Conference Organising Committee chaired by Prof. M Anandakrishnan is greatly appreciated and warmly acknowledged. The enthusiasm and encouragement of Mrs. Premalatha Seshadri and the entire extended family of Prof. Seshadri have also played an important role in bringing this all together. Also acknowledged is the approval given by Anna University to hold this event under the aegis of the CV Seshadri Endowment in the university. Most importantly, such an event would not have been possible without the generous sponsorship by the Shri. A M M Murugappa Chettiar Research Centre (MCRC) which was the place where Prof. Seshadri had carried out his pioneering work that has inspired this conference. It is a pleasure to acknowledge the whole hearted support and encouragement we have received from Shri. K Raghunandan, the CEO of MCRC. Also acknowledged with happiness is the time and effort put in by Dr. D Vidya and Dr. J K Suresh towards the production of this Book in this form. A thank you to Vasudev Balakrishnan for doing the cover design.

It is hoped that the perspectives and understanding of the ongoing dynamics in the world of knowledge reflected in this Book would help in taking the Knowledge Dialogue forward for the benefit of our country and our people.

C N Krishnan  
Convener, Organising Committee  
*On behalf of*  
The Conference Secretariat  
AU-KBC Research Centre  
Anna University Chennai  
5<sup>th</sup> February 2018

**Session 1**

**Prof C V Seshadri, the person and his work:  
*implications and relevance for today***

## **Remembering Dr. C V Seshadri**

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Dr.C.V.Seshadri and I were colleagues at IIT Kanpur during the mid-sixties and early seventies. He was the Head of the Chemical Engineering Department and also Dean of Students Affairs. When the Institute went through a severe labour problem in early seventies, he was responsible for finding amicable solution due to the faith he enjoyed with the karamcharies and the students as well as the then Chairman, Board of Governors. His professional goal has always been towards affordable technologies, oriented towards the benefit of common person. He was persuaded by Mr. M.V.Murugappan to be the founder Director of the A.M.M. Murugappa Chettiar Research Centre (MCRC). It is a non-Governmental voluntary research organization, established in 1977 in Taramani area in Chennai engaged in research mission to take the scientific developments to the rural mass.

At MCRC, his special emphasis was on simple and affordable technologies from using uncommon materials. Since there were very few institutions in India devoted to rural technologies, he was able to attract substantial research grants from national and international organizations to help MCRC grow into a reputable and viable institution. MCRC is recognized by Department of Scientific and Industrial Research, Government of India as a Scientific and Industrial Research Organization to conduct research in various areas and is approved by University of Madras, Chennai to offer Ph.D. programmes in the areas of Energy, Bioenergy and Biomass for Rural Development.

Dr.Seshadri's vision is sustained by MCRC's efforts through substantial support by various funding agencies worldwide, including DST, DBT, MNES, CAPART of Government of India to carry out research and rural development programmes. The research Centre has been working on devices and technologies for rural application eco-friendly technologies to combat pollution. Resource utilization, recovery and management are the major areas concentrated by scientists in MCRC. Many of the devices and technology packages are eco-friendly and are dovetailed with local needs. Simple technologies have also been designed for the use of local artisans.

Dr. Seshadri developed Gandhian ideas on organic farming and self-sufficiency at the MCRC. He contributed to the development of Spirulina algae, which was considered as a healthy supplement to the government-run noon meal programme. His work resulted in his being given the Jamnalal Bajaj Award for Application of Science and Technology for Rural Development in 1981.

## **C V Seshadri: Energy as Value and Food as Energy**

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How does one relate a shampoo to hydrogen energy? Or a kattumaram (catamaran in older usage) to algae as nutritional supplement? Or screen printing to transhumant communities in Kumaon Himalayas?

All these were interconnected, according to CVS, who even formulated a mock “Law of Impotence” that it was not possible to construct an isolated system ever, not even conceptually.

At the heart of the interconnectedness that he had envisioned is the web of deep and intricate connections between food and energy. Food in his vision stood for not just for the edible substance; it included nourishment as well as nurture.

Energy is not just another concept in science. It has become a value parameter. Use of the Law of Conservation (and the practice of promoting strong linkages between US\$ and petroleum) has led to a ranking of the utility values of all sources of energy. CVS was one of the very few researchers globally who have spotted the spurious quality-ranking. It integrated tightly with science-based practices in production, manufacturing and general delivery of good and services. He pointed out that the quality-ranking - intact to this day - derived also from the Second Law of Thermodynamics whose current and dominant formulation (originating with Boltzmann) is based on the rather weak foundation of isolability of systems and unidirectional flow of time and entropy.

The impact of this unstated yet far-reaching value system is on food. Food is highly undervalued. Ingestion of food in a biological system proceeds at a slow pace, close to reversible steps that are considered conceptually ideal in thermodynamics. Therefore, one should expect a high value rank for the process. However, the calorific value of a food substance such as carbohydrate, which is lower but comparable with that of coal, has a lower quality value. Coal is placed higher.

This has introduced serious distortions in policy and planning that have affected the lives of literally crores and crores of people and animals as well as plant life. CVS analysed the flow of useful energy (in the thermodynamic sense) in Indian agriculture just over a generation back and observed that almost half of all useful energy was consumed in producing food and in cooking it. This was never a consideration from an energy policy perspective. Economic advancement is partly measured in terms of the proportion of income one spends on food, and that is on a declining trend for almost a generation in India.

The same cannot be said of energy used in food production and cooking. The practice of energy analysis in food production, distribution, storage, packaging and cooking has not been strengthened with conventions and reference values in any country in the last one generation. Interestingly, today

less data is available in OECD countries on the energy values of inputs, citing trade secret as the main reason!

Interconnectedness of food and energy is thus deeper and more intricate than is popularly understood. The distortions in this connection are based on foundational concepts and practices in science and are thus not easy to challenge or change. These distortions tend to fortify the nexus between petroleum as an energy source and food production, imposing indirect costs on developing countries. They have the potential to make food again a strategic tool in geopolitics.

CVS made a considerable effort to correct this set of distortions and introduce a new equivalence between food and energy. A generation after he launched the endeavor, the challenge remains as formidable as before. It is worth our effort to take up the challenge and re-position food and nurture as the core of the global system of values.

## **C.V. Seshadri - the Philosopher Scientist**

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To understand Seshadri's ideas and work, one needs to dive somewhat deep into epistemic waters. What is at stake is what truth is. And it is here that he connects with Mahatma Gandhi and calls him a great scientist. It is at this level that he connects with PPST to uphold multiple traditions of truth and therefore science. This concern is also seen in the theory and practice of science at MCRC in his leadership. His work on Thermodynamics constitutes a great case of how he questioned certain basic assumptions of Science. He questioned 'isolability' - the idea of an isolated system. What is at stake here is the idealization which takes to zero all the interactions of a system with its surroundings. The way he understood a system finds elaboration in the very small booklet 'Development and Thermodynamics'. The many faces of a system or the different ways of viewing a system amounts to, in today's language, constructing various edges connecting the system as a node to a variety of other nodes in a complex network.

The work and ideas of CVS are, therefore, greatly relevant to understanding and handling the new dynamics unfolding today in the world of knowledge. He thought differently, his ideas about evidence and inference were not the same as those enunciated in the texts of Science and the university. MCRC may also be seen as an embryonic attempt at experimenting with institutionalization of science (or for that matter knowledge) in a way fundamentally different from the way the university does it. Today, when the new dynamics in the knowledge domain is again raising the question of new possible ways of institutionalization, the MCRC experiment may have a radical message.

I shall expand on this drawing on my experience with him on the football field at IIT Kanpur, and when he was Dean of Students there, and finally at MCRC Chennai where I spent a full week writing an appreciation/critique of his work on Thermodynamics and while working together in PPST.

## Remembering CVS

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“Indians gave colour to the World” said CVS in a conference on Natural Dyes held sometime in 1995. This was a preparatory event leading to the congress of Traditional Sciences and Technologies of India that took place at the Anna University at Chennai towards the end of December 1995. This was perhaps the last public event at which I heard him since by the time the conference was held in December he was no longer with us. It strikes me that I have come away after every single interaction with him, be it participation in a meeting or reading an article written by him or even travelling with him with some memorable quotation or insight.

I had known him from 1982 when I met him first till 1995 and I had the opportunity to interact with him formally and informally in many capacities. I had participated with him in formal meetings and seminars, presentations made to Government officials and a Minister of Science and Technology, travel with him to Kalady village in Kerala where we shared a room in a picturesque village on the banks of a river where for a period of five days there was a workshop on – “Ayurvedic Principles of Food and Nutrition”. He had wide ranging interest and we spoke about a range of topics including – agriculture, biodiversity, energy, spiders, metallurgy, history and so on. I also had the privilege of frequent personal interactions which ranged from his driving up 100 kms away from Chennai to attend my wedding in a temple in 1986 to some occasions when he would – “drop in” at my residence in Thiruvanniyur on his way back from MCRC to his residence. He would venture boldly to think about and offer opinions on various topics and he was never discouraged by the thought of – “making a fool of oneself”. It is amazing that he stood for elections in the South Madras Parliamentary Constituency when he was fully aware even at the time of filing his nomination that he had little chance of even – “Recovering his deposit” – to him it was an occasion to learn and reflect and discuss about.

I count the following as being amongst his wonderful qualities -

- Though he was born with the proverbial – “silver spoon in his mouth” – he had the extraordinary capacity to put himself in the shoes of the other person, a rare empathy and it came as no surprise to me when I learnt that in his days a Dean and Professor at IIT, Kanpur he was the only “elected Dean” and enjoyed the trust of the students, the faculty and everyone on campus.
- He had the capacity to go straight into the heart of any issue and come up with deep insights. In his preface to his outstanding book – “Equity is good Science” published in 1993, he starts with the passage – “India has seen two bloodless revolutions in the twentieth century. One when we eased out the British in 1947 and one when the Western powers took us back through their economic theories in the 1970s”.

His personality is best understood by the following passage which forms the closing paragraph to the preface that he wrote to the above book – “I would be lacking in my duty if I did not acknowledge the help of my village friends. From the remotest village in the Kumaon Himalaya to

the tiniest bay fishermen, I have invariably received more than I have given. I treasure their kindness.”

## **Commemorating Prof. CV Seshadri (CVS): the Conference and Beyond**

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Prof. Seshadri (CVS) stood for many things in his life and his work, of which preparing the grounds for a new foundation for *knowledge in society* (although the term itself may not have been current in his times) may be considered one of the most important. In light of this, a meaningful commemoration of his life and work is likely to be primarily determined by how we employ them to produce new imageries and idioms of an alternate world, which in turn are capable of enabling contemporary struggles for equity and justice. It is evident that such processes are urgently required in the society, given the speed with which new forms of power and control have emerged, destroying livelihoods and spreading destitution to a billion people in the country.

Four decades ago, it was a herculean task to attempt to establish that there are systematic inquiries of the world different from ‘Science’ (Western Science), that the ‘Needham question’ (<https://goo.gl/PznMf1>) merely rephrased the colonist’s denigration of the other, that the Kuhnian hypotheses (e.g., <https://goo.gl/twRcHm>) were only formally phrased tales of self-deception and aggrandizement; more specifically, that the logic of ‘Science’ provided both the reasoning and the means for violence that informs the conquest and destruction of the other, and so on and so forth.

For many amongst us, Prof. Seshadri is remembered as much for his exploration of the hidden meanings and biases of ‘Science’ as for his association with the Patriotic & People Oriented Science and Technology (PPST) group. For him, the primary challenge of the time seems to have been the deconstruction of the legitimacy and edifice of a science that falsely claimed universality for itself and became a willing tool for the enslavement of the world. When taken as a whole, his work at the Murugappa Chettiar Research Center (MCRC) and with PPST must therefore be interpreted as an attempt to develop ideas and practices of a new science by challenging dominant theories (e.g., thermodynamics) even while investigating practical alternatives that exist in the margins of extant science (e.g., algal supplements).

This paper aims to outline the dimensions through which the changes in the world around us over the last thirty years can be explored, and identify the crucial ideas therein that can help us contemporize the legacy of Prof. Seshadri. The strong coupling of Science with the market, emergent models of the world and the development of new discourses on knowledge in society are considered as three critical starting points in this exploration. We also discuss how a contemporary reassessment of Prof. Seshadri’s work provides a natural continuity with the idea of Lokavidya - knowledge in society – that has the potential to serve as the basis for restoration of initiative and justice to the people of this country after three centuries of enslavement and deprivation.

## Roots of Indian Creativity Revisited: 1996-2018

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In a lecture in 1996, I had observed:

*Perhaps for those who believe that colonial period had extinguished the fire of creativity in Indian society, the message is, “sorry, you were looking at the wrong door”*

*The door to people’s creativity was actually never closed. A large mass of poor people had no choice but to be inventive in order just to survive. On the eve of 50th anniversary of independence, it is appropriate that we ask ourselves a question, ‘why didn’t the pervasive potential for creativity and innovations by farmers, artisans, tribal, pastoralists, fishermen and women and forest dwellers never become the building block for nation building at any level so long?’*

*It is not that there never was a concern for building upon local knowledge and institutions. It is just that in our drive to develop through borrowed concepts and instruments we created such a super structure of the state that it lost its ability to scout, much less spawn experimentation and innovations at grassroots. If it was only an absence of sensitivity, the problem would have been less serious. But this statist structure also developed antibodies which ensured that if some innovative farmer or artisan succeeded in breaking out of the mold of mediocrity, the myopic mandarins in this system will ensure quick rejection of such hopes. That explains partly why there is so much of cynicism and hopelessness in the society.*

*Elite sees hope in the burgeoning consumerism. It is not in the realm of new discoveries, inventions and innovations (with the exception of few sectors such as information sciences), that we expect global leadership to be ever ours. Be it sports, or science, the dominant alibi seems to be, ‘that is the best we can do’. No more, no less. India, as we wag had put it years ago, is a country of losers. Is it?*

*There are easy explanations for this state of affairs, An obvious and popular explanation is decline of leadership in all this sphere of life. But such an explanation masks a more serious problem in our society, which is our inability to follow the leadership based on competence, commitment and concern for ethical and civil values. There is no dearth of such leaders. And yet, they are not the point of reference.*

I will reflect on the journey of thirty years of Honey Bee Network and more than 70 years of Indian republic under the guidance of seniors thinkers like Dr Seshadri, Dr A K N Reddy, Dr Y P Singh, Dr K M Munshi, Shri Dharampalji etc., ask new questions, seek new answers and explore the institutional structures of thought that are still unwilling to make robust bridge between informal and formal science and technology for the larger social good.

Indian renaissance cannot be deferred for too long, notwithstanding look-east, act-west domination in Indian polity. Gandhian utopia matters and decentralized, diversified, inclusive and compassionate future is possible despite occasional inflammation of intolerant fires. Inclusive, innovative and integrated India is a viable idea.

## **Dr. C .V.Seshadri– a multidimensional personality**

Message from Dr. M.R. Srinivasan

Former Chairman of Atomic Energy Commission and brother-in-law of Dr. C V Seshadri

Dr. C.V. Seshadri was an unusual person who was unconventional in many ways and left a great impact on all those who came into contact with him. Though born to privilege and comfort as the eldest grand-son of the erstwhile Divan of Travancore, C.P Ramaswamy Aiyar, he empathized with the less fortunate people and tried to help them in any way he could, throughout his life. I met him in 1960 in Bangalore through a common friend. He had just then returned to India after securing a PhD from Carnegie Institute of Technology, Pittsburgh, USA (later known as Carnegie Mellon University). He taught at IIT Kanpur for a number of years, where he became a very popular teacher. Subsequently, he moved to Bangalore and Mysore and eventually to Chennai to start the Shri. AM Murugappa Chettiar Research Centre (MCRC) at Taramani. He devoted his entire career thereafter to developing technologies relevant for rural conditions, involving low investments and skill sets that could be mastered easily, including by rural women. Thus, he built low-cost windmills and solar water distillers to produce safe drinking water for infants. His major contribution was in the cultivation of blue green algae and championing its potential use in low cost Vitamin A supplement essential to prevent childhood blindness. Spirulina has now become an important nutrition supplement and a “nutraceutical” for helping convalescing patients. This has now become a big industry in India and elsewhere.

Dr.Seshadri was a multidimensional personality, an original scientist, a great nature lover, hiker, sportsman, an inspiring teacher and a connoisseur of music and dance. When he went missing in the sea as an energetic sixty five year old in 1995, society was robbed of a person who had many more years of creativity left in him.

In remembering Dr. C.V. Seshadri, the younger generation can recall the colourful personality who was always questioning (in the mould of Socrates) and who challenged conventional wisdom by pointing to the simplest of questions. In an India which is seemingly driven by conformism, we need people like Dr. C. V. Seshadri for essential course correction.

**Prof. C V Seshadri – an inspiring engineer and an articulate philosopher of science**

Message from Prof Ashutosh Sharma

Secretary DST, and Prof C.V. Seshadri Chair at IIT Kanpur

The conference on Science-Society Interface Dialogues being held in memory of Prof C.V. Seshadri between the 8th-10<sup>th</sup> Feb 2018 is a landmark effort that brings together academicians, activists, scientists, artists, social scientists and thinkers to celebrate and take forward the pioneering legacy of Prof C.V. Seshadri. This is indeed an apt tribute to a legend who was an exceptional developmental scientist and a visionary in search of more equitable and sustainable interfaces between science and society. A chemical engineer by training who taught at many institutions before moving to IIT Kanpur, Prof. Seshadri distinguished himself as an innovator who engaged strongly with several everyday problems of marginalized sections of society and rural areas to seek practical solutions to mitigate and solve their concerns. For example, he pioneered many of the discourses towards alternative and renewable energy resources that have now become more mainstream. He worked on developing appropriate technologies that use local resources and skills to address local needs. These involved working with building low-cost windmills, solar roofs and regenerator systems, biogas, low-cost but robust housing materials and techniques, and so on in his capacity as Director of MCRC, Chennai. His varied grass root technological innovations included working with synthetic catamarans for fisher folk that improved catch. His most enduring legacy has been in the area of low-cost cultivation of spirulina algae as a nutritional supplement and also source of high protein and beta carotene used by cancer sufferers. He was also greatly concerned with the empowerment of women and engaged them in training of grassroots technologies in a bid to improve rural nutrition.

Prof. Seshadri had collaborated with numerous institutions in India and abroad including DST, DBT, CAPART, NRDC and others. He was also an articulate philosopher of science who forcefully argued that the progress of technological modernity in India, with some of its roots and shoots in colonialism, had certain inherent biases. While science is global, technology must have local elements. Not all technological solutions are universally applicable to non-western societies. These have to be often re-appraised and re-engineered within their own paradigms. With his multi-disciplinary interests and zestful pursuits which included trekking and swimming, he was also an inspiring teacher and legendary figure to many of his students and associates. Having spent over thirty years in the Department of Chemical Engineering at IIT Kanpur, both as an undergraduate (1977-82) and as a faculty member (1990-), I am personally aware of the many lives he has inspired and the love and respect his former colleagues and students have had for him.

I wish the conference and its deliberations success in taking further the momentum toward resolving many of the ongoing challenges at the interface of science and society. I am sure that the life and

approach of Prof. C. V. Seshadri will continue to inspire generations of scientists in this worthwhile goal.

**Situating Science and Technology between Academia, Art, and Activism --  
Panel discussion**

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How can globally-engaged scientists and humanists, situated in different disciplines and on different continents, find ways to discuss questions about science, technology, and society? Communication technologies, global conferences, and international think tanks have proliferated since the peoples' science and appropriate technology movements initiated similar conversation in the 1980s.

How have social movements, voices of the disenfranchised, and ordinary people challenged top-down notions of scientific expertise? What promises and perils does populism bring? This panel combines scholarship, art, and technology, bringing together artist, software professional and film scholar Karl Mendonca, computer scientist and fiction writer Anil Menon, and feminist historian Kavita Philip.

Bringing into conversation speculative writing, art, history, and media, this panel suggests that we need to forge a new imagination of the future, rather than repeating conventions of academic debate and activist sloganeering.

Each panelist will present facets of their own artistic/scholarly work that has engaged with some of the new technologies and practices that animate a global conversation about the production of popular forms of knowledge in engagement with histories of science and technology.

**Session 2**  
**Traditional Knowledge Systems of India:**  
*sharing some experiences and reflections*

## **Ayurveda to enhance public health in India**

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In spite of the progress achieved since Independence, most of the health indicators of India are considerably worse than the world average. One of the major reasons for this dismal state of affairs is the highly inadequate government spending on health in India, which at around 1% of the GDP, is abysmally low compared to the world average of 5%. Another equally important reason for the poor state of healthcare in India has been the total lack of state support to the Indian Systems of Medicine like Ayurveda, Siddha and Unani.

Since independence, health care planners have relied solely on Modern Western Medicine (MWM/ Allopathy) to achieve better health indicators, but this has not resulted in better health for our people. As diseases are innumerable and newer ones keep appearing, creating new vaccines and tailor-made drugs with limited scope (and numerous side-effects) for each new disease as advocated by MWM, has not proved to be a viable strategy even in the West and least of all in India.

This presentation based on our experience in the field of Ayurveda over the last 30 years, presents an overview of some of the current public health issues facing India, the nature and extent of the problem, and points out that relying on the Ayurvedic and other Indian Systems of medicine and radically altering the health care policy of India, we could enhance health care in India.

Some of the major public health issues discussed in this presentation are: malnutrition, high rate of anemia among women and children, issues related to pregnancy, mother and child care, acute respiratory infections (ARI), acute diarrheal diseases (ADD), and communicable diseases.

## **Creative communities can address crisis in Indian agriculture**

Anil Gupta

Diversity of agricultural ecosystems requires tremendous place specific knowledge and institutional structures for using natural resources sustainably. But generalised knowledge by definition provides scale, ignores location or place specific constraints and thus discounts local knowledge.

Indian agriculture development is a story of such Agro and so up-ecological neglect but giving farmers an opportunity of scalar advantages, bigger markets and more income in the medium term.

Consequence is sharp decline in water table, mining of soil nutrients, depletion of soil organic matter, loss of Agro-biodiversity, resistance among pests to excessive use of chemical pesticides Etc.

Declining productivity of all external material inputs has created a crisis. Policy planners are unable to increase prices to contain inflationary pressures. The margins have gone down and in some cases are negative-a fact acknowledged by the government. But there is not any concern for reduction of cost, use place specific knowledge and maximising knowledge and minimise material inputs including water.

At this juncture, the three decade long journey of Honey Bee Network and thousands of farmers innovations, traditional knowledge practices and contemporary experiments find a new relevance.

Government is unlikely to shift gears given strong lobbies of chemical input industry and civil society is weak to create bottom up horizontal network for Restoring ecosystem health beginning with soil health, enriched agrobiodiversity and working with nature rather than against it.

I will share how mapping unmet needs has helped create new ways of engaging with youth through Techpedia.in [gyti.techpedia.in](http://gyti.techpedia.in) [Ss.sristi.org](http://Ss.sristi.org) and numerous databases in open source and creating Biotechnological innovation ignition schools to validate and value add farmers knowledge and generate sustainable solutions. Hopefully, start up movement at some stage in future will tilt towards rural youth and mobilise the knowledge of elders and enthusiasm of youth in formal and informal r&d institutions.

## **Agariyas and their Iron: Lessons learnt**

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Technology/engineering is developed and sustained in the context of a society, its culture and economics. In that sense, there is an element of the art which is in tune with the underlying natural science. Acceptability/feasibility is therefore not limited to a scientific(?) question alone. Development and sustenance, and achieving excellence in a technological practice in particular, need synergy with the culture and philosophy of the practitioners of the trade. A society looking for prosperity through technological advances therefore needs to understand the cultural milieu of its people. One way to do this is to study the trades that the very people practiced for prosperity and wellbeing of the society, and achieved excellence. Ironmaking is one such example.

Iron and steel trade in India had maintained a high level of excellence in terms of quality and quantity, till the arrival of the large scale production technologies from the post-industrial revolution European culture. Numerous references exist, Delhi iron pillar and the wootz steel of Damascus sword fame being only the well-known examples.

Making of iron from iron ore and charcoal is a difficult technology. The temperature needed for making iron of quality necessary for use in agriculture, house hold items, buildings or warfare is in excess of 1350-1400°C. This is near the limit of temperature achievable using charcoal and atmospheric air. Small variations in atmospheric conditions and in the process can make the difference between success and failure. This may be the reason why iron technology was late in arriving anywhere in the world, and once it arrived provided the foundation for rapid expansion of civilizations. Iron technology in that sense was truly high-tech in the traditional setting.

In India, the technology developed early and seemed to have evolved into high quality manufacture almost two thousand years ago. It maintained its preeminence well into the latter half of the second millennium. Development and sustenance of the high quality of the product would have needed keen observation and incisive analysis, on one hand, and establishment of standard practices on the other. The study therefore should be enriching. Since there are no standard documentations available, it is difficult to understand the methodologies adopted. One can only glean these from the stories and the ‘myths’ and the lifestyles of the practitioners. The iron smelters of Central India, classified together as the Agariyas, are representative of the class of the practitioners and their story is revealing.

Agariyas are the iron people. The community is deeply engrossed in their practice, such that their social mores, Gods, myths and ‘magic’ or even marriage rules, are all intertwined with the iron making trade. The important elements of the technology are codified into their beliefs and stories. For example, why they should run their furnace only in the night is related to their enmity with sun, and how they should prepare the furnace for the operation evolves out of a dialog with their God. The stories also reiterate the pride that they felt about their trade and themselves.

That the excellence a society achieves depends on the devotion that it develops towards its goal by embedding the knowledge in its socio-cultural base is clearly discernible when one studies the Agariyas.

### **Artisanal metal technologies: historical trajectory and survival**

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Respectability for traditional technologies and practitioners formed an important part of the development paradigm expounded by C.V. Seshadri. As paraphrased from Wolfgang Sachs, 1992, 'The Indian scientist, C.V. Seshadri in a paper on 'Development and Thermodynamics' has provided some original clues to the historical development between industry and science. As Seshadri pointed out, both nature and non-Western society and proved to be losers when thermodynamic definition of efficiency became the criterion for development: 'In fact all processes or work effected at ambient temperatures (such as handicrafts, tribal processing the resources of the forest etc.) are discounted in the suzerainty of modern science (as inefficient).' Ziauddin Sarkar (1998) in 'Postmodern and the Other' also points to the articulations of C.V. Seshadri that 'traditional crafts and technologies are designated as inefficient and marginalised' in the paradigms of modern science.

This paper touches upon some of the skilled artisanal metalworking technologies that India was famed in antiquity but which have greatly declined in recent times, against the background of prospects for their survival or revival. Several of these metal crafts were kept alive by the vibrant five-fold traditional communities of the Vishwakarma and Kammalar, though some of the groups are increasingly facing marginalisation. India was famed in antiquity for the making the legendary wootz steel, a European corruption of the word 'ukku' in southern Indian languages, observed by several European travelers and traded to West Asia to make Damascus swords. Ukku was a high carbon steel of 1.5% carbon made by crucible processes and the use of high-carbon steels may go back to early antiquity with some examples from at least the early historic period in southern India as suggested by some of the author's studies. In many parts of southern India there is evidence for crucibles and slag from wootz steel making as reported by the author from Tamil Nadu. Archaeometallurgical surveys have also been made in the Telangana region which in its heyday was a major centre of iron and steel production (with studies made in the 80's by Thelma Lowe who also interacted with Seshadri, followed by S. Jaikishan and then by the author in collaboration with S. Jaikishan, S. Ranganathan NIAS and G. Juleff). Several blacksmithy communities still live in proximity to such archaeological debris of iron and steel making. Metal icon making and bronze and bell metal making flourished in the Thanjavur heartland going back to Chola times. There has also been a vibrant tradition of making highly skilled vessels of high-tin bronze (23% tin) especially by the Kammalar community in places such as Kerala which is greatly in decline but astonishingly goes back to Iron Age finds such as from Adichanallur (as shown by the author's studies). The metal mirror craft from Aranmula, is also a rare and specialized tradition shown to be of specular bronze (as seen from the author's studies and researches in collaboration with I. Glover). Although this craft has received a GI patent, there are other challenges to keeping it viable since only a few traditional families now practice it. The

challenges in terms of survival of crafts are many given that metalworking is labour intensive, while the paucity of raw materials have led to several crafts depending heavily on re-cycling. In some cases the coming together of artisans under co-operative societies may have helped to promote livelihoods. The revival of crafts may require sustained engagement between crafts communities and other stake holders such as cultural practitioners, educationists, scholars and students. Lessons from an iron and steel smelting experiment at NIAS in collaboration with J. Kenoyer are touched upon, involving potters and blacksmiths working with students. Thus, from the author's field and archaeometallurgical studies some vignettes concerning artisanal technologies and strategies for their survival and better integration into the educational milieu are touched upon.

## **Traditional mathematics and astronomy in the context of present day India**

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The nature of discussion on the knowledge systems including comparison with the prevalent 'modern' dominant systems would be varied depending on the nature of the discipline considered. In disciplines like agriculture, water management, medicine or architecture, the differences between the Indian and modern methods are glaring. For instance, there is a clear cut distinction between the characterization of a disease and its treatment in allopathy and Ayurveda. In more theoretical disciplines like astronomy and mathematics, very clear cut distinction in the sense of 'this method' in total contrast to 'that method' is not there. However, the traditional Indian astronomy and mathematics have very distinctive features, compared to modern astronomy and mathematics descended from the Greko-European tradition. It seems to me that the discussion at large seems to have moved from negating the 'universality of science' to recognising the distinctive features of the Indian tradition, and their ramifications. As an example we can compare the the geometry which arose from the 'sulvasutras' in the Vedanga period, and its later systematisation with the somewhat rigid axiomatic structure of Euclidean geometry.

Work on Indian astronomy and mathematics, with a view to disseminate it among the modern-educated audience in India and elsewhere has been going on nearly two centuries, though not with the same vigour or respect or enthusiasm, always . For some of us, there was a fresh impetus and focus provided by the famous book of Dharampal on traditional Indian science and technology in the 18th century. Scholarly work in this field with translations and explanations of important texts has been going on steadily for several decades. The efforts of the last half a century has uncovered a great deal of understanding of the post-Bhaskara period, especially, the important work of the Kerala School. There is still a lot more that needs to be studied and comprehended about Indian tradition of sciences. By and large, the Indian academia is still not looking at Indian sciences as a topic worthy of serious study. It is up to all those who visualise that the traditional sciences of India are of relevance in the contemporary context, to put in serious efforts to study these sciences.

It is only then that our discussion of the relevance of the non-modern, non-western traditions or even popular knowledge etc will become more concrete and meaningful, and help the younger generation today to take up their study seriously.

We now come to the regular school education system. There are sporadic references to Indian traditions of astronomy and mathematics. Actually, much of school level mathematics is either Indian in origin or has deep connections with India. This is true to some extent at advanced levels also ( I am referring to the calculus concepts, for instance). One does not get this impression from the way the various topics are treated in the school text books, with only some stray references to ancient Indian astronomer-mathematicians in boxes. There is a crying need to change this. This is not only for 'pride' and 'priority in discovery'. It is also for the Indian methods which are much more flexible and direct, not burdened by the excesses of rigour, and rooted in our society. As has been pointed by some discerning critics of our education system, the whole of the present mathematics education is geared towards producing 20 or 30 outstanding international-level researchers. This should change in favour of crores of students in the school system, by rooting it in our conceptual framework.

**‘Testing’ & ‘Validation’ of Traditional Knowledge:**  
*Reflections of some efforts and experiences*

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Is there a need for “Testing” or “Validation” of traditional knowledge? This presentation is to share some reflections about - who needs this (if at all), who has been doing this and some of the recent trends. Efforts at validation have been of various kinds and with different motivations and interests such as -

- To pick up bits and pieces or chunks of traditional knowledge, materials, biodiversity etc. essentially to incorporate them in a – “Modern Scientific Framework”, be it of health, agriculture or other areas.
- To separate out what is valid, current, relevant from what is meaningless, dead or irrelevant based on the understanding that – the times have changed, we need to separate out the science and technology from aspects that are superstition, irrelevant etc.

During the last few decades there has been an increasing realisation and understanding that there may be various geographic, cultural and value elements underlying and embedded in various kinds of sciences and technologies. There has been a better understanding and discussion about the nature of traditional knowledge, its social organisation and an appreciation of the fact that it may have different approaches in terms of the - nature of theories, measurement and quantification, experiments and observations, testing and validation and parameters used to construct theories. Nevertheless, collaborative efforts involving traditional and modern scholars in a partnership with any sense of equality (both in terms of resources and power, as well as on the grounds of epistemic validity) have proved to be almost impossible to conceive, leave alone achieve. However, there are some interesting initiatives on the ground which are in the nature of efforts led by the consumer / end user of this effort. For example, in the case of medicine there have been – efforts at integration of knowledge, wisdom and practices from multiple traditions of health care that are / free of any “hangover” of methodologies. Some of these initiatives have become quite powerful since they are capable of horizontal spread and acceptance through new age media. In order to transform these kinds of initiatives to a more powerful and effective level, we need to nurture them, so that -

- They must involve both traditional and modern experts in a partnership with some sense of equality
- The end user / consumer of the knowledge / technology generated must also be a partner in this effort with an equal – “Epistemic status” and
- Such efforts must be nurtured patiently with substantial investments in terms of time and resources

There are no pre-existing models or templates for such efforts but the Indian society with its eclectic traditions and genius for synthesis can provide the most fertile ground to nurture them.

## **Perils of the Past and the Promises of Tradition**

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Dharampal, who was a major inspiration for PPST, did not very much concern himself with our glorious past or grand systems of knowledge or the Shastras.

He always invoked the bundle of traditions of our people consisting of their practices and skills, ways and manners that have been buried under hostile conditions of colonial rule. He urged us in the PPST to find ways of bringing them out and relate ourselves to them, the living traditions of our people.

His thesis was that the traditions of our people have not become a dead past but are only dormant and waiting for favorable conditions to come back and assert themselves. He saw the efforts of PPST and others as attempts by our elite to relate themselves to this dormant creativity of our people. He therefore enthusiastically welcomed every expression of our people however crude and distorted they may appear to the elite. His famous line was that our people and their ways will come back into their own.

Dharampal's archival research was aimed at convincing the disoriented elite of our country that our society was functional even around the time when it came under the British rule. He was at pains to show that it is not our Shastras and Pundits but the humble Shudras and women who have preserved our culture and traditions. He often invoked the name of Mahatma Gandhi to reaffirm his faith in the genius of our people.

Towards the last decade of his life when he went beyond the main body of his work to understand BharatiyaChitta, Manas and Kaala, he chose to read Ramayana and Mahabharata. It is worth noting that he did not attempt to study the Shastras, not only because he lacked the equipment to do so but perhaps because of a suspicion that our lofty Shastras may not help restore functionality to our society. My understanding of Dharampal suggests that he was less concerned with past glory because of its own perils. For, it is only through a theory of the past that one can reconstruct the past. In that sense, there is no past without the theory, irrespective of our acknowledgement of it. Further, the idea of many pasts is a default position for dealing with the past although at times a single past may come to dominate our discourse. For example, Gandhi's conception of our past dominates the thinking for at least a couple of decades around 1920 although there were notable opponents to it. Today, other ideas of the past have come to dominate the whole spectrum of Dharma, caste and social Justice.

The process of reconstruction of the past is often fraught with an inherent danger. The connections, evidences and interpretations employed in the process by their very nature allow for multiple and equally authentic pasts to be derived from the same or similar situations. The very recent incident of the Dalits celebrating Bhīma Koregaon victory and the unrest that followed is sufficient proof of the dangers in the reconstruction of the past. Mahatma Gandhi's theory of Swaraj produces an Indian past characterized by ahimsa, self control and simplicity. Such a past was and could be put in service of the traditions of our society and people. The new Nationalist past of recent times attempts to serve an Indian past that is self confident, militaristic, and even pompous. The possibilities of a militaristic and/ or a scientific past are being witnessed today through a widely socialized symbolism of a

tolerant Hinduism under attack which can only be repulsed through a show of strength and if necessary through a recourse to violence.

Unlike the past, traditions can be largely understood only through the practice. Traditions, despite their alleged rigidity, are more often very flexible and accommodative. They keep modifying themselves so as to be alive. To relate one's self to traditions is almost the same as relating oneself to one's own people who are the carriers of these traditions. Standing with our own people also amounts to standing by our traditions.

Before ending this note, I wish to share a few apprehensions about attempts at reviving or resuscitating our traditions. It seems to me that one can get trapped in what one may call a certain componentization approach to traditions. It is as if by recreating several components or traditions like Ayurveda we may obtain the whole of tradition. Another danger in reviving tradition is a tendency to view our great traditions as museum objects to be showcased to a clientele that finds a worldwide market for them. One may have to look at various projects that have been attempting to excavate texts rather carefully. While as scholarly exercises they are commendable, they are often blind to the social conditions that are needed for these traditions to become useful to our people.

Insofar as there are no traditions that are accessible beyond what one may call Lokavidya, it seems to me that we must choose to reconstruct only such pasts that are likely to serve what may be termed living traditions of our people. By doing so, we shall only be acknowledging the subordinate status of the past to the living traditions of our times.

### **Session 3**

## **Impact of the Net & the Web and other recent scientific advances on the Knowledge Domain**

## **The impact of the ICTs: The new ‘Knowledge – Politics’ Dialectic**

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By and large ICTs relate to the computer and the cell phone. A little over a quarter of a century ago the cell phone appeared and it was the same time when the net and the web too appeared. Together they took the world by a storm. First the world of knowledge was destabilised and then the world of politics. Command of Science in the world of knowledge, the place of knowledge activity, criteria of legitimate knowledge, ideas and methods of validation, truth, hierarchy between various knowledge domains, monopoly of the Science-paradigm, respect for other knowledge traditions, appearance of new sciences, fresh spaces and opportunity for legitimisation of Lokavidya, appearance of new technology, nature of commercial importance, controls, knowledge movements, name anything related to the world of knowledge and there has been a fresh debate on it questioning the received ideas and proposing takes that do not fit into the extant practice and understanding. To top it all the marriage of the net and the cell, the smart-phone, has created a political condition that opens up big spaces for questioning the monopoly of European Rationality as the sole authority for determinations of what is true and what is false. This is to say that the epistemological debate has led to fundamental questioning of the received ideas on ontology, on what this world/universe is constituted of. There is no turning back now. I shall expand on these ideas during my talk.

## **ICT and the consensual taming of dissent**

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The proliferation of ICT has provided people with a cornucopia – in terms of access to knowledge, ability to reach out to others. All this at costs that are unimaginably affordable. The advent of web 2.0 has all but obliterated the “digital divide” – before which content-creation was the preserve of an elite few compared to the much larger numbers of those who were consumers of the content. Today, anybody can put out content without barrier of language, without constraint of literacy or formal structures of review (that tend to be controlled by oligarchies).

So, is this the “heaven of freedom” that Tagore prayed that the country should awake to? Disagreement on this point sounds churlish, invites charges of “you are a Luddite”. The apocryphal General Ludd was in the mould of Robin Hood, a precursor of Marxist distributive justice – snatch from the wealthy and distribute among the poor. It is difficult to see what was “snatched” from anybody to bring about this ICT-led utopia – when most of its offerings are free for the users.

The word “users” holds the key – all the offerings come with an End “User” License Agreement (EULA) that we all “Agree” to without thought, especially when the service is free. The ICT industry is perhaps the first where the “User” is a category completely different from “Customer” (the one who pays for the service).

The Users are exposing themselves to a ubiquitous panopticon that defines the new world order in a connected information era. What the Users reveal about themselves is far more valuable to the “Big Other” than the meaning that they intend to communicate through the medium. The customers of this inadvertent vulnerability are criminals, the State and commercial forces – all of whom are interested in not just predicting but moulding the users, to conform to patterns of behaviour that serve their interests.

The content of the messages – data – being shared by the Users is less important than the context in which these are shared. This context – metadata – is opaque to the users, but intelligible to the few who use the tools of ICT (such as Big Data and AI). Insights from such a contextual understanding enable the Big Other to influence the most private of our decisions without our feeling violated. We become willing partners in our own subjugation.

The closest parallel to this that I can think of is the disparaging of closer connectivity – in the context of Railways and Postal services – by Gandhi in Hind Swaraj. Who then used both the technologies extensively to mobilize the masses! We must tame the technology, or we will end up being tamed by it.

## **ICTs and the reshaping of the knowledge domain: A Lokavidya Perspective**

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In 2001, CSIR created the Traditional Knowledge Digital Library (TKDL). The effort was prompted by attempts of American companies to patent medicinal properties of turmeric. Even earlier, in 1993, the World Bank organised a meeting on "traditional knowledge and sustainable development." Before the 1990s, though one does not find too many instances of such discourse. A result of the arrival of the "Knowledge Age" has been the vastly increased presence in the public domain, of what has been referred to as "traditional and indigenous knowledge." This knowledge has received a new type of validation from the Internet and of course from the market, where "organic", "artisanal" and other type of goods enjoy a new appeal. The old question of the scientific validation of traditional knowledge seems less and less relevant today. What are the potentials and limits of such a transformation in the world of knowledge? We will discuss this question in this talk.

## **Knowledge in the Age of Information, Communication and Networks**

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An often encountered question in recent years is ‘What, if anything, has changed in our understanding of what knowledge is and how we know?’ In this paper, we argue that the global information networks established over the last few decades have initiated a radical change in the spheres of thought, action and relationships in society that in turn fundamentally alters our understanding of the epistemic and methodological bases of knowledge.

For around three centuries, notions of individualism and objectivity have ruled the world of human imagination. When imported into the ‘scientific’ study of the world, they find expression in terms of the consumer and the good in economics, atom and concepts of space, time and motion in the physical sciences, identity and freedom in the humanities, and civilian and society in the social sciences.

In contrast, in recent decades, an emergent process is developing another view and theory of the universe based on information, connectivity and communication. As part of this, a new perspective of man and the world is coming into existence, characterized by networks providing the means for the organization of concepts, and information flows the means for defining relationships. The ongoing de-disciplining of academics that is creating a new language and imagery for describing the world provides a good starting point for distinguishing the old structure of knowledge from the new (that correspond to what may be loosely termed as the Industrial and the post-industrial eras).

In the new understanding, concepts as well as entities such as the agent, matter, actor or member of a group may be represented as nodes in a network with a multiplicity of attributes such as type, form, state, function, meaning, etc. Underlying such a structure is an understanding that human reasoning is flawed, autonomy is suspect and ethics is illusory; which leads to the inescapable conclusion that most constructs of rationality, independence and morality are ex-post facto confabulations. This in turn provides a fertile ground for a new understanding of knowledge, reality and fact to emerge, given that logical fallibility (e.g., the Gettier problem), conceptual representability (e.g., the real as one of many worlds) and practical non-determinism (e.g., algorithmic approximation) have already become mainstream.

Perhaps as a consequence, for example, the dominant global binaries of earlier times – symbol and meaning, truth and untruth, materiality and immateriality, body and mind, science and nescience to name a few – are in disarray, seemingly facing a serious erosion of their authority over framing, defining and steering the very idea of public discourse, built over the last two centuries.

In consequence, these changes may also be seen as a step towards creating a new ontology of the world – where information, networks and knowledge are treated as primary entities, with all else in the universe being secondary. In areas as diverse as biology or economics, the “network as the structure, information as the essence” view of phenomena seems to be currently taking precedence. For example, ranging from intra-cellular to macro processes in life forms, and from e-commerce to behavioral sciences, information flows across networks are considered indispensable for understanding both structure and function. However, this is not to suggest that ‘old’ biochemical or

physical standpoints have been abandoned, but that the dominant view of “information as the essence” subordinates them.

What do these developments imply? In the nearly 30 years since the WWW, by refuting established notions of Science, the world of ideas has been destabilized considerably enough for alternate methods of argument, debate and explication to quickly come to life. The promise of significance it holds is that the consequential undermining of the world of practice is not far away. If ever there was an opportune time for the legitimacy of knowledge in society to be established and for the knowledge claim of the ordinary human to be appropriately recognized, when was it but now!

## **Exploring South Asian Ethics for the New Knowledge Domains**

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Ongoing scientific developments are transforming the very basis of our physical and mental being. What 3 billion years of evolution has crystalized into the human body and mind, and their environment is being re-made and must be re-thought. For example:

Mental activities are being projected onto computing artifacts including the Net & the Web; artifacts themselves connected or not, at times outperform humans as mental processors, human senses are artificially projected outward and extended beyond human boundaries, the body is projected outward and introjected inward by artificial means; "Synthetic Biology" would redesign existing genomes and create new life forms; the Human Connectome Project would give a picture of the neural structure of the human brain opening the door to changes in the very apparatus through which we perceive the world; we could in theory change the windows for our physical perceptions; we could introject brainstem cells and rewire ourselves, so that we could switch from one frame of knowing the world to another; brain cells in Petri dishes have been connected to robotic devices to do some human-like tasks with "some sense of what is going in themselves"; mind reading technology is creating consumer goods controlled by the mind and is making possible in principle to remotely access the visual content of mental processes. The above list can be expanded.

When we and our surroundings are thus constructed and reconstructed, from new developments in biotechnology, neurology, information technology, and nanotechnology as say in clone or robot or admixtures of both, deep questions are raised that challenge existing ethical systems.

Currently dominant, Western ethical systems for these new technologies are derived from presumably "secular" roots or from Christianity, Judaism or Islam (the "Abrahamaic" religions). Western "secular ethics" are ultimately derived from the idea of "humanity", a Eurocentric concept of humans as "sacred" that probably derives from the ideas of the Humanists as Europe emerged from the late Middle (the Dark, Christian) ages. But in an increasingly non-human and post-human world, such simplistic definitions of humanity must be transcended in search of ethics. The ethical system in the Abrahamaic religions is presumed to be "revealed" and to be "God's word" which the new developments where humans and artifacts do "play God" challenge some of the core revealed Abrahamaic ethical assumptions. As, in the coming decades, the production, consumption and creative bases of the world increasingly shift to Asia, there must be foundational Asian thought on these culture impregnated issues. There have been only a few such discussions based on the philosophical bases of Hinduism or Buddhism. The present paper explores perspectives from the latter.

Buddhism, is not revealed, and shorn of the unobservable (rebirth etc.), it has both a strong core of observations and a strong philosophy. Buddhist observation and philosophy has change and process as its core. Some core Buddhist approaches have direct relevance to a future where both the human and his/her environment is constructed and reconstructed. The paper describes the central Buddhist position on both the human person, including his body and mind, as well as the environment he

operates in, as not given or sacred but constructed and changing. The paper suggests that an orientation from this core Buddhist perspective of continuous change, no permanent self and both human and nature as constructed would fit better as a cultural orientation to examine and live in a future world under continuous change, and where man and nature are continuously reinvented and reconstructed. It also suggests that Buddhist ethics derived from such a perspective (which unlike the revealed religions of Judaism, Christianity and Islam is not absolute but contingent and situational) may better fit as a means of navigating the coming interconnected world of the clone, the robot and the cyborg.

**Session 4**

**Beyond the Modern - Traditional dichotomy in Knowledge:  
*The concept of “Knowledge in Society” (Loka Vidya) and its implications***

## **The Making of a New World: The Promise of Lokavidya**

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The world of ideas is changing rapidly in recent years with much of established thought discarded or deprecated. The change is perceived in a variety of ways, e.g., beliefs about the world and how it operates and articulations of the nature and essence of relationships, thinking and action, and communication, and so on. The locus of these changes is not the university, considered for centuries as one of the greatest sources of authority in the realm of thought; rather, it is constituted by a combination of physical and cyber spaces that act as fertile grounds for ideas to emerge, acquire a life of their own, gain momentum and swamp them for a time before being replaced with the new.

Furthermore, a majority of the actors in this space are not from the intelligentsia or the elite of the society. They are often ordinary people, whose expressions in a networked space form patterns that interact with each other constantly and sometimes morph into a persuasive meme that extends its influence into various parts of the network as though by magic. It is in the constant renewal of ideas in this space that perception and reality acquire different meanings, connections and interpretations.

For now, there is little distinction between what this space denotes and connotes, given the rapid evolution of the meanings of the principal terms that characterize the space – networks, information, knowledge, data, communication, etc. In addition, the type, style and content of argumentation in the space have changed too, to the extent that disambiguation is typically achieved by accepting multiple and loose interpretations, and not by eliminating opposing views as in the archetypal 20th century debate.

To give an example, truth and falsehood have no broader meaning beyond what the immediate context demands in a given segment in this space. All other global binaries of our times - democracy and dictatorship, good and bad, reality and fiction, materiality and immateriality, progress and regress, body and mind, high and low, reason and unreason, science and nescience to name a few – are also in disarray meanwhile, seemingly facing a sudden end to their two hundred years of dominance in framing, defining and steering the very idea of public discourse. The disempowerment of sorts of the intelligentsia in recent years is possibly related to this process. Or so it appears. In areas ranging across politics, economics, technologies or culture, the distrust in binary categories is perhaps a central characteristic of the social discourse of recent times.

A striking feature of the new space is the displacement of the abstract by the episodic or the thematic in discourse. This is not to suggest that abstractions do not wield influence any more, but to propose that the nature of discourse itself has changed significantly. Together with the profound changes in the overall dynamics of society over the last few decades, this has induced a sea change in the organization of lives and ideas in comparison with the past.

Perhaps most importantly, this development offers tremendous possibilities for those who seek genuine change in the political, social, scientific and philosophical systems that have - ideology, promises and proclaimed achievements notwithstanding - delivered little for a large majority of people in the world over the last two hundred years. In particular, for the first time in this period, a

state of flux in the world of thought, as evidenced today, represents a new opportunity for realizing Swaraj by transcending the governing ideas and imaginations of the world of today.

In the background of the failure of ideologies of all hues, Lokavidya - knowledge in society – remains the only framework for thought with the capacity, resilience and vision needed to fulfill the promise of delivering humanity from its current depths of misery. This paper develops the idea of how Lokavidya can lay the basis for a new language, ontology and means of knowing that in turn can serve as a foundation for the struggle for creation of a better world.

## **Lokavidya and the Caste Question**

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Since the colonial period, knowledge has been in the trap of the "traditional-modern" dichotomy. The rise of the Brahmin-led caste coalition during this period has meant that text-based knowledge has received far more status and attention than the knowledge of the majority, lokavidya. Even more importantly, Indian society itself was understood as a reflection of texts and scriptures rather than as an autonomous entity. The crisis of identity produced by modern knowledge was sought to be solved by a recourse to India's text-based knowledge traditions. This contributed to the strengthening of Brahminical power. Speaking of "Indian knowledge traditions" often became a code-word for elite (usually Sanskrit) paradigms and in the world of realpolitik, it strengthened the Hindutva forces. But the dominance of Brahmin and Baniyajatis in the ruling class, is an anomaly in the long duree of Indian history. After the 1960s slowly shudrajatis have regained their dominant status in political terms, through the electoral system. However they do not lead in the sphere of ideas, spiritual or material. The lokavidya philosophy has the promise to create a new imagination of India and of Indian knowledge traditions.

### **Truth – A Lokavidya Perspective**

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In every age human beings have aspired to know, understand, feel and internalise truth. What is this truth? Science claims to discover truth, where as our saint-tradition talks about truth being inside us. In many spiritual ways of thinking there are ideas of being face-to-face with truth or ‘seeing’ truth and many crafts persons and artists talk about reconstruction of truth in and through creative activity. Gandhiji talked about experiments with truth. Other than these too, there must be ways of thinking about truth. Human societies have known truth in many ways. In and through these various conceptions of truth, the knowledge of reality and life and ways of organising life enter into dynamic interaction and relation with each other. In this dynamic lies the strength for construction and (social) change. The first part of the article will discuss this with some examples.

For lokavidya way of thinking, truth resides in ordinary life and truth, knowledge, morality, beauty, life and loka are not separable from one another. In this thought every human is knowledgeable. It is for this reason, that people’s initiative and people’s strength are based in lokavidya. Lokavidya constantly enriches itself and renews itself by building fraternal relations and healthy exchange between the many streams of knowledge in society and it is for this reason that truth and knowledge inherent to it is never one sided. Therefore that, this truth and knowledge in lokavidya is not away from bhava and sensitivity. Seen this way kala darshan (philosophy of art) and lokavidya darshan (lokavidya philosophy) are very close to each other. Everyone is familiar with the spread of art among the people (and the world) and its robust creative presence in ordinary life. In the last couple of decades the Lokavidya Movement and Vidya Ashram have seen and perceived these forms of truth among farmers (kisan samaj), artisans (karigar samaj) and adivasi samaj. This would be discussed in the second part of the article.

## **The Health Science Agenda of the Trans-Disciplinary University.**

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Just as the past, present and future lie on a continuum, the roots of modernity lie in Tradition. The appropriate historical and sociological definition of modernity is "evolving Tradition" . In an interconnected world ( most parts of the world have always been connected....much more so today) modernization processes cannot be insular , in fact throughout social history ,while being rooted in their own traditions , all societies have also adopted knowledge,skills, practices from the evolving traditions of other cultures. Tradition and Modernity are not polar apart but intrinsically interdependent within and across cultures.

The Indian education system in the last few centuries ...except for its use of vernacular language as medium of instruction has largely forsaken its own cultural and intellectual traditions. This alienation from its roots is an aberration of recent political history. The alienation is evident at many levels of the content, form, pedagogy and distance from communities. The societal implication of the alienation deserves incisive analysis. Balanced growth of knowledge institutions will however impel independent minded knowledge leaders to demand for change in track and to seek inspiration within.

My experience of the living indigenous traditions in the health sciences and practices have convinced me beyond doubt that the Modernisation of healthcare in India in the current century is incomplete without their application.

The Trans- disciplinary University is as yet a small but brave initiative to modernize health sciences and practices in our country.

**Session 5**

**Arts, literature, music, theater, films etc as Knowledge Activity –  
*meaning and implications***

## **Transformations: Music to Painting, Desi to Margi**

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There is tale to be presented which could elicit response to the beauty of transformations. Something happened few decades ago, in fact it happened exactly four and half decades back, happened in Bhopal but the process which lead to this happening started much before that. It started in the same village where many decades ago well-known anthropologist Veriar Elvin has lived. Patangarh is the name of the village. There lived a boy called Jangarh Singh Shyam. He was a member of Parthans which is supposed to be the community of musicians and story tellers of the Gonds. It is the community which can also be considered as the live vehicle of the collective memory of Gonds. As a result of the colonial erosion of the social patronage of Parthans, they could hardly perform or hone their art of musically presenting the narratives related to Gonds and their deities. The tradition of musical narration was about to dry out and something very strange happened. The boy named Jangarh experienced in his own being what can only be called the transformation of music into painting. His artistic longing for musical narration underwent a transformation and it lead to a most unique style of contemporary painting. I am calling it 'contemporary' and not 'modern' which is a much more inclusive category. A new style of painting came into existence which was ancient in so far as its inspiration was the ancient musical tradition but was of our times because it underwent the transformation that we have referred to in our times. Transformation of music into painting made it possible for the deities of Gond community to make their appearances in the visual forms for the first time in their lives. I have a hunch that some phenomenon of this kind even happened when the early sculptures of Vedic deities came into being. To my mind such transformation took place even then. The only difference seems to be that in Parthan's case the transformation was of music into painting where as in late Vedic times it was of mantras(which are also seeds of music) into sculptures.

Very soon in mid-eighties of last century Jangarh Singh Shyam became one of the most significant contemporary painters. The transformation we talked about was not only of musical into visual but was also of desi musical form into something which lies at the border of margi and desi painting style. There are other instances of transformations of desi forms into margi that I would like to talk about. They happened in theatre and also in music. I think Sanskrit, Malayali and Hindi theatre director Kavalam Narayan Panikkarand Manipuri director RatanThiyam of Imphal too tried to transform desi narrative and theatrical forms into margi theatrical styles.

## **Poet's world and Poet's way of knowing**

Bishnu Mohapatra

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I do social science in English; write my poetry in Odia. Sometimes my poetry and social science remain as two isolated processes: silent, looking inward, flowing at their own pace, immersed in their own music. At other times they are braided, entangled and speak to each other as good friends. It is not merely that I use different languages to do distinct things. Rather, these are different domains of cognition and affect I inhabit - my way of being in the world.

Does the poet know the world any differently? The many ways of knowing are quite clearly structured in hierarchies - some claiming 'superiority' over others. Within this overarching context of how the world is grasped, what does the poet un-conceal? Do poets, like philosophers, seek 'truth'? Are they burdened by an aspiration to 'get things right'? Through readings of my poetry interspersed with reflections, I uncover my very different ways of 'knowing'.

## **A Festival of Memories, and a time to remember**

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In over 300 villages of Tamilnadu, the Mahabharata is celebrated as a festival. For over 20 days and 20 hours a day, the epic is performed as village rituals, narrated as a story and enacted through the night as theatre in the traditional Therukoothu form.

The epic is seen as an anti-war text and Draupadi in these festivals is seen as the real heroine of the epic, and she is also the symbol of all people unjustly affected by war.

Draupadi in these festivals is also doubled with a narrative purely of this region of an ambiguous story of another 'Draupadi' who was born in Senji. Senji was once a prosperous city, but right now is only a shanty town around the ruins of an old fort.

This paper attempts to explore this intriguing, complex festival which gives another insight into another imagining of the self.

It is a huge festival and what is striking is the fact of a narrative of a fratricidal war being performed for peace and community harmony. Inclusivity seemed to be ingrained into the Mahabharata festival and while the overall organization of the festival was the responsibility of the core committee, each days rituals were seen as the responsibility of different caste groups in the village. Each jati in the village would sponsor an event in the village which celebrated their caste identities.

The Mahabharata being celebrated in these villages becomes more than just the memory of the epic; it includes the memories of the various jati groups in the village and includes in itself a memory of the region also.

Due to the way the festival is structured, to participate in the festival immediately becomes an act of 'remembering', an entire series of memories, from the individual to the collective, with the epic functioning as the trigger of recollection.

The Mahabharata is also not performed in its entirety and the responsibility of imagining the whole is the responsibility of each individual member of the audience. Each one would have seen over the years, different renditions of different episodes of the epic and what would be remembered would be a cumulative memory of all that each had witnessed. This cumulative memory would naturally include the memory of oneself witnessing a particular rendition, and by a curious process, by remembering the epic, one also tends to remember oneself, reflect on oneself.

The word which sprang to my mind was the word dhyanam. Mani Kaul, the film maker once defined this word beautifully. He said "This word "meditation", which is mystified in the West, has no meaning in India. There is simply a question of attention, a quality of attention. The word 'Dhyan' literally means attention.

There is a dichotomy between Being and this quality of attention. Being cannot free itself from certain sorrows; it cannot free itself from its problems and unhappiness, because Being is full of them. The idea of transcending them and reaching a state where there's no sorrow is all a dream. You can talk about it, but until the end of your life, your sorrows will pursue you.

However, “attention” can be free. A great teacher transforms that quality of attention- of listening, of talking, of seeing, of touching – until there is no sorrow, no fear, no anger, no pain; In music, and perhaps in some of my films, one has this quality of “attention” Mani Kaul

So how does one achieve this quality of attentiveness, towards the other, to one’s community of belonging and towards oneself?

## ***Kattaikkuttu performances as a source of indigenous knowledge***

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I propose to look at all-night Kattaikkuttu performances and the knowledge they embody and transmit as a source of indigenous knowledge. Where does this knowledge come from, where is it stored when not performed and how is its particular configuration linked to the goal(s) that a Kattaikkuttu performance is expected to achieve?

Live Kattaikkuttu performances are ephemeral, they disappear, but they do replicate themselves through their own structures and codes creating in the process a horizon of expectations for future performances. Introducing the concept of an “oral reservoir” I will argue that Kattaikkuttu performances, even when non-scripted, do not spring up from nowhere. In doing so I hope to take the idea of a repertoire, representing systems of embodied practice in performance, introduced by Diana Taylor one step further. Taylor uses the term repertoire in opposition to the archive of written, disembodied and supposedly enduring, neutral documents.

I see the oral reservoir as a porous source of knowledge and know-how underlying an endless repertoire of live Kattaikkuttu performances. The oral reservoir is grounded in the bodies and minds of all the participants who have a stake in Kattaikkuttu. It allows performers to produce live performances that are attuned to a particular occasion and location, in addition to enabling a flow of performance-related information between adjoining artistic expressions. And it allows spectators and patrons to relish all-night Kattaikkuttu performances, while fulfilling the expectation that such performances will contribute to the well-fare and well-being of their village communities.

The nature of Kattaikkuttu’s knowledge as predominantly oral, multimedial, multisensory and experiential and the actors’ full-bodied emersion into character appear to have contributed to the impression, in particular among those not familiar with the theatre, that the theatre lacks rules, an analytical structure, rigour and sophistication. Such qualities are often used to define the “classical”, even though they apply in equal measure to “folk” Kattaikkuttu.

A recent collaborative experiment between “classical” Karnatic vocalist T.M. Krishna and “folk” Kattaikkuttu actor, director and playwright P. Rajagopal, brought to the fore that both forms share much more than what most people think in terms of musical knowledge and terminology. However, the organisation and application of such knowledge and its social ownership have served different communities and different aesthetic and sacral goals defining the historical trajectories, form and content that both traditions have taken.

## **Kamban - a majestic student**

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Kamban, perhaps the greatest of all Tamil poets, is elegantly Tamil in the way he handles the story of Ramayana. At the same time his great regard for Valmiki, the Prime Poet, is evident throughout his wonderful epic. Kamban's scholarship in both Tamil and Sanskrit is unquestionable. It is not for nothing that he is called the granddaddy of Scholarship.

Kamban's Rama, unlike the Rama of Valmiki, is the embodiment of the ultimate reality. In this he closely follows the Tamil Alvars, especially Nammalwar, whom he evidently reveres. At the same time Kamban is also an heir to a hoary Tamil tradition, which must have been more than 1200 years old at the time of the poet. Thus, his Ramayana is grand blend of Valmiki, Sangam and Kavya conventions and an outpouring of Bhakti.

If the way he handles the various episodes of the original Ramayana to bring in splendid drama wherever possible is fascinating his extra-ordinary skill in the art of epic poetry makes his Ramayana a timeless joy to read and marvel at.

My paper outlines a few instances where Kamban with his extraordinary genius remolds the original epic and makes it resoundingly Tamil. It also covers his indebtedness to the Alvars.

**Session 6**

**The Knowledge Revolution and our Institutions of Higher Education  
and Research**

## **The Knowledge Revolution and our Universities**

C N Krishnan                      and                      J K Bajaj

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We examine how the Knowledge Revolution presents our institutions of Higher Education and Research (HE&R) with new challenges and opportunities. In this article, we limit ourselves to institutions whose primary goal is to produce graduates at all levels, thereby excluding purely research institutes run by the various departments of the Government of India. Hereafter, we refer to these as “universities”. An examination of their performance, both on account of their original contributions to global knowledge as well as applications to society and economy, seems to show them in rather poor light except on the count of producing very large number of graduates.

We look into the widely known and discussed reasons given for this phenomenon and point out that these reasons are mostly valid only for the system of state universities and their affiliated colleges that make up more than 90% in terms of numbers, and are mostly inapplicable to an elite group of about 150 centrally funded institutions in various fields. It is suggested that there is a deeper reason for the inadequate performance of our universities and that lies in their not being connected in any significant manner with the society, people and economy around them.

From science to engineering to social sciences to arts, the curricula and syllabi of all our universities seem to follow a certain unchanging template, despite regular revisions of the curricula and syllabi. That template is traceable to the western university system where it probably did make sense at some time in the past. As far as the elite institutions are concerned, they do have some level of linkages with the “organised/ formal” sector of our industry economy and society, and the issue is to see how these institutions can be made to meet the pressing needs of the nation in this sector, especially given the enormous amounts of resources and privileges that have been bestowed on them.

The state level institutions however connect to this sector only as supplier of relatively inexpensive manpower; they do not seem to have much to do with the “un-organised/ informal” sector either. In this context, we look at how the ongoing revolution in the knowledge domain is impacting both the university and the society, and claim that this is perhaps opening up some new possibilities for creating the linkages with the society and economy. On the one hand, it is becoming clear that the methods and tools of modern science may not alone be adequate for a just and sustainable future for our people, and we may need to look beyond the laboratory and the university. On the other hand, developments in Information Technology along with global connectivity with mobility amongst people in unprecedented numbers is beginning to make the Net and the Web alternate locations of knowledge not controlled by the university, but capable of supplementing and often challenging it. It is proposed that this situation is creating an opportunity for the universities to connect with our society and economy and contribute to them in diverse ways.

The situation especially offers an opportunity for the system of state universities to connect with the “un-organised/ informal” sector of our economy and society in all fields – science, engineering, medicine, management, social sciences, arts, etc. Some suggestions are given as to how this may be attempted, providing some illustrations from the field of engineering education.

**About the Authors**

(Arranged in the order of the Sessions in which their abstracts appear)

## **Session 1**

**Munirathna Anandkrishnan** did his BE in civil engineering from the College of Engineering Guindy (Anna University) , and Master's and Doctoral degrees in civil engineering from the University of Minnesota. He was Professor and Head of Dept. of Civil Engineering at IIT Kanpur during 1963 to 1974. He served as the Science Counselor, Embassy of India, USA from 1974 to 1978, and then at the United Nations Centre for Science and Technology for Development (UNCSTD) in different positions. He was the Vice-Chancellor of Anna University, Chennai during 1989 – 95, after which he served as the vice chairman of the Tamil Nadu State Council for Higher Education (TANSCHHE). Prof. Anandkrishnan has served in many other positions such as Chairperson of the Madras Institute of Development Studies (MIDS), Chennai, the Chairman of Board of Governors of IIT Kanpur, etc. He continues to serve the cause of education in Tamil Nadu and the rest of the country in a tireless and inspiring manner.

As a distinguished educationist, Prof. Anandkrishnan has served as Chairman or Member of a number of high-power Committees of the UGC, AICTE, MHRD, NAAC etc., and has contributed significantly to Engineering Education in Tamil Nadu and the country. He is a recipient of many awards and honors such as the Distinguished Leadership Award from the University of Minnesota, award of the President of Brazil, etc. He is a recipient of the Padmashri award of the Govt. of India.

**V. Balaji** was a research student who worked under the guidance of Professor C V Seshadri during 1983 to 1989. Since the last about 25 years, he has worked in applied technology research in relation to agricultural and rural development. His current work focuses on what is broadly called learning technology for areas that have limited or no access to grid power or data connectivity. He works as a staff member in an inter-governmental agency based in Western Canada.

**Shiv Visvanathan** is an Indian academic best known for his contributions to the field of Science and Technology Studies and for the concept of cognitive justice, a term he coined. He is currently

Professor at O. P. Jindal Global University, Sonapat. Formerly, he was Professor, Dhirubhai Ambani Institute of Information and Communication Technology, Gandhinagar, India and has held the position of Senior fellow, Center for the Study of Developing Societies (CSDS) in Delhi. He has also taught at the Delhi School of Economics and held visiting professorships at Smith College, Stanford, Goldsmiths, Arizona State University and Maastricht University. He is the author of *Organizing for Science* (OUP, Delhi, 1985), *A Carnival for Science* (OUP, Delhi, 1997) and has co-edited *Foulplay: Chronicles of Corruption* (Banyan Books, Delhi, 1999). He has been consultant to the National Council of Churches and Business India.

He is a columnist in newspapers like *The Hindu*, *The New Indian Express*, *The Deccan Chronicle* etc. He also writes for popular magazines like *Outlook*, *India Today*, *Scroll.in* and *Tehelka*. His popular writings range across topics such as science, cricket, anthropology, development, and walking.

**Sunil Sahasrabudhey** is President (and founder member) of Vidya Ashram, Varanasi, an institution engaged in building a knowledge movement of the ordinary people, viz., a Lokavidya Movement. Over the last 40 years, he has edited magazines such as *Mazdoor Kisan Niti* and *Lokavidya Samvad*, and was member of the Patriotic and People-Oriented Science and Technology (PPST) Foundation. He has had formal training in science and philosophy as a student in BHU and IIT Kanpur and spent two decades at the Gandhian Institute of Studies, Varanasi.

As a life-long activist he has combined his theoretical interests in the philosophy of science and knowledge, Gandhian philosophy and the theoretical basis of emancipatory movements with an active engagement in the students' and workers' movement of the 1970s and the Peasant Movement of the 1980s and 1990s. He has written several books and articles, in Hindi and English, on the philosophy and practice of India's peasant movements, Gandhi's philosophy of Science, politics of knowledge in the Internet Age, etc.

For more details, please refer to the Vidya Ashram website, <http://vidyaashram.org> and YouTube.

**A.V. Balasubramanian** obtained his M.Sc degree in Chemistry from Bangalore University and a diploma in Molecular Biophysics from the Indian Institute of Science, Bangalore. He also studied at SUNY at Stonybrook. Since 1982 he has been working on various aspects of Traditional Indian Sciences and Technologies and their current relevance and potential. In line with this, he founded in 1995 the Centre for Indian Knowledge Systems (CIKS) to focus on sustainable agriculture. Currently, as the director of CIKS, he is involved in the production of educational and training material on various aspects of Sustainable Agriculture drawing upon indigenous knowledge, wisdom and practices.

More recently he has been involved in helping farmers set up organic produce companies. He was a member of several committees of the Government of India (Ministry of Science and Technology, Ministry of Rural Development and Ministry of Human Resources Development) and on the Editorial Board of the Journal of Ayurveda and Integrative Medicine. He received an honorary doctorate awarded by the Gandhigram Rural University, Gandhigram, Dindigul district, Tamil Nadu in 2010.

**J. K. Suresh** is a founding member of the Loka Vidya Vedike, (<https://goo.gl/WUQn1m>), a Bengaluru based platform that is part of the Lokavidya Jan Andolan initiated by Vidya Ashram (<http://vidyaashram.org/>), Varanasi. The Lokavidya movement endeavors to develop a dialogue on knowledge in the public space that underlies a new politics for a radical transformation of society to attain the ideals of equity and social justice.

He is also a member of the Gram Seva Sangh, Bengaluru (<https://goo.gl/AmYbwv>). The Gram Seva Sangh aims to build deep connections between rural and urban India that have the potential to aid the process of (re-)construction of the society to provide sustainable livelihoods for all while catering simultaneously to a deep concern for all life forms on the planet.

He obtained his B-Tech and M.S. (Engineering) from the Indian Institutes of Technology at Kanpur and Madras respectively, and a Ph.D. from the Indian Institute of Science, Bengaluru.

**Anil K Gupta** is a visiting faculty, IIM, Ahmedabad and at IITB. He is also the founder of Honey Bee Network. A Ph.D. in Management, he has an MSc. in Biochemical Genetics. He is a Fellow of the National Academy of Agricultural Sciences and of the World Academy of Art and Science, California (in 2001). He also plays executive roles in National Innovation Foundation (Nifindia.org), and organizations like SRISTI.org and GIAN.org. His work lays strong emphasis on innovations at grassroots and creating knowledge networks to aid innovation through frugal and flexible platforms. He pursues research and has widely lectured across the world on sustainable natural and institutional resource management, building global value chains, unlocking creativity through open innovations, etc. He has pursued Shodhyatra, a learning walkathon across India a few years ago. He is published widely, with a new book in 2016, “Grassroots Innovation: Mind on the margin are not marginal minds,” by Penguin Random House.

He has won many awards and honors over the decades. He has won many awards and honors over the decades. For more details about Anil, please see <http://anilg.sristi.org>.

**Kavita Philip** is faculty at the University of California, Irvine and holds an M.S. in Mathematical Physics and Ph.D. in Science and Technology Studies. She will argue that we need to re-visit older histories of scientific knowledge, as well as the legacies of protest such as nineteenth-century resistance movements that united labor, nature, and anti-colonial knowledge, without slipping into anti-scientific nativisms.

**Karl Mendonca** is an artist with wide experience in the visual and digital arts. He is now writing a Ph.D. dissertation in Film and Media Studies at the University of California, Santa Cruz on the history of an IBM 7044 that made its way in the 1960s from the IIT-Kanpur computer science center to Blaze Advertising, a company that had a monopoly on the distribution of intermission ads in cinemas across India. He follows the flow of both intellectual and material forms of knowledge to open up the speculative and political implications of a broad, interdisciplinary history of computation in India.

**Anil Menon** holds a Ph.D. in Computer science and has published widely in speculative fiction.

His most recent novel, Half Of What I Say, was shortlisted for the Hindu Literary prize in 2016. He will speak about the ways in which playing with “context” in fiction is a form of political, philosophical, linguistic, social, economic speculation that helps us re-imagine pasts, presents and futures.

**Muthatha Ramanathan** has taught at Srishti, Bangalore, has a Ph.D. in Science and Technology Studies, and expertise in the history of Indian Industrial Design. She will offer a commentary on the three presentations above, bringing them together in the context of a new generation of Indian academics trying to re-think the connections between science, technology, activism, art and design.

## **Session 2**

**P L T Girija**

**T M Mukundan**

**Anil Gupta.** please see Session 1.

**N B Ballal** hails from Udipi, Karnataka and completed his B.E. from KREC, Surathkal (now NITK), and his M.Tech, PhD, and post-doc from IIT Kanpur. He taught at IIT Bombay, Mumbai, for more than three decades and retired as a Professor in its Metallurgical Engineering and Materials Science Department in 2015. He is presently an Emeritus Fellow at IIT Bombay. His research interests are in process metallurgy and mathematical modeling, with a special interest in Steelmaking. A popular teacher, who is remembered for the deep context he brought to every lecture, conversation and theoretical discussions, he has worked extensively on iron smelting technology of traditional artisans in India.

**Sharada Srinivasan** is Dean and Professor, School of Humanities, National Institute of Advanced Studies with special interests in technical art history, archaeomaterials and archaeometallurgy, and

significant contributions in the study of South Indian metal icons and traditions. She is a Fellow of Royal Asiatic Society of Great Britain and Ireland and the World Academy of Arts and Sciences. She is a recipient of the Kalpana Chawla Young Women Scientists Award, Indian Institute of Metals Certificate of Excellence award, Materials Research Society of India Medal and Flinders Petrie Award. She has a PhD from Institute of Archaeology, UCL, London, MA from SOAS and B.Tech from IIT-Mumbai in Engineering Physics. She is a Member, Advisory Board, Centre for South Asian Studies, University of Exeter. She has held international research grants under the UKIERI-I and UKIERI-II schemes and from AHRC, UK.

**M. S. Sriram** Born in 1950, M.S. Sriram did his Ph.D. in the area of particle physics theory from IIT Kanpur in 1978. He worked in the University of Allahabad during 1981-1986, and joined the department of theoretical physics in the University of Madras in 1986, from where he retired in 2011. He has been working in the area of history of Indian astronomy and mathematics for more than 25 years, and has published many books and articles in the field. Currently he is associated with the K.V. Research Foundation in Chennai, an organization devoted to Indic studies.

**A V Balasubramanian.** Please see Session 1.

**G Sivaramkrishnan (aka GSR Krishnan)** was born in 1949 and was educated in Bangalore. He started his teaching career in 1971 with MES College Bangalore. After 15 years, with a brief stint as Professor at Mysore University, he joined Bangalore university in 1986. He retired as a Professor of sociology in 2008. He was a visiting professor at NLSIU Bangalore from 2010 to 2016. GSR Krishnan has been associated with PPST since its inception and was a close associate of Dharampal for over two decades. He has been involved with the Lokvidya movement from its inception in 2004.

Krishnan has been an activist since his student days. He has edited and published Padigal a Tamil quarterly for eight years. He was a general secretary of the State Federation of University and College Teachers in Karnataka for over a decade.

### **Sessions 3 & 4**

**Sunil Sahasrabudhey.** Please see Session 1.

**Kannan Lakshminarayanan** has developed and commercialized several customized solutions in the domain of electro-mechanical engineering through innovative products with high reliability in price-sensitive markets. He engages widely with grass-root level organizations that work with rural poor with a view to attain scalable and sustainable solutions that improve quality of life.

He has been a serial entrepreneur, and has founded/co-founded a number of for-profit and non-profit entities spread across areas such as schooling, ATM services, Industrial design and product consultancy, Cotton spinning and skill development tools. In addition, he has made several inventions related to ATM services and cloth production. Kannan and his organizations have received various awards, in the areas of Social Innovation and Community Health Initiatives.

Kannan holds a B. Tech. in Mechanical Engineering from IIT Madras (1988). He has been conferred a Distinguished Alumnus Award by his alma mater in 2014. He can be reached at

[kannan@fractal.in](mailto:kannan@fractal.in).

**Amit Basole** is Associate Professor of Economics at the School of Liberal Studies, Azim Premji University. He has previously taught at the University of Massachusetts, Boston and Bucknell University. He holds a Ph.D. in Economics from the University of Massachusetts, Amherst. Amit's research combines quantitative and qualitative methods to address poverty and inequality, the structure of the Indian economy, and the economics of informal knowledge. Prior to switching to Economics Amit completed a Ph.D. in Neuroscience from Duke University where his research on the

neurophysiology of the mammalian visual system was published in journals such as Nature and Progress in Brain Research.

**J K Suresh**. Please see Session 1.

**Susantha Goonatilake** has explored the geo-politics of knowledge and information. His 15 books published by international scholarly houses include: “Anthropologizing Sri Lanka: A Civilizational Misadventure,” “Toward a Global Science: Mining Civilizational Knowledge,” “Merged Evolution: the Long Term Implications of Information Technology and Biotechnology,” “Technological Independence: the Asian Experience,” “Evolution of Information: Lineages in Genes, Culture and Artefact,” and “Aborted Discovery: Science and Creativity in the Third World”. He has taught or researched in several universities in Europe, USA and Japan. He lives in Colombo.

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**Chitra Sahasrabudhey** is a social organizer and activist and one of the architects of the idea of Lokavidya (knowledge in society) that arose from her organizational work among artisans and women and association with the farmers’ movement. She headed Naari Hastkala Udyog Samiti whose work in and around Varanasi was based on the ideas and the practice of Naari Vidya and Sthaaniya Bazaar.

She played an active part in the Women’s movement in India during the late seventies in Delhi and has been working with women and artisans at Varanasi since early 1980’s. She was one of the chief organizers of Lokavidya Mahadhiveshan, the Third Congress on Traditional Sciences and Technologies of India (CTSTI), Varanasi, 1998. A founder member and coordinator of the Vidya Ashram, she is an editor of Lokavidya Samvaad and Lokavidya Panchayat, the organs of the Lokavidya movement, since 2004.

After completing her M.Sc. from Indore University and her Ph.D. in Chemistry from IIT Delhi, she chose to work with the ordinary people around her rather than engage with Science professionally.

**Darshan Shankar** is Vice Chancellor, Institute of Trans Disciplinary Health Sciences and Technology (TDU), and Managing Trustee, FRLHT, Bangalore.

Over the decades since the 1970's, Darshan has held several positions such as a Reader in Bombay University, Consultant to UNICEF at Delhi, Director of Academy of Development Science, Maharashtra, Research Fellow, UN University, Japan, Executive Chairman of All India Network of Community Health Organizations, Tamil Nadu, Consultant to advisor to the Prime Minister of India on Technology Missions of the Government of India at Delhi, Executive Director (FRLHT) and Advisor, Planning Commission, Government of India.

He was awarded with the Commonwealth Youth Service Award in 1976 for his work in education, the Norman Borlaug award in 1998 for conservation of medicinal plants, Columbia University's center for complementary and alternative medicines international award in 2003 for revitalization of health care, and the Padmashri award in 2011.

He has published and lectured widely across India and the world.

## **Session 5**

**Baha'ud'din Mohiuddin Dagar** (born 1970) is the rudra veena player and son of famous north Indian musician Zia Mohiuddin Dagar. He plays rudra veena with the *dagarbani* style. He represents the 20th generation of Dagar lineage, referring to Nayak Haridas Dagar of the 16th century. In 2012, he was awarded the Sangeet Natak Akademi Award, the highest award for performing artists, conferred by the Sangeet Natak Akademi, India's National Academy for Music, Dance and Drama.

BAHAUDDIN DAGAR in his own words

“In 1947, India became independent. The princely States were abolished. My father and uncle had to leave Udaipur. They finally settled in Bombay. For 25 years they stayed in garages, worked as mechanics, sold bread, played in film orchestras. They had no instruments - no tanpura, veena or sitar. The big city after small town life was in itself a distraction. So many new, dazzling influences. Under such circumstances, how did they keep their focus on their own music? Dhrupad was always in their minds - they knew they had to do only this, only in this manner, they were born to do this. People laughed, “Dhrupad? Who'll listen? Rudra veena? Play something else. Long alaaps? So boring!” If

they were not disheartened by such ridicule, I don't see any reason for me to be distracted by little things like the computer. They didn't have a house but had their parampara. Finally father built a house. Called it gurukul. Their rules remained inflexible: "I will teach the way I want, you will play the way you're told." With 20 generations of musician ancestors, teaching is part of my heritage. Boring sometimes, but also a continuous search, many discoveries, understanding nuances. In a gurukul, teaching is not just learning music, but a whole culture and life style. Nor is music forced down the throat. You are given doses according to your need and level of receptivity. There is magic in this teacher-student bond. Not all students become performers. Many become listeners, critics and connoisseurs. My inner search? I don't need to arrive or prove anything. Hopefully, at end of my life, I might have understood something worthwhile, be able to express what my guru expresses so effortlessly. Meanwhile I do know that if I immerse myself in music, that music itself has the power to make me forget distractions." [As told to Gowri Ramnarayan in The Hindu, December 2006]

**Udayan Vajpeyi** is the author of over 14 books, which include Kuchh Vakya (poems); Door Desh Ki Gandh (short stories); and Jangarh Kalam (a book on tribal painting and folk tales). He has written both plays and texts for the film as well as two books on leading theatre directors KN Panikkar and Ratan Thiyam. He also published book-length conversations with filmmaker Mani Kaul, historian Dharampal, philosopher Navjyot Singh, and Hindi poet Kamlesh. Recently his collected short-stories were published. His writing has been translated into 15 languages including French, Polish, English, Swedish, Odiya, Malayalam. He edits a journal on Arts, Literature and Civilization, Samaas, and lives in Bhopal.

Udayan teaches Physiology at the Gandhi Medical College, Bhopal.

**Bishnu Mohapatra** is a social theorist and poet. He does his social science in English and his poetry in Odia. Bishnu was educated in Odisha, Delhi and Oxford. Trained in Politics, he has a strong academic interest in history, philosophy and literature. He taught politics for more than two decades in University of Delhi, Jawaharlal Nehru University, and Azim Premji University. He has held visiting appointments at various universities in Singapore, Japan and France. In 2016 he was the Sir Ashutosh Mukherjee Visiting Chair Professor at NIAS, Bangalore. He headed the governance portfolio of the Ford Foundation's South Asia office in Delhi from 2002-2010.

Bishnu has published in the areas of identity politics, democracy, minority rights, urban politics, etc. He has been an editor of the Journal of Contemporary South Asia and of the bilingual journal, Identity, Culture and Politics.

He has authored four books of poetry and has translated two volumes of Pablo Neruda's poetry into Odia. Bishnu is currently at Forum on Contemporary Theory, Baroda as a Senior Academic Fellow.

**Sashikanth** After graduating in Cinema from FTII, Pune, Sashikanth worked as a cinematographer shooting art-house feature films and documentaries at Kolkata, including 300 plus documentaries and 6 feature films. His most notable films include, "Under the green canopy," a documentary on the Onges in the Andaman Islands, "KaalAbhirati" and "Yugant" (both won the Golden Peacock in the National Awards, 1991 and 1995 respectively). His documentary on Kaveri, "Veli", was selected for the Blow Up Chicago Arthouse International Film Festival, 2016, together with another of his films, "Kelai Draupadai", a documentary on the Mahabharata Koothu festivals in Tamil Nadu. The latter was also awarded the 'Best Foreign Film' award at the DIY Film Festival, Los Angeles, 2016.

He is currently working on the second and third of the trilogy of films (the first being "KelaiDraupadai") titled "NinaivinNagaram" and "Kalpavaasi" and two books, one on the story telling traditions of India and the other on a practitioner's perspective on the history of Indian Cinema.

A sample of his work may be accessed from:

<https://vimeo.com/137112514> (Trailer of "Veli")

<https://vimeo.com/137106755> (Trailer of "KelaiDraupadai")

**Hanne M. de Bruin and P Rajagopal.** Hanne holds a Ph.D. in Indology from the University of Leiden (The Netherlands). Among her books are Kattaikkuttu: The Flexibility of a

South Indian Theatre Tradition (1999), the first-ever Tamil-English translation of an all-night Kattaikkuttu play, Karna Moksham or Karna's Death (1998) and Between Shame and Fame: Performing Women & Women Performers in India (2011) of which she is one of the co-editors. She has published essays on the rural Devadasi tradition, popular Tamil Drama or Natakam genre, and gender in the context of expressive performance and social stigma. Together with her husband, Kattaikkuttu actor, director and playwright **P. Rajagopal**, she founded the KattaikkuttuSangam and KattaikkuttuGurukulam. Since 2002 she works full-time for the Sangam, initially as facilitator and more recently as a program director and principal fund raiser. She is involved in the Gurukulam's new productions as a co-director and costume designer and is a visiting fellow with the Centre for the Interweaving of Performance Cultures, Free University, Berlin (Germany).

**P. A. Krishnan** is an Indian writer who writes in both Tamil and English. He began his career as a teacher of physics and went on to serve many years as a bureaucrat in the Government of India. After 30 years, he joined a research organization as the CEO. He later became a Senior Director of a multinational firm.

His most famous novels include The Tiger Claw Tree and The Muddy River which were also re-created by him in Tamil as புலிநகக் கொன்றை and கலங்கிய நதி. He has also written an introduction to Western Painting the first volume of which was published by Kalachuvadu under the title மேற்கத்திய ஓவியங்கள். A contributor to several Indian newspapers and literary magazines, several volumes of his essays have also been collated and published, the most notable ones being Agrahaarathil Periyar (அக்கிரகாரத்தில் பெரியார்) and Thirumbichendra Tharunam (திரும்பிச் சென்ற தருணம்).

Krishnan writes regularly for the Hindu and has contributed to The Times of India, The Hindu, The Indian Express, The wire, Outlook and several other magazines and journals.

## **Session -6**

**J. K. Bajaj** is the founder Director of the **Centre for Policy Studies**, one of the several institutions that have emerged out of the Patriotic People-oriented Science and Technology (PPST) initiative.

The Centre has been doing pioneering work on the history, geography and polity of India from an Indian civilizational perspective. Two of the current focus areas of the Centre are: One, collection, analysis and publication of data on the fast-changing religious demography of India and the world. Two, a series of District Resource Atlases that meticulously and beautifully document the geography, culture, history and economy of the various districts of Madhya Pradesh. The Centre's work in both these areas is widely known and highly acclaimed.

Dr. Bajaj has a Ph.D. in Theoretical Physics. He has been a member of the apex bodies of several national institutions, including the Indian Council of Social Science Research (ICSSR), National Council of Rural Institutes (NCRI) and the Council for Scientific and Industrial Research (CSIR). He is currently member of a constitutional commission set up to examine sub-categorization of OBCs in India.

For further details: <http://cpsindia.org/index.php/trustees/195-dr-j-k-bajaj>; [blog.cpsindia.org](http://blog.cpsindia.org)

**C N Krishnan** holds a B.Sc. Degree in Mathematics from Kerala University, a B.Tech. Degree in Electrical Engg. (L.C.) from IIT Madras, and an M.Tech. and Ph.D. Degrees in Electrical Engg. from IIT Kanpur. He has been with the Madras Inst. Of Technology campus of Anna University Chennai from 1977. He was one of the founding members of the PPST Group and had initiated the idea of holding the Congresses on Traditional S&T of India. Dr. Krishnan is the founding director of the AU-KBC Research Centre ([www.au-kbc.org](http://www.au-kbc.org)) in the university with funding from his student Dr. K B Chandrasekhar, and he continues his association with this Centre. He is interested in finding ways by which our institutions of Higher Education and Research (HE&R) can be made to better serve the needs of our people and our country, with particular focus on improving the State System of our HE&R.

**The Conference Programme**

Ground Floor Auditorium, I I T Madras Research Park, Chennai-600113

8-10 Feb.,2018

Day-1: Thursday 8<sup>th</sup> Feb 2018:

**Inauguration:** 9.00 – 10.00 AM

Prof. M S Swaminathan, Prof. M Anandkrishnan, Prof. Bhaskar Ramamurthy (Director, IIT Madras), Prof. Ashok Misra (former Director , IIT Bombay), Prof. Shiv Viswanathan (Jindal University), Shri. Sunil Sahasrabudhey (Vidya Ashram Varanasi), Dr. J K Bajaj (Centre for Policy Studies), Mrs. Premalatha Seshadri, Prof. J Kumar (Anna University).

Prof. C N R Rao -- Video Message

*Tea: 10.00 – 10.20 AM*

**Session -1:** 10.20 – 11.50 AM :

**Prof. C V Seshadri – the person and his work: implications and relevance for today.**

Chair: Prof. M. Anandkrishnan

Opening remarks by the Chair

- Opening of the website on CVS
- A short film on CVS
- Dr. V Balaji (video presentation) - C V Seshadri: Energy as Value and Food as Energy
- Panel Discussion on implications and relevance of CVS' s work today --

> Prof. Ashok Mishra --

> Prof. Shiv Viswanathan - CV Seshadri's Vision of Democracy as Knowledge Systems

> Shri. Sunil Sahasrabudhey – C V Seshadri, the philosopher-scientist

> Shri. A.V.Balasubramanian – Remembering CVS

> Prof. Anil Gupta –Roots of Indian Creativity Revisited: 1996-2018

> Shri. Joseph Thomas –

> CVS' family Member --

Concluding remarks by the Chair.

**Session – 1 (a):** 11.50 AM – 12. 30 PM:

**Open session “Recollections of CVS” by the audience**

**Session - 1 (b): 12.30 – 1.10 PM**

CVS as a Scientist-Activist: Situating Science & Technology between Academia, Art, and Activism – Panel Discussion ( Kavita Philip, Karl Mendonca, Anil Menon, Muthatha Ramanathan )

*Lunch: 1.15 – 2.15 PM*

**Session – 2: 2.15 – 5.15 PM:**

**Traditional Knowledge Systems of India: sharing some experiences and reflections.**

Chair: Prof. M D Srinivas

1. Presentations on some specific areas of knowledge classified as Sciences & Technologies:

Opening statement by the Chair

- Dr. PLT Girija/T M Mukundan – Ayurveda to enhance Public Health in India.
- Prof. Anil Gupta – Agriculture and allied areas
- Prof. N Ballal – Agariyas and their Iron: Lessons learnt
- Prof. Sharada Srinivasan – Artisanal metal technologies: historical trajectory and survival
- Prof. M S Sriram – Traditional mathematics and astronomy in the context of present day India
- Prof. Navjyoti Singh – Logic and Linguistics

Closing Remarks by the Chair

*Tea*

B. Shri. A V Balasubramanian – 'Testing' and ' Validation ' of Traditional Knowledge : Reflecting on some efforts and experiences

C. Prof. G Sivaramakrishnan – Perils of the past and promise of tradition.

Day-2: Friday 9<sup>th</sup> Feb 2018:

**Session - 3 : 9.00 – 11.00 AM:**

**Impact of the Net & Web and other recent Scientific advances on the Knowledge Domain**

Chair: xxxx

Opening remarks by the Chair

- Shri. Sunil Sahasrabudhey -- The New 'Knowledge – Politics' Dialectic
- Shri.L Kannan – ICT and the consensual taming of dissent
- Dr. Amit Basole – ICTs and the reshaping of the knowledge domain.
- Dr. J K Suresh – Knowledge in the Age of Information, Communication and Networks
- Dr. Sushantha Goonatilake --Exploring South Asian Ethics for New Technologies

Concluding remarks by the Chair.

*Tea : 11.00- 11.30*

**Session - 4:** 11.30 AM – 1. 30 PM:

**Beyond the Modern - Traditional dichotomy in Knowledge : The concept of “ Knowledge in Society” (*Loka Vidya*) and its implications**

Chair: Shri. Sunil Sahasrabudhey

Opening remarks by the Chair

- Dr. J K Suresh – The Making of a New World: The Promise of Lokavidya
- Dr. Amit Basole – Lokavidya and the Caste Question
- Dr. Chitra sahasrabudhey – What is truth?: A *lokavidya* perspective
- Prof. Darshan Shankar – The Health Science Agenda of the Trans-Disciplinary University

Concluding remarks by the Chair.

*Lunch: 1.30 – 2.30 PM*

**Session - 5:** 2.30 – 5.0 PM:

**Arts, literature, music, theater, films etc as Knowledge Activity – meaning and implications**

Moderator: Kannan Iyer

Opening remarks by the Moderator

- Dr. Gowri Ramnarayan
- Dr. Udayan Vajpeyi – Transformations: Music to Painting, *Desi to Margi*
- Bahau-ddin Dagar
- Prof. Bishnu Mahapathra –Poet’s world and Poet’s way of knowing
- Shri. Sashikanth - A Theatre of Ideas, oblivious to the idea of verisimilitude.
- Shri. P Rajagopal and Dr. Hanne M - Kattaikkuttu performances as a source of indigenous knowledge
- P A Krishnan – The Ramayanas of Valmiki and Kamban

Concluding remarks by the Moderator.

Day-3: Saturday 10th Feb 2018:

**Session - 6:** 9.00 – 11.00 AM.

**The Knowledge Revolution and our Institutions of Higher Education and Research**

Chair: xxxxxx

Opening remarks by the Chair

- Lead Paper presentation – Dr. C N Krishnan and Dr. J K Bajaj

- Panel Discussion (members to be announced)

Concluding remarks by the Chair.

*Tea : 11.00- 11.30 AM*

Session – 7: 11.30 AM – 12.30 PM:

**Concluding Session**

Chair: Prof. Ashok Jhunjhunwala

Report on the Conference: xxxx

Discussion

*Lunch*