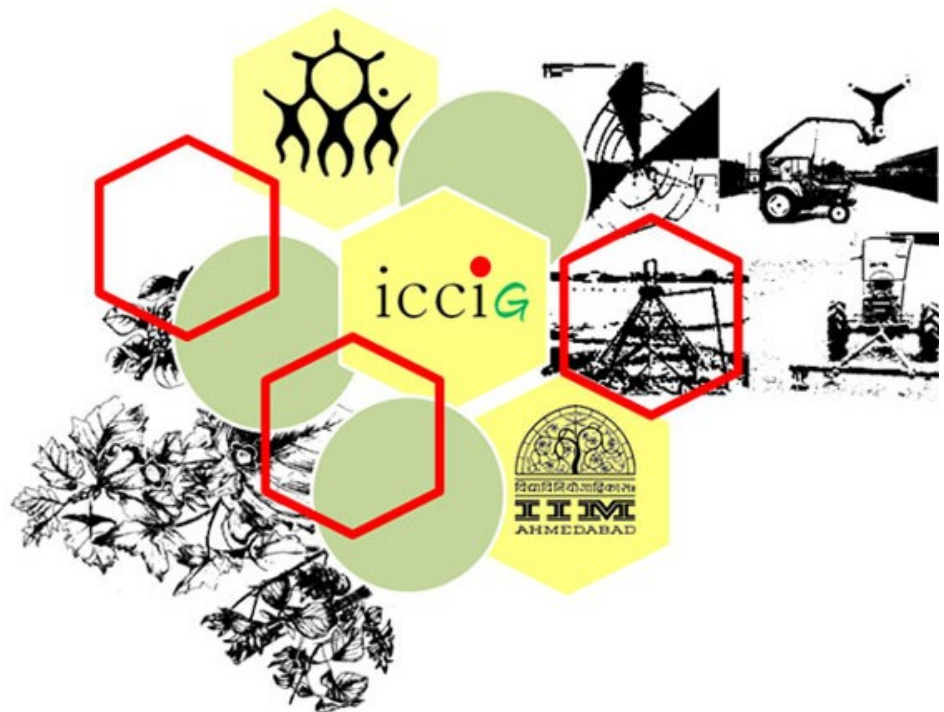


ICCIG 3
Third International Conference on
Creativity and Innovations at
(for/from/with) Grassroots



IIM Ahmedabad
January 19- 22, 2015





Honey Bee Network

Supported by:



National Innovation Foundation, India



SRISTI

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Foreword

The third International conference on creativity and innovation at/for/from/with grassroots [ICCIG 3] was organised at Indian Institute of Management, Ahmedabad from Jan 19-22, 2015 to enrich the ecosystem for inclusive and empathetic innovations. The main objective was to pool the insights from the ground and global playfields of ideas, institutions and initiatives. The conference covered four major themes of grassroots innovations: Technological, Cultural, Institutional and Educational. There was participation from various countries namely, India, China, US, UK, Russia, South Africa, Canada, Germany, France, Brazil, Portugal, South Africa, Singapore, Malaysia, Indonesia, Zimbabwe, Togo, Nepal, Ethiopia, Kenya, Pakistan, Bangladesh, Mali, Nigeria, Italy, Sri Lanka, South Korea. We had received close to 230 abstracts. There were around 300 participants from across the globe. There was also an exhibition of innovations and glimpses of *shodhyatras* during the conference. We had a Doctoral Colloquium organized by FPM students in which 26 students had registered from around the world.

In the two and half decades of its existence, the Honey Bee Network (HBN) has initiated and spawned many efforts to highlight the untapped potential of grassroots innovators in alleviating poverty and generating sustainable development. Twenty five years ago, HBN started to raise the voice for collaboration between formal and informal sectors, respect for local/indigenous knowledge for conservation of biodiversity and associated knowledge system, sharing of benefits through ethical supply chains and recognizing, respecting, rewarding local communities and individual innovators and traditional knowledge holders. Large corporations have realised much later that internal Research and Development is not enough to generate frugal innovations for the society and market. Hence, there is a palpable warming up of erstwhile closed companies towards open innovation models. Sustainability is also another basic character that had been overlooked for long. Frugality, both in terms of resource productivity and also as an essential attitude, is critical for sustainability. How to generate frugal solutions, systems and attitudes can be best learned from grassroots innovators who have found solutions in severe resource drought. In these conditions, an attitude for frugality is developed. These lead to solutions that almost close the loop and therefore weave a circular economy. HBN hopes to reinforce heuristics of frugality in the formal sector and build a sustainable innovation system.

Though the concern for inclusive innovation has become much more widespread, the voice of the knowledge rich, economically poor people and the youth is still not heard adequately. This generates an urgent need for the Network to introspect, debate, analyse and improve upon our limitations and find ways to serve the grassroots innovators and traditional knowledge holders. The first International Conference on Creativity and Innovation at the Grassroots (ICCIG) was held in 1997. The ideas exchanged on this platform gave rise to Grassroots Innovation Augmentation Network (GIAN) in 1997. In 2007, the Tianjin Declaration in a cooperative research program between IIMA, Honey Bee Network and Tianjin University of Finance and Economics. The second ICCIG Conference was organised at Tianjin (Dec 3-5, 2012), China and Ahmedabad (Dec 7-8, 2012), India. The Conference aimed at gauging the state-of-the-art, reinforcing the Network's values, and consolidating the lessons learned over the years. The Ahmedabad Declaration issued at the end of Second ICCIG at IIMA. We have tried to give voice to innovation agents from Technology, Education, Institution and Culture from all across world hoping to give respect and do justice to creativity at the grassroots.

Introduction

From Sink to Source: Enriching the ecosystem for inclusive and empathetic innovations require rethinking educational, institutional, technological and cultural edifice of our society. The creative impulses in the society at different levels and in various sectors need reinforcement from actors from formal and informal sectors of any society. Management science has restricted its exploration of knowledge systems and economy essentially to intra-form level or in some cases with the larger society but from the firm's perspective. Seldom have we pursued the discourse from the perspective of knowledge rich-economically poor people. This was the major departure that the Honey Bee Network ensured. Disadvantaged people in villages or cities were not just sink of advice, assistance and aid but also source of ideas, innovations and practices of traditional or contemporary origin.

Voice, velocity and visibility for creativity at grassroots

Recognising, respecting and rewarding local and indigenous knowledge, innovations and practices for conservation of biodiversity and other resources required sharing of benefits through ethical supply chains. One could learn from innovations using local resources for solving persistent social problems frugally at a) artefactual, b) metaphorical, c) heuristic and d) gestalt level. Large corporations have begun to realise only recently that internal research and development is not enough to generate frugal innovations for the society and market. Hence, there is an effort to move towards open innovation models (started originally by Honey Bee Network decades ago). Frugality in terms of resource use as well as waste generation is an essential attitude for sustainability. How to generate frugal solutions, systems and attitudes can be best learned from grassroots innovators who have found solutions in severe resource deprived situations. We have to move from cradle-to-grave oriented Life Cycle Analysis (LCA) which is premised on the production of waste to Circular Economy i.e. cradle to cradle with minimum or zero waste. HBN hopes to reinforce heuristics of frugality in the formal sector and build a sustainable innovation system. Frugality is not just about affordability, a mistake often committed by many scholars in the field. A one rupee sachet may appear highly affordable but only till we calculate the cost of collecting small pieces of plastic from hundreds of thousands of villages. Thus we should look at ecological, social and financial costs together to arrive at affordability of an innovative solution.

Towards empathetic and autopoiesis model of Innovation

One of the significant drivers of innovations is *Samvedana*, i.e, experiencing the pain oneself as intensely as the other person feels so that one does not solve a third party's problem. Instead, one innovates for one's own happiness [*swantah sukhyā*]. However, the paradox is that we all have limited emotional and spiritual bandwidth. Not all problems that we sense and feel, we can really act upon. It is like an inverted triangle. We know a lot, we feel only about some of the issues that we know and we act even on fewer things that feel about. In such a context, how do we sense the unmet social, institutional and technological needs? And if we don't sense them at all, then how will new innovations emerge? The marketers will tell us that we don't have to only respond to the felt needs. There are many needs of clients or potential customers which even they may not be able to aware of. So the paradoxical pendulum swings between the felt and not felt needs. The responsible organisations will not

make those needs felt which are bad for the environment or for the health of the people or widen the moral distance between us and the perfect strangers. If we pause and reflect for a minute, we will realise that perfect strangers are the ones who are unknown and unknowable. It could include an ant on the wall, a squirrel on the tree or a child unborn. We cannot figure out what do they think, what their needs would be and how do we create a society which they find as hospitable as we could make it to be.

Samvedansheel innovations will emerge if society at large adopts such an attitude. There are several changes required in our way of thinking to make a society *samvedhansheel* [empathetic is not the right translation, empathy is towards others, *samvedansheelta* is within oneself]: a) I don't have to personally suffer from a problem to experience the pain that somebody else suffers; b) The increasing uncertainty in the world can put me in a situation when I may be even more vulnerable than the people whose pain I may ignore today. God forbid, if there is a train accident in a remote area, the question of who lives and dies will depend upon how well the nearby primary health centre works and how much voluntary spirit in communities in the nearby villagers have to save life; c) I have received so much help from strangers in my life to whom I have no way to reciprocate. I am not the only one; d) We have all enjoyed resources, the shade of an old tree on the roadside or other services for which we have not paid anything and in creation of which, we have no contribution; e) Need for respecting other's ideas. Creative ideas and innovations are seldom completely original. Any new building needs a lot of bricks, many of which were not baked by me, or for me, or based on my ideas. Open source sharing of ideas has helped society to solve so many of its problems; and f) We can balance or compare our personal ambitions, desires and aspirations with the unmet needs and desires of those who may seldom be able to dream a flight in an open sky of freedom.

There are several other paradoxes that need to be resolved:

Autonomy vs. Agency: many actors in public and private system know what needs to be done to overcome various asymmetries in knowledge system between formal and informal systems but lack agency to take relevant decisions to avail of the autonomy granted to them. We need almost a cultural revolution for changing the mind set of such bureaucracies.

Accuracy vs. affordability: In general, higher accuracy is always better than less accuracy. But sometimes, there is an optimal accuracy which is enough. The cost of achieving higher accuracy may make the product or service unaffordable. Many GPS solutions are accurate within the range of ten metres. For most purposes, that is fine and the result is that even ordinary phones can have GPS system. If the choice is to have only extremely accurate systems, this function may go out of our hand. This is something that must also be learned from grassroots innovators.

Symeterical vs. assymeterical open innovation: A large number of companies, public and private organisations are starting to have open innovation models in which they seek ideas from outside with or without compensation. But, they very seldom share their own ideas in public. They also don't tell the idea providers as to what did they do with the ideas they got. The idea provider doesn't get feedback and therefore her self-esteem may not go up. Her ability to come out with better ideas may not increase. Obviously, she won't be able to demand much more value than what she got. The tension between these two kinds of open innovation model is waiting to be resolved slowly and slowly. The grassroots innovators are becoming aware of these possibilities and thus may be much more demanding in future.

Blueprint vs. autopoiesis: Blueprint implies a pre-determined trajectory for a project. Such an approach does not give a chance for learning, reflecting, revising and recorrecting the trajectory. The autopoiesis systems are based on self-design and self-correcting capabilities. Innovations are likely to emerge much more when flexibility, responsibility and consciousness allow learning and self-design. This is one quality that many grassroots innovation embody.

Building upon the potential of youth

As far as the role of students in developing frugal and affordable solution is concerned, a platform serving several important institutional objectives is needed such as : a) promoting originality among the students so that they do not try to do what has been done already before; b) trigger distributed design so that lateral instigations forge new communities of practice. c) support *kho kho* or relay model of frugal innovation, d) put the unmet social needs and grassroots innovations with on the agenda of the students; e) link MSME needs with academic community through students, f) create a 'market for merit' for the faculty guides of outstanding projects of the students why may be in small colleges and cities many times, g) offer challenge awards to students to take up wicked or persistent social problems to overcome civilisational inertia, and h) create funding and mentoring and entrepreneurial opportunities to encourage early stage start-ups. Dream is that in due course, all the student projects all over the world will be at this common platform so that a new revolution of democratic, frugal, extremely affordable solutions to social problems any where will emerge in the next five years. This was achieved through Techpedia.in to some extent. We need a similar portal for the student projects of management science.

Though the concern for inclusive innovation has become much more widespread, the voice of the knowledge rich, economically poor people and the youth is still not heard adequately. This generates an urgent need for the Network to introspect, debate, analyse and improve upon our limitations and find ways to serve the grassroots innovators and traditional knowledge holders. The first International Conference on Creativity and Innovation at the Grassroots (ICCIG) was held in 1997. The ideas exchanged on this platform gave rise to Grassroots Innovation Augmentation Network (GIAN) in 1997. In 2007, the Tianjin Declaration led to a cooperative research program between IIMA, Honey Bee Network and Tianjin University of Finance and Economics. The second ICCIG Conference was organised at Tianjin (Dec 3-5, 2012), China and Ahmedabad (Dec 7-8, 2012), India. The Conference aimed at pursuing the idea of grassroots to global (g2G). The Ahmedabad Declaration issued at the end of Second ICCIG at IIMA pointed out new areas where much more work was needed. In order to enrich the ecosystem for inclusive and empathetic innovations, the third ICCIG will pool the insights from the ground and global play-fields of ideas, institutions and initiatives. This compilation contains the abstracts received for the ICCIG III. We have tried to give voice to innovation agents from Technology, Education, Institution and Culture from all across world hoping to give respect and do justice to creativity at the grassroots.

National Innovation Foundation, which has supported this conference in a big way, is an autonomous institute of Department of Science and Technology. It has spawned and or implemented several new models of supporting grassroots innovations. The concept of Technology Commons implies that people to people copying is not allowed but also encouraged but people to firm transfer of technology has to be through licensing only.

Likewise, the GTIAF (Grassroots Technological Innovation Acquisition Fund) has been developed to acquire the IP rights of the innovators after some advance compensation and of course with their written consent and then make these innovations available at no cost or low cost for small entrepreneur to expand public domain. The principle of prior informed consent (PIC) of knowledge holders has been evolved over the years though a great deal of improvement remains to be done. Many students at IIMA and other institutions continue to learn from these Honey Bee Network organisations as inclusive innovation labs. Critical feedback from young minds will be constantly needed to improve the national and global ecosystem. Many countries around the world are learning from this experience of several decades. China has one of the strongest following of Honey Bee Network outside of India. A key output of the conference will be the Ahmedabad declaration on forging creativity and innovation at/for/from/with grassroots and many more policy, institutional and practical initiatives through voluntary partnerships forged at the conference.

Plenary Sessions

Opening Addresses

Welcome Note: Anil Gupta, Founder, Honey Bee Network
Elaben Bhatt, Founder, Self Employed Women's Association (SEWA)
Raghunath A. Mashelkar, Chairperson, National Innovation
Foundation-India (NIF-India)

Vote of Thanks: Vipin Kumar, Director, National Innovation Foundation-India
(NIF-India)

Professor Gupta's Opening Address

Professor Gupta welcomed the more than 300 delegates from 27 countries and urged the use of the conference to forge partnerships in addition to the value of sharing knowledge and learning from each other.

One of the goals of the conference is to define the boundary of the concept of frugal innovations— is it about affordability or more than that. Jargon should not be used unthinkingly. Frugality has to be in terms of its compatibility with the interests of current and future generations. There is a paradox of outstanding achievements in science and technology despite basic needs and dignity not being provided for. The concerns of the working class are not addressed by those who run the system. There is a need for a paradigmatic shift in management science and vision - to reach the unreached.

The need for careful use of terminologies is necessary, especially avoidance of the terms 'bottom of the pyramid' and 'jugaad'. Are poor people at the bottom of all pyramids – ethical, knowledge, and innovation? Jugaad is a shortcut, a temporary solution that will not let society progress systematically - longer term achievements need more than cutting corners.

Empathy is a driver of innovation at the grassroots. There is a need for a collaborative approach and a recognition of the importance of reciprocity – the sharing of the benefits of the knowledge, technology and rewards with the innovators, to raise the self-esteem of those providing the information. Intellectual property rights are on a P2P not P2Firm basis.



Professor Gupta emphasised the value of children's perception of problems and the innovative solutions they are capable to producing.

Open access databases will lead to democratization of the knowledge space, the hope is that India will become the largest provider of open source innovations. A democratic space is needed for the evolution of ideas. How will society use an idea? An idea has users, observers, a supply chain through which it moves.

Dr Mashelkar's Opening Address

This conference should address the importance of game-changing thinking, to recognise the value of the economically poor, but knowledge rich sections of our communities who have the potential to contribute to the achievement of a sustainable balance between the planet, people, and prosperity for all. Ideas need to be pursued with compassion as well as passion in order to generate high quality solutions that lead to inclusion of all sectors of society in the generation of the benefits. It is important to identify investors who



are willing to bring grassroots innovations to the market, and also to recognise the potential of children to generate innovative solutions. In this respect the Gandhian Young Technology Innovation Award is an important movement.

"This conference should address the importance of game-changing thinking, to recognise the value of the economically poor, but knowledge rich sections of our communities who have the potential to contribute to the achievement of a sustainable balance between the planet, people, and prosperity for all"

Smt Elaben Bhatt's Opening Address



disconnected from the real needs of the population, only when they include protection of natural resources can they contribute to meeting people's needs sustainably.

People's needs can be met sustainably only if the protection of natural resources is put at the centre of innovation. As God created life, we can create a life worth living, create sustainable solutions for the community. Game changing thinking needs to be applied to the creation of new business opportunities; for example recycling should be more profitable than manufacturing new goods, tree planting should be more profitable than cutting down forests. Engineers are often

Plenary Session on Inclusive Design

Chair: Raghunath A. Mashelkar
Chairperson, National Innovation Foundation-India (NIF-India)
Co-Chair: Anil Gupta, Founder, Honey Bee Network

Keynotes:

Amos G Winter	Faculty, Dept. of Mechanical Engg., MIT, USA
Shashi Buluswar	Executive Director, Institute for Globally Transformative Technology, Lawrence Berkeley National Lab, Berkeley, USA
Aguinaldo dos Santos	Head of the Design & Sustainability Research Center, Federal University of Parana, Brazil
Li Weian	President, Tianjin University of Finance and Economics (TUFE), PRC
Renu Swarup	Sr. Adviser/Scientist "H", Dept. of Biotechnology, Ministry of Science and Technology, Govt. of India

Dr Amos Winter, MIT, USA

How affordable excellence can be achieved by adopting disruptive solutions that produce high technology, low cost solutions is the focus of his work at MIT. He explained the thinking and approach to three products: 1) production of clean, desalinated water, 2) prosthetic limbs and 3) a robust, low cost wheelchair, that are examples of disruptive solutions that can be marketed globally. The success of the design and development of these products depended on grassroots research to identify the real needs in their social and



cultural, economic, terrain and climate contexts. All of these were researched in Indian villages. The water solution took into account that 25% of India's population lives in villages, mostly without electricity, that 60% of the ground water is salty. The solution is a solar powered, electro-dialysis village level desalination technology that is being introduced to villages in Rajasthan. The wheel chair which is suitable for rough terrain in rural areas, costs US\$200. A \$300 version was developed for the USA/European markets which has higher quality parts and fits into a car. Sales of 12,000 chairs in both markets have been achieved.

"Affordable excellence can be achieved by adopting disruptive solutions that produce high technology, low cost solutions"

Dr Sashi Buluswar, LIGTT, Lawrence Berkeley National Lab, Berkeley, USA

The identification of critical technology breakthroughs that are required for sustainable development in India was discussed. Six were highlighted: water desalination, TB diagnostic equipment, 'clinic in a box' healthcare delivery of maternal and baby care, suitable materials for homes in slums that include a toilet, sustainable agricultural systems such as precision irrigation, and a human rights related



innovation of a point of use DNA based rape kit. LIGTT, Institute for Globally Transformative Technologies, has 3,500 scientists and engineers, 13 Nobel Laureates, working on technologies that can be game-changing. Based on their '50 Breakthroughs' Study, they have identified some of the most important technology breakthroughs required for sustainable global development. They focus on technologies for which a critical breakthrough appears to be many years away, and work to accelerate the time-to-market.

Dr Aguinaldo dos Santos, *Design & Sustainability Research Center, Federal University of Parana, Brazil*



Dr Santos identified three main issues: first, the legacy of poverty as a basis for innovation and an improvisation capability.

Associated with this is the problem of how to scale up design to support low income communities. In this respect he spoke of the www.innonvations.com initiative which is based on the principle of crowdsourcing design through co-creation and collaboration. Secondly he identified the importance of product-service systems to reduce environmental

impact; and thirdly, the need to change consumption habits through design for sustainable behaviour.

Professor Li Weian, *Tianjin University of Finance and Economics (TUFU)*,

Tianjin University students are accelerating the incubation of grassroots innovations by providing technological, marketing and business model support which in turn attracts support from venture capitalists. The innovator gains these professional inputs and the students gain experiences which enhance their employability on graduation. Professor Li provided examples of four grassroots innovators: Tao Yonghua who developed a greenhouse for vegetable growing that can operate in -20C temperatures without artificial heating; Guo Yufu, and corn cultivator; shadow puppets production with technology support from students; and a sand painting business in which students contributed technology, marketing and business model support to attract venture capital support.



Dr Renu Swarup, *Department of Biotechnology, Ministry of Science and Technology, Government of India*



As CEO of Biotechnology Industry Research Assistance Council (BIRAC), Dr Swarup described its function to empower and enable innovations in the biotechnology sector by being a catalyser and a connector, in particular in forging academic/industry partnerships. She mentioned that SPARSH had been launched to focus on the development of biotechnology innovations and solutions for maternal and child health.

BIRAC will also be partnering with Gandhian Young Technological Innovations (GYTI) operated by SRISTI

Grassroots Innovators – Their Accomplishments

Farmer Innovator: Amrutbhai Agrawat from Junagadh, Saurashtra, Gujarat

“I have worked on agricultural implements for many years and designed 15. It involved a lot of effort and time to make 15 implements. The process required a lot of hard-work and was costly too. It has been difficult yet enjoyable. I was introduced to HBN, SRISTI through Rakesh Basant who was doing his PhD research. The organisation encouraged me a lot and supported me. Who will care for someone working in a small village? Thanks to the organisation my ideas and innovations have developed and diffused across different countries. I have even travelled to South Africa and France. I regret and will always regret the fact that I did not really get any sort of help from the government.



I have set up a total of 24 Shodh Sankals (innovation chains) in various villages and talukas across Saurashtra. I have learned from various innovators. Across Saurashtra, I have established 18 Shodh Panchayats (village level council of innovators). Till now I have missed just one Shodhyatra and I regret that. I have participated in 33 of the 34 Shodhyatras. I have helped hundreds of other innovators to get in touch with the institution. I urge all the people inspired to innovate to contact the organisation. I tell them there is no other way their innovations will get any recognition. SRISTI, GIAN, NIF, HBN - I am happy that they have recognised thousands of innovators and awarded several among them. I am eager to do more such work in future too.”

(Amrutbhai Agrawat is a serial innovator – tilting bullock cart, ground nut digger, self-locking pulley for lifting water and so on.)

Cultural creativity: Motibhai Nayak a retired school teacher



“I have always worked in education but as such I am a folk artiste. I have particularly worked for girls’ education. I have used songs to encourage girls to attend school. There exist Gujarati songs called *halarda* sung to celebrate the birth of a boy. I created *halardas* to celebrate birth of girls which never existed. I have also trained students in musical instruments and Bhavai (folk dance) to encourage girls’ education. As a result in 1975 my village achieved 100%

girls’ literacy. In 1992 I came in contact with HBN. Thanks to NIF, SRISTI and HBN my work has been covered by international media especially BBC London.

I have also composed songs for conservation of agro biodiversity like tulsi and livestock. I also use puppets to raise consciousness. In areas like Shyamalaji near my village there are Adivasi tribes. So I created songs in their language to raise awareness.”

Educator: Rakesh Patel, Gujarat

“I joined the school as a teacher in 1998 and on the very first day said “I don’t want to do this” when I returned home. My Grandma urged me to go the next day just to find out if my students had bathed or not. After that day there was no looking back. I changed the school’s name to Masti Ki Paathshala - the joyful/fun school. What is there in a school which binds students and teachers together? Why study if I enjoy playing? I gradually started doing away with rules. This process took a lot of time. In 2008 we came across an important useful tool i.e blogging. After blogging we got mixed responses. Some said we were doing a good job. Some complained that students were disrespectful towards teachers and they actually occupy the teacher’s chair. We thought this is the way it should be. I changed the way students greet the teachers. We made it less formal and students just address teachers by their first names. The staff meetings were also less formal and things were just lightly discussed over lunch rather than by giving sermons. It is only after blogging that our faith in this kind of system was reinforced. We realised we were doing a good job. We also received feedback on how we could improve our style of learning. We used to take kids to farmers and herders to learn all about them and their job. We would put such ideas on blogs and received a comment saying we should create stories for such topics. We got several such ideas through blogs.



Till 2010 blogging was not regular. Then we started an email newsletter and named it Bioscope. It has 2000 subscribers today. Some just say, Good! Others give more detailed feedback. Once a Gujarati from France called up to suggest we paint the pillars of the school in a particular way and we have done so. All thanks to the email newsletter, it is possible to reach anyone across the globe.

Today we blog and are on Facebook too. We get lots of demands and at times suggestions for books. It feels like the entire world is concerned for our school. We use social media to empower children in a small school in a village.

For us this journey has not ended yet. We need citizens/children who are aware of their rights and can claim them. They should have a voice. We live in a small village. Others decided things on our behalf and I wanted this to end. Today the children's voices are stronger. The *talati* (district revenue administrator) listens to us. He comes to the school and educates the children about his duties. Similarly we take them to the doctor who tells them his duties. I wanted my children to know that I (the teacher) exist because of them. The subjects/topics are not important. It's the children who matter. Subjects are for children. Children are not for subjects. Freedom is necessary to assert rights. We are moving forward with this thought."

Pomegranate Farmer: Genabhai Patel

"I am the son of a farmer and come from a village 250 km away. Farming is tough. Wheat, finger millets, sorghum was what we grew on our sandy soil. The needs of the farmers are not fulfilled by farming. Whenever they need money for marriages and other such expenses they depend on local money lenders for loans at exorbitant interest rates. When I was young I thought about how to free the farmers from such difficulties. I started a dairy in 1980 by co-ordinating with Banas Dairy. At that time in my village the villagers had a tradition not to sell milk to anybody. But that has changed and now 6 to 7 lakh litres of milk is sold each month from my village. Livestock keepers now don't have to depend on money lenders for their needs.

You fight nature to earn a living as a farmer. The weak are unable to look for a path whereas even the Himalayas cannot stand in the way of a strong-minded person. I organized farmers in my village to form Khedut Kisan mandal (a mandal is an administrative division). I thought there should be something that we can sow only once and reap for many years.



I am physically handicapped but drive my own car and tractor. I work on the land myself. My brother and family help me today. But I started alone. I planted pomegranate. People rebuked me saying I am handicapped and will make others handicapped too. But I refused to listen to others. I borrowed Rs 4000 and earned Rs 1.16 crores (1 crore = 10 million) through the pomegranate crop. I had never seen so much money in my life. A farmer can never even dream of earning so much in his lifetime. Today we sell thousands of tons of pomegranate. All farmers in my village wanted to follow my way, so I started giving them lessons on pomegranate farming. You can call it *Anar ki paathshala* (pomegranate school). I have held meetings in villages, sometimes even text message people to inform them about the meetings. I have even diffused the knowledge in other states like Uttar Pradesh and Rajasthan. I have sold pomegranate from Rs 3/kg to 161/kg. I grow and sell across the

nation. Some farmers who were on the verge of selling their land are now earning Rs 20 lakh (2 million) a year. We have 50-60 cars in our village. This year has been difficult because of the cold. But things are still looking good. I hold a meeting in each village every year. I speak at colleges focusing on mentoring the children of farmers. I tell everyone: I have an apple, you have an apple. If we exchange them we still have only 1 apple each. But if we share an idea each, we both have two ideas. A farmer keeps learning and is tested each year. Across the world, success is the one thing that can be attained only after you are hit with failure. We only gain by being humble. Just like a bucket can be filled with water only when it is lowered in a well. I also bow down to all of you.

I have received eight awards from the government. I have received awards from Narendra Modi, Central Government and also the Rajasthan Government. Other governments have also honoured me.”

“I have an apple, you have an apple. If we exchange them we still have only 1 apple each. But if we share an idea each, we both have two ideas”

Harnessing innovations for and from the extreme grassroots, street vendors and other workers

Chair: Elaben Bhatt Founder, Self Employed Women’s Association (SEWA)
Co-chair: Pradyuman Vyas Director, National Institute of Design, Ahmedabad

Keynotes:

Reema Nanavaty & Manali Shah	Self Employed Women’s Association, (SEWA)
Dheeraj Agawal	Developer, Street Saathi, Mumbai
Chitra Mukerjee	Manager, Chintan Environmental Research and Action Group
Sangeeta Singat	Manager, Street Food Programs, National Association of Street Vendors of India, (NASVI)
Indu Prakash Singh	Executive Committee Member, Shahri Adhikar Manch: Begharon Ke Saath (SAM:BKS)
Ashwin Parulkar	Centre for Equity Studies
Tarique Mohammad Queresha	Faculty, Tata Institute of Social Science

Discussant: Rajesh Solanki Dalit Hakk Rakshak Manch

The theme of this session was how can creativity and innovation be harnessed from and for people often considered to be at the margins of society? For them, with them, from them.

National Association of Street Vendors of India - NASVI

NASVI has 6 lakh members in 25 states and 900 organisations. It promotes professionalism, provides better opportunities through promotional activities such as Street Food Festivals. The organisation provides training in hygiene and safe food handling, and advocates their interests against police harassment. In 2014 they had garnered sufficient support for successful passing of legislation - The Street Vendors (protection of livelihood and regulation of street vending) Act



SEVA

Since 1972, SEVA has pursued a policy of supporting the poor, first in Gujarat and then in neighbouring states. For them innovation is a means of survival, and they need help for their ideas in the form of finance and access to resources.

SEVA has 155,000 members who are street vendors and they have provided support for them in many ways, in particular in protecting the institution of natural markets. They have mapped natural markets in the city to generate protection for them against city planners' unsympathetic actions. They have encouraged the vendors to organise leaders from among them who will monitor hygiene, order, negotiate with the police, and build good relationships with local shops and residents.

Street Saathi - App for finding safe street food



Dheeraj Agarwal described how he came up with the idea for a safe street food app and demonstrated its key features. It was launched on Christmas day in 2014, and supports street vendors to develop their market and reputation. A rating feature on the app promotes food hygiene and business discipline among the vendors. Search for vendors includes type of product, and contact and location information.

He also described his experiences as a street hawker and his initial small

scale support to hawkers in increasing their sales turnover.

Homeless Audit

Indu Prakash Singh described the measures that have been taken to protect the homeless from police brutality and to extend the number of shelters for them in Delhi. Empathetic listening sessions with the police has cut down police brutality. There is a shelter deficit of 87% in Delhi. The Chief Secretary of Delhi reduced the number of shelters in Delhi to 17 saying - *Dilli mien thane kahaan, Dilli mien thane hoti hai an and lens ke liye*. Media coverage has helped stop the demolition of shelters



- 50 publications and more than 10,000 reports on homelessness, and the consequent media coverage has caught the national imagination. The homeless people are city makers - they are vendors, waste pickers. We are saddled with a heartless bureaucracy - although the courts are helping to counteract our failed governance.

Chintan environmental research and action group: Chitra Mukherjee



Chitra Mukherjee described the transformation of waste management at Delhi railway stations by organising the waste pickers and coordinating with the railway management access to the trains and platforms, and to space for sorting the waste for recycling.

13 tons of waste per month is sorted. The sale of recycled materials pays the wages of the pickers who are provided with training, protective uniform, healthcare, regular shift working in clean conditions. Their children are able to go school.

Chintan runs several programmes: voice for waste, scavengers to managers, no child in trash, responsible electronic waste handling, knowledge power to impact government policies on waste. They have a partnership with Safai Sena which is an organization of 12,000 informal workers in waste management. It is a registered group of waste pickers, doorstep waste collectors, itinerant buyers, small junk dealers and other types of waste recyclers. There are 2 million waste picker children in India - typically an entire family works in waste picking. 20% of our waste is recycled by waste pickers.

Protection of beggars

Beggary laws in India criminalise begging. Mohd Tarique described the measures he has undertaken to release 30,000 beggars from police custody, change the attitude of constable caretakers of the detention centres to cease brutalities and reduce the number of deaths, reach out to students to provide support to inmates and help them re-integrate with their families, lobby central government to redraft the law on beggars and take more stringent action against human traffickers.



The beggars are people abandoned by family, suffering illness, itinerant street workers, migrants. They can be subject to 10 years of detention under the law. Moreover, any dependents can also be detained. The handicapped, blind, and lepers can be detained for an indefinite period. 50 to 60 people are arrested every day in Mumbai.

Summing up by Elaben Bhatt

The informal sector is growing, has no name, there is a constant struggle for survival, they should not be treated as poor in need of welfare, they are workers, economically active, they contribute to GDP and national income, 63% of GDP comes from the informal sector, 50% of savings and 40% of exports come from the informal sector

What is the contribution of street vendors to the economy? Until 1990 they were not recorded as workers in the census of India which noted them as non-workers. Though the situation is changing ever so slightly, the lack of specific employer-employee relationship is sufficient to continue discrimination and exploitation. The questions that need to be

addressed are: does a worker need a supervisor to be counted as a worker? Why should anyone who works and contributes be treated as poor? One of the solutions is to organize through trusts, societies, trade unions, to develop a collective voice and validation of work as this is the key to meaningful change.

Why should anyone who works and contributes be treated as poor?

Quadra Helix: Linking Education, Culture, Institutions and Technology

Chair: T. Ramasami	Former Secretary, Dept. of Science & Technology (DST)
Catherine A. Odara Hoppers	DST/NRF South African Chair in Development Education, University of South Africa
Pradip Khandwalla	Retired Faculty, IIM-Ahmedabad

Epistemology of hope

Professor Catherine Odara Hoppers spoke about how she is incorporating South African indigenous knowledge systems into the curriculum and research agenda of the University of South Africa, the largest in Africa. One of her strategies is to include elders, guardians of indigenous knowledge, to work alongside 30 professors from a variety of disciplines, in defining a new indigenization of the curriculum, to represent African metaphysics which starts from *ubuntu* - I am because you are, your problems are mine, my triumphs are yours.



Her mandate is to advance the frontiers of knowledge and to stimulate strategic research into the actions that are needed to enable restorative actions and sustainable human development that is just and fair. She organises annual retreats which include on their agenda 'restorative action for rural communities' Indigenous knowledge systems are not about woven baskets, but relate to the scientific and technological development of the people. A new indigenisation is required which acknowledges reciprocal valorisation among knowledge systems

"ubuntu - I am because you are, your problems are mine, my triumphs are yours"

Forms of creativity, innovation and organisations

Professor Khandwalla identified with examples relating to grassroots innovations six forms of creativity, Drucker's four types of innovators, and the two types of organisation that support the innovation process from ideation to market.



He also identified issues relating to the achievement of an innovating economy based on grassroots knowledge: the need to capture and disseminate creative ideas, in particular indigenous knowledge; the need to develop entrepreneurship in rural communities; the need to develop the education system to eliminate the emphasis on rote learning which paralyses the mind; the need to capture CSR funds which provide a potentially huge source of funding for rural development. These

suggestions were all accompanied by examples.

Linking education, culture, institutions and technology

Dr Ramasami compared the dominant science and technology innovation system with the grassroots innovation system and identified the advantages of inclusiveness and resource optimization of grassroots innovations in comparison with the resource intensiveness and competitiveness of the science and technology based innovation system.



Grassroots innovations provide a pathway for resource optimization for unserved markets, but access to global markets will require support from testing and certification institutions, and from MSMEs to carry out the distribution and sales functions.

Dr Ramasami's closing remarks included the observation that the purpose of education is to reveal the perfection in man.

"purpose of education is to reveal the perfection in man"

Interaction: A P J Abdul Kalam, Former President of India

Dr Kalam's address in the auditorium took place after a tour of the Conference Exhibition to which he referred in his opening remarks. He supported the premise of the four streams of institutional, cultural, educational and technological innovations displayed in the exhibition as being a sound basis for defining the scope of innovative activities.



He described the basis of innovative behaviour as being learning leading to creativity, leading to thinking, leading to knowledge.

He identified the Honey Bee Network as being a platform for innovation and creativity capable of empowering the nation.

He spoke of his support for the IGNITE Awards and gave examples of insightful innovations by young children that have been recognised by this national level award. In particular he referred to Santos, the student from Tamil Nadu who proposed a mechanism on public buses which prevents the driver from moving the bus while someone is still on the step of the bus; the student from Bihar who devised a stair walker; and Riya in Delhi who invented a cycle powered street cleaner.

"Dr. Kalam predicted that in fifteen to twenty years' time, India will have smart waterways, comprehensive solar powered energy and sufficient food to satisfy the entire population's nutritional needs"

Those who imagine the impossible will change the world.

Development is powered by competition, competition is powered by technology which is powered by creativity. Innovation has to be continuous, on multiple dimensions and is based on the ability to imagine. Scientific endeavour leads to a culture of excellence.



He urged the audience to imagine what India should have achieved by 2020, for example 24 hour solar power generated by satellites. He urged the audience to define what they want to be remembered for. He invited interested people to write to him with their ideas at apj@drkalam.com.

Blending of Formal and Informal Science: Experience of Honey Bee Network (1)

Chair: Akshai Agarwal, Vice Chancellor, Gujarat Technological University
Co-Chair: Amit Dinda, Faculty, Department of Pathology, AIIMS

Panelists:

Dhananjay Tiwary Scientist, Department of Biotechnology
Gopal Kundu Scientist, National Centre for Cell Science (NCCS)
Debprasad Chattopadhyay National Institute of Cholera & Enteric Diseases & Late Shatrughna Prasad Vaidya, Traditional Knowledge Holder
Ravikumar R.K. & Vivek Kumar, NIF, and Khumaji Badaji Kataviya, Innovator, Sakarabhai Bhariya, Traditional Livestock Healer
Chandrashekhar V M, Dept. of Pharmacology, Shri Kumreshwar College of Pharmacy, Karnataka; Pawan Kumar, NIF, & Chandrasekhar, Traditional Healer

GRIDS @ SRISHTRI

Grass Roots Innovation Design Studio in Bangalore is a collaborative partner with NIF which takes NIF supported innovations to the next level so that they become sustainable and marketable products, and to provide a bridge between the informal and formal sectors. It offers an open facility for products to be proto-typed. Success stories include a ceiling fan, bicycle cleaner, stair climbing trolley and a grain sorter. Other projects with a frugal design approach include developing papier maché production as a livelihood, supporting craft communities, and exploring new ways of making, such as by use of a 3D printer.

Dhananjay Tiwary, Scientist, Institute of Himalayan Bioresource Technology, Council of Scientific & Industrial Research, spoke about their MOU with NIF to support value addition for herbal practices, and in particular a case of a treatment for crop protection against pests that has superior qualities compared to a well-known Neem preparation. He spoke about the difficulties of translating an indigenous knowledge holder's language, processes and procedures into scientific terms. In order to obtain an understanding, he spent three days with the indigenous knowledge holder observing his processes, and from this developed a raw formulation. This was tested on selected insects and found to be superior to Neem in respect of certain characteristics. Experiments were carried out to understand the reason for this and the superior understanding of the indigenous knowledge holder was confirmed.



Khumaji Badaji Kataviya spoke of innovations in veterinary science contributed by indigenous veterinary healers and their medications. Their concern is the healthcare and productivity of livestock, providing low or no cost, effective solutions without any expectation of personal reward. They are willing to share their knowledge and skill within

their vicinity, and are found to be uniformly distributed. Two cases of value addition carried out by Nagpur Veterinary College, Maharashtra in support of NIF-sourced innovations relating to treatment of gynaecological conditions in cows and treatment of bloat in goats were discussed. There is a need to create interacting networks between the indigenous veterinary healers and the formal veterinary science holders to incorporate their knowledge into the formal system.

Chandrashekar V.M. Department of Pharmacology, Shri Kumreshwar College of Pharmacy, Karnataka spoke of his work in the scientific validation of herbal medicine, in particular in the validation of a herbal tea for the treatment of arthritis. Scientific tests supported the herbal healer's claims.



Vijay Kumar, Microbiology Research Laboratory, Christ Church College, Kanpur spoke of the difficulty of treating lesions and fungal infections of the skin (tinea) with existing β medications that are very costly. Herbal approaches are being sought.

In the conclusion to the session the chairman observed that Indian herbal medicine is not as advanced as Chinese Traditional Medicine in terms of validation, support from clinical trials, and identification of dosage.

Blending of Formal & Informal Science: Experience of the Honey Bee Network (2)

Chair:	Akshai Agarwal	Vice Chancellor, Gujarat Technological University
Co-Chair:	M. N. Patel	Vice Chancellor, Gujarat University
	Anil Sahasrabudhe	Director, College of Engineering, Pune

Panelists:

Hardev Chaudhary, NIF & Debati Devi, NIF & Gulshan Vashistha, NIF, Binoy Kurian, Mentor, and Mohan Lal, Innovator-Z-Drive	Prakash Singh Raghuvanshi, Innovator-Kudrat Reformer
Nitin Maurya, NIF & Mushtaq Ahmad Dar, Innovator-Pole Climber and Walnut Cracker	Khumujam Jina Devi, Innovator-Mangal Herbal Soap
Marianne Esders, Research Scholar & Mansukhbhai Patel, Innovator-Cotton Stripper	
Anamika Dey, NIF & Dharambir Kamboj, Innovator-Multipurpose Processing Machine	

Walnut cracker: Mushtaq Ahmad Dar, Jammu and Kashmir

Jammu and Kashmir are the main walnut producers (around 90%) of walnuts in India. Policies have been promulgated to increase productivity and among the problems identified

are lack of machinery and farm equipment support which lead to human drudgery and pain for the walnut crackers.

In 2005, Mr Dar recognised the need to mechanise walnut cracking and in 2007 the first prototype of a walnut cracker was produced. He then engaged a designer and over the last six to seven years the design has been improved such that it now achieves 80% efficiency, and has won several design awards. He spoke of the role of the NIF in the improvement of innovations and the empowerment of grassroots innovators, and support for social diffusion.



Questions put forward by Mr Dar were: how do we ensure that innovations do not remain localised and how to increase their impact. What next steps would enhance penetration of markets..

Innovator-Z-Drive: Mohan Lal, Kerala



Mr Lal identified a problem regarding the fuel efficiency of small boats used for fishing and the associated pollution problems as well as the financial burden. He developed a small reversible reduction gear box and Z-drive through persistent effort of over more than five years at considerable personal investment. The outcome is less than 75% fuel efficient and 100% pollution free with

retrofitting provisions. The Kerala government has announced a 50% subsidy on this product. He said changing the lives of people is the ultimate success of the project. He identified the importance of the blending of the informal and the formal innovation systems to support a successful outcome, in his case he received support from Tata Steel at the right time.

Cotton stripper as a case study: Ms. Esders, PhD student, IIM-A

The study of the development of the cotton stripping machine provides insights into a multitude of issues relating to the process of its design and development and the contexts. It provides a good case study of how the gaps between the formal and informal innovation sectors can be bridged. Among the implications identified are: the asymmetries in the

innovation value chain (arising from the open culture of grassroots innovators), inertia and differentiations in the degree of inclusiveness; the lack of intermediaries and communication gaps; lack of trust and issues in benefit sharing; access, assurances, abilities and attitudes; funding gaps; last mile connectivity. Contextual issues include the need for a reduction in drudgery and child labour, development of a technology commons, capacity and institution building and access to CSR funds as a way forward.



Case study of multi-purpose food processing machine: Dharam vir Khamboj, Haryana



The innovator identified an untapped opportunity for a multi-purpose food processing machine to enable value addition for fruit, vegetable and herbal farmers. The first prototype was produced in 2005, after 18 months of development. Redesigning was required for improvement and subsequently the second, third and fourth models were created during which the communication gaps between professional designers

and the grassroots innovator were bridged and healthy relationships emerged. The unique feature of the machine is the wide variety of functions it offers. The market in India and overseas is growing rapidly.

Herbal soaps: Smt Devi, Manipur

The innovator, Khumujam Jina, uses several local herbs and plants which are traditionally known to have health benefits using the traditional soap making process. With milk and honey in addition to the plants/herbs, she has developed eight types of herbal soaps which offer medicinal values and other health benefits. This has been accomplished with support of formal science provided by the NIF who have offered value addition, and support for developing the market. In addition to her soap making, Smt Jina operates her home as a



rest home for widows, HIV+ infected women, and the elderly. She has become a role model for gender empowerment in her village.

Case study of plant varieties: Prakash Singh Raghuvanshi, Uttar Pradesh

The innovator developed many high yielding varieties of food grains and pulses without support from any agency until 2002. The role of NIF as a partner has supported the resistance to major pests and diseases, and maintaining seeds of good flavour and taste for his crop varieties of wheat, paddy, mustard and pigeon pea. He developed more seeds per spike on paddy; and on pigeon pea; bold seeds and more pods per plant. Many institutions



have evaluated and validated their superiority. Variety release in many cases requires data collection and help from formal institutions. The innovation was taken up for registration prior to submission for clearances. The NIF has also supported him through the Micro Venture Innovation Fund for nursery development, cultivation and scaling up manufacturing channels for his improved varieties.

Milk Master Machine: Raghava Gowda, Mangalore



For marginal farmers, milking cows is a time consuming task. Imported, electrically powered machines are simply not an option for them, so Mr Gowda decided to develop a machine that can be operated manually, based the functions of an insecticide pump. NIF supported the development of four variants of the machine that can be operated without electricity. It is easy to use and hygienic as the milk is least exposed to air. It is priced at around Rs 12,000 to Rs 39,000 compared to imported

machines of around Rs 90,000. It has gained acceptance for large scale production and state governments should announce a subsidy for its use.

Health burdens for homeless people: Ashwin Parulkar, Centre for Equity Studies, National Resource Team for the Urban Homeless

Supreme court judgements on the homeless act as a trigger for policy provisions concerning shelter for the homeless. Policy mandates and follow-up actions are based on sensitization



by third party people such as care organizations for vulnerable sections of the community. The Centre for Equity Studies operates a health recovery shelter in north Delhi where health services and social counselling are offered for vulnerable people to support reunification with their families. Homeless people often suffer from multiple serious ailments, such as post-traumatic stress disorder, chronic respiratory disorders, mental illness and

tuberculosis. The complexity of their health issues is often a major obstacle to accessing appropriate care.

Chairman's summing up of the session

The chairman's summing up included the following points raised by the speakers:

- The grassroots innovation process which is based on incremental improvements is a time consuming process. The economic subsistence of the grassroots innovator during the innovation process is challenging.



- Asymmetries between the formal and informal systems include culture, attitudes, and abilities.
- Challenges include communication difficulties, trust relations, institutional inertia in providing back up, funding and capital support, equitable benefit sharing, and a lack of reciprocal relationships.
- There is a need to identify the possible roles of intermediaries, relevant institutions, technology organizations and support, including funding, from corporates' societal responsibilities policies.
- When gaps are bridged and CSR support from corporates flow, success is more realistic.

Rapporteurs' Summary of Each Track

The rapporteurs' summaries are presented here as sets of points arising from the several sessions in each track.

Technology Track

The first step is validation of the innovator's claim and then to facilitate the closing of the gap that can exist between the traditional knowledge holder and the scientist. On many occasions 'hard science' is found to be deficient.

Speed up the time frame – how can NIF reduce the time to market – now engaging private firms and public institutions to speed up the process to market.

Affordable excellence is a guiding principle.

The wisdom of GRIs – for example neem has destabilizing factors unknown in the scientific world, but the GRI knows this.

Value addition and business market requirements – value addition has to be market led; the business model follows a *land* (identification of the solution) to *laboratory* (for testing and development) to *land* (marketing to potential users) model.

Cultural Track

A wide spectrum of case studies were presented including crafts, folk songs, special needs where self-respect was a strong theme.

Culture is not baskets alone, but the cultural, economic and social systems behind the design and production of artefacts.

Innovations in quality improvement were presented.

Skill *recognition* is very important, as compared with skill development

How to mobilise CSR funds to support culturally based innovations was raised.

Recommendations:

Cultural innovations involve a unique approach.

Cultural skills to be included when considering technological skill development in innovations.

Use public space for display of cultural skills.

Innovation should be included in the school curriculum.

Children should map local history and culture.

Special recognition should be given by universities to indigenous knowledge holders.

Knowledge training should be distributed on open platforms.

Locally made products need to be brought into mainstream use.

Use of CSR funds to provide financial support for cultural innovations.

Institutional Track

To avoid falling into western cultural compliance requires deep institutional action that is rooted in the different ways of seeing and defining issues.

Grassroots innovation should become the norm, not the exception.

The grassroots have a permanent voice that cannot be silenced.

Indigenous knowledge systems and other imported frameworks need to be integrated into a holistic knowledge framework in the service of humanity.

Educational Track

Teachers as Transformers

- Grassroots and leaf-tips: synergies and possibilities
- Centrally-driven initiatives necessary but not sufficient
- Grassroots experiments/innovations indicate gaps in policy implementation and present models for scaling up (e.g. CCE, SMC, quality tracking)

- Such gaps need to be systematically directed to key institutions like DIETs (orientation to innovation and training); training in partnership with innovative teachers
- Incorporate validated teacher practices in B.Ed / teacher training curricula
- An innovation fund to work on problems that the system identifies and for support to scalable innovations

Civic Innovations in Education sparked many interesting conversations

- Themes ranged from the role of civic society in sparking innovations in education, to what makes for a more civilized education that encourages and not stifles creativity.
- A key attribute of innovations is the recognition of strengths often ignored in mainstream discourse:
 - Recognizing the ability of children to create a social impact and create productive learning spaces in unstructured environments
 - Developing committed teachers from underserved communities via sustained engagement
 - Creation of community based systems to enhance democratic accountability of government systems
- Contested nature of education, its goals and means to achieve multiple goals
- Need to democratize education and the role that civic participation can play in it

Parallel Sessions

Community Solidarity and Grassroots Institutions

Chair: Catherine A. Odora Hoppers DST/NRF South African Research Chair in Development Education, University of South Africa, Pretoria

Co-Chair: Astad Pastakia Advisor, SRISTI, Development Consultant

Challenges of grassroots innovation: designing effective organizations for the weaver community by Sumit Mitra, Associate Professor, IIM-Kozhikode, Kerala; Suresh Kalagnanam, Associate Professor, Edwards School of Business, University of Saskatchewan, Canada; Margie Parikh, Professor, B.K.School of Management, Gujarat University, Ahmedabad

Sumit Mitra presented the case of Jaipur Rugs, Co (www.jaipurrugsco.com) founded by Nand Kishore Chaudhary whose business model links grassroots artisans with world markets. A wide range of carpets are produced by 40,000 artisans in 600 villages in remote areas. 80% of the artisans are female. Jaipur Rugs came to international attention through C K Prahalad's work on BOP.



The family business has expanded on the basis that if more carpets are woven, more livelihoods are created. The business is now at a juncture where organizational transformations are needed to overcome problems created by size. Design effectiveness is now more important to maintain and increase their markets

The current business model includes payment of competitive wages, skills training, education and health care provision. (In their education system they use the language of weaving to teach literacy.) Weavers are paid for performance and they pay for their own looms with support from the company. The weavers have contracts with the company and the freedom to sell to other buyers. Jaipur Rugs is competitive with other purchasers and provides guaranteed wages 365 days a year. Procurement of yarns and their dyeing is centralized, and kits with yarns and design instructions are distributed to the weavers through the branches. The finished carpets are collected by the branch.

The company is now facing two challenges – from the market where demand is for newer, unique designs at lower prices and high quality; and from the weavers who increasingly have alternative choices of employment and demand higher incomes. Retention of skilled workers is exacerbated when infrastructure development reaches the remote village, as soon as villages are connected by metal roads, they lose their weavers.

An organisational intervention is now being introduced by the creation of an intermediary between the weavers and head office. The role of *Bunkar Sakhi* is filled by women weavers with leadership and communication skills, and with a basic education provided through Jaipur Rug. They operate in their own or nearby villages as coordinators and trainers - they communicate the founder's mentality, provide feedback to head office on problems faced by the weavers, and can be promoted to Quality Supervisor. They support the introduction of more complex designs, and overcome problems faced by the weavers in improving quality.

They can also assist in the change in the self-perception of the weaver as an employee/contractor to that of an entrepreneur.

Limits to innovation in Indian handicrafts: issues of exclusion for two rural clusters by Keshab Das, Gujarat Institute of Development Research, Ahmedabad.



Rural clusters account for 94% of all clusters in India making a significant contribution to local income and employment. However the rural economy faces various forms of exclusion from the mainstream economy: spatial (remoteness), sectoral (specialization based on local raw materials that creates a risk of obsolescence), systemic (marginalized by state institutions), seasonal (material availability, demand).

What constrains innovation in these clusters? The reasons are contextual and to do with the characteristics of the artisans themselves. Key issues discussed were: actors are not seen as entrepreneurs or innovators, lack of organized information in structured databases, lack of reliable statistics, poor government policy measures. They are an example of subsistence industrialization which needs to be overcome by state provision of infrastructure, and support for access to markets.

Currently the study involves two clusters: Molela in Rajasthan for terra-cotta items (a 400 years old cluster) and Barpeta in Assam for bamboo crafts including utility and decorative items. Both have characteristics of little innovation, no intermediaries, low and uncertain incomes, lack of collective action, poor institutions and business services, lack of raw materials. But there are instances of successful clusters in the same areas. The question is why does blue pottery flourish while these older clusters continue to struggle? The presenter is currently creating a Cluster Grid, a database - with fields for sector, space and support systems.

Innovations – the drive and driver: a journey to develop a unique system of plant moisture application through System of Water for Agricultural Rejuvenation (SWAR) by K S Gopal Centre for Environment Concerns, Hyderabad

The Centre for Environment Concerns has developed several tools to eliminate drudgery such as scythe, wheel-based trolleys for shifting materials, digging tools and an automated plant watering system. Rural women, for whom these tools were designed, are not purchasing them, instead large farmers, government institutions such as the forest department, and corporations show more interest.

SWAR is a system of water for agricultural rejuvenation that has been developed to conserve water. It requires only a 10th of the water used in drip irrigation. The concept is based on the delivery of moisture to the roots of the plant in the soil. The current experiment is based on the growth of trees by delivery of water to the roots through a system of water bottles and pipes. The next development will be a method of delivering moisture to vegetables whose roots system is much shallower.

Traditional governments and natural resources management in Manipur: a case study of Sekmai village by Rakesh S. Khwairakpam, Doctoral Candidate, Tata Institute of Social Sciences Mumbai, India

This is a study of the resumption of control over community forest and river areas by traditional governments in the Loi tribal areas in Manipur. Traditional governments have continued to co-exist with the three tier system originating in colonial times.

The Phamneiba traditional government is the oldest elected body and is represented by 12 male members, wives of elected members are also members of the traditional assembly. They control all land resources, maintain land records, and allocate land for farming, often in opposition to governmental agencies. Such traditional governance structures offer lessons for contemporary institutions.



Semiformal as a link between 'informal' and 'formal' systems in society by Usha Jumani, IIM-Ahmedabad, Gujarat

Differences between formal, informal and organized and unorganized sectors of society were discussed. Researchers refer to large proportions of the Indian population belonging to the 'to the 'informal economy'. The formal and informal economies have distinct systemic features, and the semi-formal concept takes the properties of both. The institutional innovation of the 'semi-formal system' can provide an effective mechanism to understand the linkages between the informal and formal systems. Some traditional examples of the semi-formal system are community organisations like the *bhat-barot* in Gujarat, the caste panchayats, the *samaj*, the *mahajan*, various *mandals* of youth and women, forums for training, religious activity, entertainment, etc.



Some contemporary examples of semi-formal systems are federations of self-help groups, registered trade bodies of self-employed people, registered forums of youth, women, registered community forums for agriculture, governance, justice. Some semi-formal institutions are highly organised, but are refused recognition by government as there is no formal database. This reflects the societal challenge of providing an organizational umbrella for people in a culture where the oral tradition prevails. The processes of contract enforcement are different where the oral tradition prevails which has implications for the processes of conflict resolution which become more critical because of the large size and diversity of Indian society.



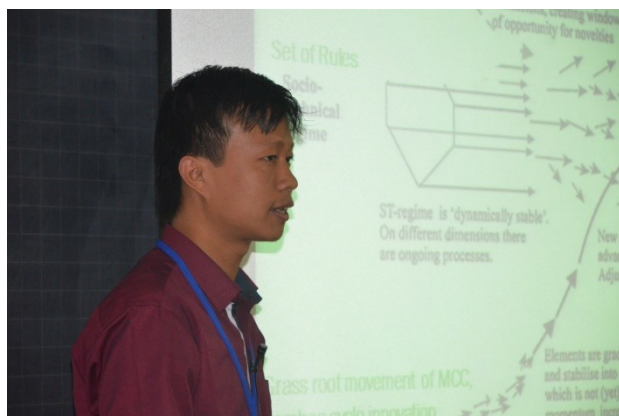
Co-chairman's comments: How do we create modern institutions that take traditional artefacts to the market? Pro-poor value chains have been created in India, for example Rang Sutra by Sumita Ghosh. She created a producer company where all the artisans are co-owners, and has a private company to do the marketing, creating market-led livelihood promotion through professional marketing. Different institutions are needed at different stages to form a pro-grassroots modern supply chain.

Indian Ecosystem for Inclusive Innovation

Chair:	Harkesh Mittal	Head, National S & T Entrepreneurship Development Board
Co-Chair:	Vipin Kumar	Director, National Innovation Foundation-India (NIF-India)

Exploring the grassroots innovation of bamboo bicycle in Imphal City of Manipur: geography of sustainability transitions perspective by Thounaojam Somokanta, CSSTIP (Centre for Studies in Science, Technology and Innovation Policy), School of Social Sciences, Central University of Gujarat, Gandhinagar

This is a case of grassroots environmental activism by the Manipur Cycle Club (MCC) to create a cycle friendly city in Imphal. Part of this movement was the idea to develop a bamboo bicycle which has failed due to lack of funds and support from government.



The presenter examined how grassroots activism can be a source of transition to improve policies on sustainability. The MCC drafted the state policy for mitigation and action on climate change, and submitted a memorandum to the Chief Minister about improvements to the urban transport system.

Phenomenological approach to the study of the essence of grassroots innovations by Rajul Joshi, Research Scholar, Management Discipline Group, Graduate School of Business University of Technology, Sydney

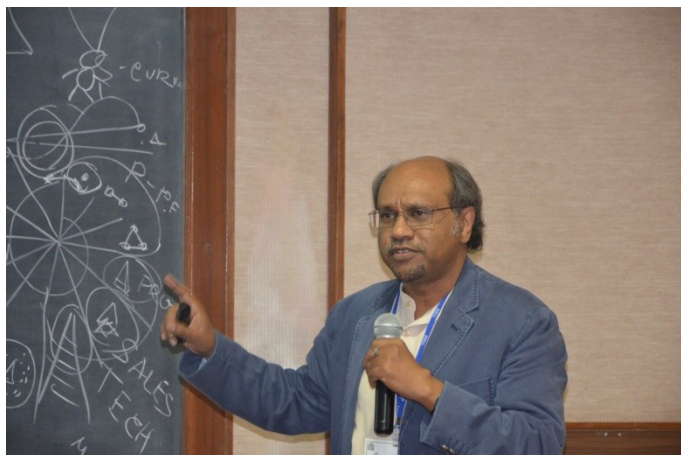


This study is a PhD thesis now at the examination stage. It focuses on the experience of grassroots innovators and what sense they make of that experience. She has identified implications for policy makers which are: livelihood challenges and capabilities need to be recognised; there is a need to create opportunities for learning, especially business skills; a need to encourage and nurture innovation-led rural entrepreneurship; and there is a need to create participative platforms. Policies must reflect empathetic concerns.

Understanding modes of creativity for effective innovation at the grassroots by Peer Mohideen Sathikh, School of Art, Design and Media School of Art, Design and Media College of Humanities, Arts, & Social Sciences, Nanyang Technological University, Singapore

Inclusiveness is an issue for development directed innovation. This is best achieved through culture focused innovations to gain social acceptance at the grassroots. The presentation focused on different dimensions of creativity – artistic and idea creativity, their bases and values.

The paper is based on the concept that value propositions of innovations at the grassroots level are different in many ways to innovations in urban contexts, in particular as a defining characteristic of grassroots innovations is they emerge from or be directed to local development. However they need to be accompanied by tangible benefits and an emotional appeal.



Identification and acceleration of farmer innovativeness in Upper East Ghana by Tobias Wünscher, Center for Development Research (ZEF), University of Bonn, Germany



This study of the innovativeness of farmers in Upper East Ghana examined whether smallholder innovations contribute to food security. To test this farmer innovation contests were held and will continue to be held to stimulate innovative behaviour. These have been successful in generating highly innovative solutions to problems such as pest control, onion seed conservation, recycling of fish pond water. Sustainability, social potential and level of innovativeness were the criteria

adopted to evaluate the ideas from the smallholders. Whether grassroots innovations disseminate more effectively than external innovations is a question that is relevant for innovation policies relating to agricultural practices.

Identification of anti-cancer formulation for plant derived extracts using in vitro and in vivo melanoma and breast cancer models. Dr. Gopal C. Kundu, Scientist G, Laboratory of Tumour Biology, Angiogenesis and Nanomedicine Research, National Centre for Cell Science, Pune, Maharashtra

The National Centre for Cell Science (NCCS) is an autonomous institute of the Department of Biotechnology, Government of India. The focus of its research is cancer biology, cell biology,



immunology, genomics and proteomics. NIF is providing plant extracts from remote areas of India for testing by NCSS for inhibition of growth of cancer cells in breast cancer and melanoma. The test results are positive and the treatment may be launched as medical food rather than as a medicine and be distributed as open source for others to commercialize. The holistic approach to the treatment of cancers includes dietary agents, use of herbs and nutritional supplements and other therapies.

Innovative service delivery model to serve the rural people: The VLE Model by Dr. Ajith P., KIIT School of Rural Management, KIIT University, Bhubaneswar, Odisha, & Dr. Anita Goyal, Indian Institute of Management, Lucknow, Uttar Pradesh



Development of village level entrepreneurship (VLE) will lead to better utilisation of all resources in rural areas. This needs a supporting ecosystem involving NGO's, panchayats, and support for women. A partnership with the consumer (partsumer) is also an important element.

This paper focuses on the use of VLE's for effective rural distribution to replace the existing model of redistribution stockists which is inefficient and not viable for small villages. A generic model of a VLE has been developed based on current successful models such as one being used by SEWA which has RUDI, a rural distribution network to help rural producers sell their products to their own communities at better prices as intermediaries are removed from the value chain. The trading conglomerates HUK and GTN are providing consulting advice and business training. The value of VLE's includes wage security, and the development of a culture of entrepreneurship and enterprise.

Max Weber's Bureaucracy and Buddhist Monastic Organisation as possible templates for management by Susantha Goonatilake, Royal Asiatic Society Sri Lanka

Around 100 years ago, one of the most influential theorists related to management, Max Weber, described what he and others considered a "modern" form of administration, namely bureaucracy. His theory was developed in the context of a Protestant Germany emerging into nationhood. On the other hand, detailed description of organisational structure and workings are found in the archives of Buddhist monasteries some of which had thousands of members and with a history of nearly 2600 years which could make them the oldest surviving organization form. Weber among other formulations theorised that Asian cultural systems unlike the Protestant one, did not have the prerequisites for industrial development. With Asian countries currently developing faster than the Protestant ones, a comparison between Weberian and the Buddhist organization forms could have lessons for our own creativity. This paper made a comparison between Weber's and Buddhist theories.

Integrating Women's Knowledge, Creativity and Innovations in the Innovation Ecosystem

Chair: Asha Kaul Faculty, IIM-Ahmedabad
Co-Chair: Usha Jumani Member, Governing Council, ETASHA Society, New Delhi

Mainstreaming gender for inclusive innovation and development by Lindile Ndabeni, Institute for Economic Research on Innovation, Faculty of Economics and Finance, Tshwane University of Technology, Pretoria, South Africa.

The South African economy resembles a dual economy. It is a racially divided capitalist economy with multiple inequalities. Technical skills and the building of an urban based manufacturing capacity are developed for a minority group. The economy is monopolized by the commodity markets, the R&D sector, and by technical know-how.



One of the government's economic policies is gender mainstreaming aimed at increasing the number of businesses owned by women, and improving access to job opportunities for women, to boost productivity and enhance the demand for goods and services. One of the programmes run by the Department of Trade and Industry (DTI) is Technology for Women in Business (TWIB) which helps women entrepreneurs grow their businesses with the application of science and technology based business solutions.

The overall objective of the various DTI programmes to help women entrepreneurs is to create a more integrated economy, facilitate broader participation, improve equity, and provide redress for women who are primarily involved in the subsistence economy which reinforces their confinement to low-value and low-paid sectors. Women's work in various value chains is often invisible. The TWIB programme emphasizes the need to enhance the visibility of women entrepreneurs. Gender mainstreaming is part of the broader national transformation effort to bridge the economic divide.

Governance by women leaders in Union Parishad in Bangladesh: unheard voices and grim realities from the grassroots by Md. Mizanur Rahman, Research Division, Bangladesh Academy for Rural Development (BARD), Kotbari, Comilla, Bangladesh.



The research question for this study was: How do women leaders (WLs) contribute to governance in the Union Prashad (UP the lowest level of government in rural in Bangladesh). A qualitative method was undertaken. The findings were:

WLs share information with community people and are involved in the planning process and undertaking of projects in the Union Parishad. They discuss problems with villagers and seek advice and consultancies from experts and maintain good linkages with the rural elites. They contribute to ensuring

social justice in the UP by replacing verbal evidence through eye-witness accounts in case of the physical assaults. They assist in reducing corruption by distributing social needs benefits on the basis of need rather than taking bribes and this improves pro-poor services to the community. By enhancing the participation of the stakeholders, WL's are able to enhance the quality of projects in the UP. Suggested intervention/policy options are: to enlarge

education facilities for women, women's organizations/network should lobby for introducing quotas for political parties in Bangladesh to increase the number of female representatives, and finally an apex body of "UP WLs forum" can be formed to integrate UP WLs.

CADS' strategies in expanding opportunities for women and worker innovators in Zimbabwe by Lillian Machivenyika, CADS, Zimbabwe.

In most developing countries the colonial economic policy emphasized the production of cash crops for export. Domestic food production was neglected as natives were forced to migrate to cultivation of cash crops. Due to the patriarchal nature of many societies, women are less likely to be identified as innovators because they are often not allowed to deviate from what their husbands tell them to do in their gardens and fields. Local innovative techniques in Zimbabwe are being explored to address challenges faced by small holder farmers and the nation at large.

As local innovations in food production and consumption are very limited, the Cluster Agricultural Development Services (CADS) strategy includes: a) developing food security through sustainable agricultural development and dissemination which includes organising food festivals, demonstration sites and farmer's field schools, providing awards for food and farm innovations; b) support for business development and marketing through training and capacity building, business skills training and access to rural finance; c) gender and HIV/AIDS support is given through integration with sustainable agricultural development; d) advocacy and lobbying by empowering community based organisations to lobby, educate and raise awareness, and e) knowledge management and information dissemination through partnering with such organisations as Scientific and Industrial Research and Development Centre (SIRDC) and collaboration with government ministries and departments.

Medicinal plants used by farm-women to cure disease and common ailments in Africa by Omede Ugbede David and P.R. Kanani, Department of Agricultural Extension, Junagadh Agricultural University, Gujarat.

Many African communities face problems of no clean water, gastric illnesses and risk of malaria. Most will use traditional medicines to counteract these ailments. It is estimated that in southwest Nigeria, in the Okeigbo area of Ondo state, 50 kinds of medicinal plants are used for the treatment of malaria. Traditional health care practitioners and farm women incorporate the use of traditional plants which have played a significant role in health care delivery in rural areas. The documentation of these plants along with their biological/pharmaceutical activities is an urgent need. It is estimated that about 80% of the population in developing countries uses traditional medicines because they cannot afford the high cost of western pharmaceuticals and health care, and because traditional medicines are more acceptable from a cultural and spiritual perspective.

Bio-diversity, Value Addition and Local Knowledge

Chair:	Kartikeya Sarabhai	Director, CEE-Ahmedabad
Co-Chair:	S. Ragupathy	Chief Curator, BIO Herbarium, Biodiversity Institute of Ontario, University of Guelph, Canada

Impact of the Medicinal Plant Conservation Area (MPCA), a conservation technique, on rural development: Mohan, Almora District, Uttarakhand by Nikita Kala, Jyoti K Sharma, School of Environment & Natural Resources, Doon University, Dehradun, Uttarakhand

Communities living in the Indian Himalayan region of Uttarakhand depend on native plant species for sustenance of their traditional health care system. Medicinal Plant Conservation Areas (MPCA) have been established in the country to capture and conserve the diversity of plants growing in the wild. One such MPCA has been established in the Mohan Almora district, Uttarakhand. This is a study of its impact on the health of local communities in this area.



The survey was of around 50 households where it was found that 44 % of the population is using medicinal plants from out of which 20 % are growing the medicinal plants in gardens for personal use. 17% of the uses surveyed were for primary health care. This was a good case study for assessing the conservation of plants in a MPCA (core zone from where collection of medicinal plants is not allowed and in a MPDA (medicinal plants development area - buffer zone from where the collection of medicinal plant is allowed by following the National Biodiversity Authority (NBA) guide lines).

Dr. S Raghupathi suggested the use of a recent formula published in 2005 for the conservation analysis.

Adaptation of environment friendly entrepreneurship for forest waste management and livelihood generation: a case study by Dr. Prabir Kumar Panda, Siliguri Institute of Technology, West Bengal and Analjyoti Basu, Entrepreneurship Development Institute of India, Gandhinagar, Gujarat.



The presentation by Prabir Kumar Panda and Analjyoti Basu has shown how vermiwash produced from waste is being popularized for crop productivity in organic farming and employment generation in remote areas of West Bengal at the border with Bangladesh. Various video clips of farmers using it and the effect on crops like potato were shown. Currently, sales are 5000 litres per month through an established network in five districts. There is a need for policy initiatives for

assistance in the management of the quality control of the produce, as well as for a small subsidy for boosting production expansion to large scale commercialization and the generation of local entrepreneurship.

Innovations in the food processing industry: ethnography of bamboo shoots in Manipur by Wairokpam Premi Devi, PhD student, Central University of Gujarat.

In this presentation, human and non-human interventions in promoting bamboo shoots for food processing were identified. The study was based on Actor Network Theory (ANT) to exhibit the analytical evidence of a heterogeneous network of human and non-human interventions. Human actors include farmers, practitioners, proprietors, food technologists, managers, marketing and production staff, customers, and government organisations) and non-human actors include bacteria, enzyme, time, technologies, and texts. It was shown how the actors in the value chain were structured around a particular problem, and the details of OPP (obligatory passage point) which is a necessary element for the formation of a network and defines the action programme. This was an attempt to explore the linkage of various actors in the innovation process of production of bamboo shoots for the food processing industry.



Dr. Tapas K Giri from IIM-Shilong presented on the various uses of bamboo in his paper *Bamboo and innovation for biodiversity conservation and sustainability in North East India*. The data shows that 66% of total bamboo production of the country is in the north east. 39% of the total forest area of the country comprises of bamboo. Of the total bamboo available in the country 85 % are on forest land and 15% are on private land. Dr Giri enumerated many new uses of bamboo that could transform the poverty ridden areas of north east India. A National Bamboo Mission (www.nbm.nic.in) was set up in 2003 to invest in the development of the industry which has been ineffective and government policies resulted in crippling the sector. New government initiatives are required to



rehabilitate the industry, and support biodiversity conservation of bamboo.

P. Vivekanandan from SEVA, Tamil Nadu presented *How to recognize the role of pastoralists / livestock keepers in the conservation of animal biodiversity*. The paper was co-authored by Dr. DK Sadana, NBAGR, and Prof. Anil K. Gupta, IIM-A

He highlighted the pressing need of a policy intervention to promote and protect livestock keepers' rights as crop growers' rights are under the Protection of Plant Varieties & Farmers' Rights Authority (PPVFRA). They should have



the right to make breeding decisions and breed the breed they maintain, including keeping bulls; the right to graze their animals (there is a law is but there is no implementation of it). A training and capacity building facility is needed for livestock keepers, and a National Awards system is needed encourage livestock people to continue to keep and breed their herds.

He explained his involvement with the conservation of livestock from 2009 onwards, through the example of the Sahiwal cattle breed in Kasaragod, Kerala in which there has been an increase in daily milk production to 12 litres. All kinds of improvements in local breeds can be accomplished given the facilities and initiatives. He also discussed the affordability of the conservation of the Kharai camel of the Kutch. He suggested that there should be a national award for community conservation of livestock.

Dr. Vivek Kumar from National Innovation Foundation-Ahmedabad (NIF) gave a presentation on *Is all traditional knowledge community knowledge?*

The initiatives of the Honey Bee Network to collect and disseminate plant based knowledge were shared. The NIF has 1.3 lacs of local plant-based knowledge resources. The national register, methods of documentation, shodhyatra (discovery treks), shodhsankal (knowledge sharing meetings), scouting and documentation through students, fellowships for students, science clubs in schools and colleges, prior informed consent (PIC) and village knowledge registers were discussed in detail. An example (innovator Sakrabhai's treatment of bloat) and the entire value chain in the contexts of local knowledge, conservation, plants used by him and by the local community for this remedy was shown. The role of village meetings to discuss the plant and their uses was highlighted for awareness building for conservation.

Traditional knowledge genomics in the context of the conservation and protection of biocultural diversity/local knowledge by Dr Ragupathy and Dr Satishkumar, Biodiversity Institute of Ontario (BIO)



Dr Ragupathy gave a detailed presentation on the use of DNA barcoding for developing a catalogue of the world's biodiversity. The need of such a barcode catalogue to maintain the identity of resources with their characteristic local uses was discussed. Out of 1.75 million species recorded, only 2.3 lacs are estimated to have a quantity of more than 2.0 lacs. 10 % of them are under threat. Up to the present, BIO has barcoded the DNA of 54,836 plants. Traditional knowledge genomics and cryptic ethnobotany were explained. An example of plant sycophants "Swnai pullu" was given which is a snake indicator. The plant is a good snake shelter as it generates heat. The use of DNA barcode data for pile sorting and information consensus analysis, and the assistance in identifying species nova was discussed.

The case of how the Irulas (an ethnic group in the Nilgiris) identify the plants was discussed. Their methodology and the habitat was explained. *Sterbulus asper* Lour a tree of Assam (an ancient tree mentioned in Ayurvedic pharmacopeia) is used for diabetes. The same plant of South India is morphologically tiny and containing less apiole compared to Assam. DNA

barcoding has helped in NHP authentication, respective vouchering of growing genera, herbal products certification etc.

BIO's Life Scanner programme is ongoing which is assisting in developing DNA barcodes at the doorstep by following NBA guidelines. It is a new tool for biodiversity application.



Design for Making a Difference: Institutional Context and Product Design

Chair: Aginaldo dos Santos Head of the Design & Sustainability Research Center, Federal University of Parana, Brazil
Co-Chair: Amit Garg Faculty, IIM-Ahmedabad

Not Janta, not Jaadoo, and not Jugaad: A critical reflection on the categorization of grassroots community members as users, innovators, and entrepreneurs
Dr. Prashant Rajan, Department of English, Communication Studies, Iowa State University.



This paper reviews issues in the use of language for and philosophical approach to design for development. Much of the current literature and practice is based on distinctive differences between the roles of researcher, designer and user. A dominant assumption is that the marginalised communities of the Global South who are identified as low income, low literacy users, do not have the capability to engage in the design of technological solutions to their needs. However the resource-poor 'grassroots innovators' are from knowledge-rich

communities, and their innovations represent a community-based and user-driven model of technology and design based on empathy and social responsibility that produces successful solutions to local problems.

Design of an efficient and ergonomic bangle-making furnace and tools by Davinder Pal Singh, et al, RuTAG, IIT-Delhi

Davinder Singh described how a group of students under the auspices of the Rural Technology Action Group (RuTAG) improved the performance of a bangle making furnace and the working conditions of the artisans in the Bharatpur district of Rajasthan. They redesigned the furnace for greater efficiency and drastic reduction in smoke, and adapted foldable ground chairs



to meet a better ergonomic design, and improved the tools to reduce the discomfort in their handling. This is an example of empathetic design to improve the livelihood and quality of working conditions of the artisans. This success story has developed an interest in the next generation of students who would normally avoid undertaking a project in a rural area.

The Himalayan Ecology Project by Parag Anand and Aditi Singh, Department of Industrial Design, School of Planning and Architecture, New Delhi



The Himalayan Ecology Project began with the Industrial Design Department partnering with the Deer Park Institute, located at Bir, in the Kangra District of Himachal Pradesh. The objective was to gain insights on rethinking the design of products, processes and systems for communities in the Himalayan region. Tasks like identifying areas for design interventions, developing and reinforcing green design practices, creating innovations towards sustainability and

reclaiming, recognizing and reviving local traditions were carried out. 18 design students were taken to Himachal Pradesh to live in a village for 10 days. This experience sensitized the students to the needs of the rural community and their success in identifying solutions was directly proportional to the degree of empathy they generated with the villagers. The project highlighted two issues: a) of motivating students who often avoid working on projects in rural areas, and b) how to sensitise students to the needs of society.

Design for Making a Difference: Institutional Context and Product Design (2)

Chair: Ashoke Chatterjee Former Director, National Institute of Design-
Ahmedabad
Co-Chair: Ravi Pooviah Faculty, IIT-Bombay

Using fuzzy NPV for appropriate technology project valuation in Indonesia case study: small holder coffee processing industry development in Belu, East Nusa Tenggara by Yusuf Andriana et al, Development Center for Appropriate Technology, Indonesian Institute of Sciences, Subang, West Java, Indonesia

The problem described here was how to create SME development in this region of small holder coffee plantations to focus on value addition to the coffee bean. The objective was achieved with capacity building and intensive training of the farmers in the use of the processing equipment for coffee mix and how to use full colour paper-metal sachet as the primary packaging. Fuzzy NPV was used for evaluating the feasibility of the investment in these technologies



which projected a payback after three years. There was a high level of acceptance of the processing technology among the local coffee producers as it would be a means for uplifting them out of poverty.

Involvement of design values, knowledge and process for grass root innovators to create marketable products by Umang Shah, Sr. Industrial Designer, Lumium Innovations, Santa Clara, California, USA and Ahmedabad, Gujarat.



Lumium is converting grassroots innovations into marketable products by providing research, industrial design, innovation inputs, packaging. They currently have 16 NIF sponsored projects, among them is the staircase walker, suitcase with a seat, a metal cutter, and a walnut cracker. Particular challenges faced are: the patience required to develop the product through several iterations, the need to fail early to conserve time and resources, the need for the grassroots innovators to be flexible about their designs in order to

make the product marketable, and the need for the three parties of the GRI, the designer and the engineer to collaborate closely.

Case study: giving voice to the farmers, machine operators, local service providers and small scale manufacturers in designing scale-appropriate agro-machinery for rural Bangladesh by Sharmistha Banerjee, Department of Design, IIT Guwahati, Assam

This is a case study of the redesign of a two-wheeled power tiller which had been designed by agricultural engineers and was unworkable by low income farmers needing efficient bed planting equipment to replace manual labour. The original design had been sponsored by the USAID mission, and there was a requirement to redesign it to make it workable. This was achieved by adopting a human centred design process which is described in the case study. The new design included visual cues to help the illiterate farmer to operate the equipment, a manufacturing guideline, and a cost for a superior quality product that was very close to the original model.



A study of ethical issues concerning doctors, pharmacists and pharmaceutical representatives in the Indian health care industry by Anula Gupta, Department of Management Studies, Government Engineering College Ajmer, Rajasthan

This was a presentation on a proposal for doctoral research on ethical issues in doctor/patient, pharmacist/patient and doctor/pharmaceutical relationships.

Networks for Innovators

Chair: Franz W. Gatzweiler Executive Director, ICSU-UNU-IAMP, Institute of Urban Environment, Chinese Academy of Sciences, China

Co-Chair: Soumodip Sarkar, Dean, Doctoral School, Institute for Advance Studies and Research (IIFA), University of Evora, Portugal

Innovation networks: social capital and successful network performance

Dr. Avantika Singh and Dr Rohit Mathur, Department of Management, Central University of Rajasthan, Kishangarh, District Ajmer, Rajasthan.

Innovation networks have autonomous identities. The process of knowledge sharing and exchange is network centric, the quality of which is based on the degree of social capital. Dr Singh identified several successful innovation networks: Honey Bee Network, industrial clusters, disaster management teams, research and development networks, film-making networks. Innovation networks can occur in diverse situations, but require shared values and norms and the protection of intellectual property rights. Face to face communication from time to time and IT interactions help the development of social capital, as does geographical proximity. Models of the knowledge focus of the network i.e. its structure and components, help the participants in the network operate more efficiently, as does the recognition of the social and cultural aspects of the innovations.

India's rural spurt - towards self- sustaining micro cities / living units and responsive policies & design

Shivaji: architecture, interiors, furniture/ product design, design management

Shivaji spoke of the need to integrate the vernacular, traditional forms and features of housing which have developed in rural communities, with the latest technologies and material sciences to develop human centred micro-cities. A holistic approach is required for designing for living and working environments that are sustaining nature and thriving in coherence with it. Use of materials must be economical and in synchronisation with social and economic factors and the environment. Comfort needs to be achieved at the lowest cost. In addressing how to reduce transport needs in cities, he suggested mixed use buildings with commercial and residential spaces. He also cited other interesting approaches to the design of urban spaces such as the vertical garden city, underground city, speciality city, and transport systems such as Mumbai Local (the busiest rapid transport system in the world) and use of cycle paths.

Grassroots entrepreneurship and creative construction

Prof Soumodip Sarkar, Department of Management, University of Evora, Portugal.

For products to be successful 'at the grassroots' they need to be affordable, robust, require minimal energy use and have multi-functional attributes. The grassroots entrepreneurs who create them have the characteristics of curiosity, have relevant thinking skills and knowledge in their domains, and make do with whatever materials are available and recombine existing resources. They are often motivated to achieve social objectives, and often create social enterprises

An ecological perspective of integrating grassroots innovation into rural development strategy by Carolina, Centre for Appropriate Technology Development, Indonesian Institute of Sciences, Subang - Indonesia

The Act 6-2014 by the Indonesian Government provides privileges to 79,000 villages to design and implement their own development plans as part of a policy to strengthen the rural economy. The role of grassroots innovators will be pivotal in the success of this strategy of granting autonomy and support for the development of village-owned business units.

Effective implementation of this policy will require the integration of grassroots innovators with rural development strategy, effective collaborative support for GRI's, and business management support for the growth of innovators into entrepreneurs.

The case of an oyster mushroom farmers' group was discussed to identify the components of their ecosystem of indigenous innovation. How to develop a market for the sale of their mushrooms was an issue which was supported by the local government.

Approaches to pro-poor grassroots innovation making in India in a historical and comparative way: a critical assessment by Dinesh Abrol et al, Centre for Studies in Science Policy, Jawaharlal Nehru University, New Delhi.

This paper first examines the historical development of policies to support 'pro-poor grassroots innovation' in India from the perspective of the role of the state in developing the formal science and technology sector and higher education, state supported research and development, and support for social movements to enhance pro-poor technologies and innovations. The second part of the paper identifies the importance of new actors to accelerate the outcomes and impact of grassroots innovations by up-scaling traditional technologies. It is suggested that large firms, including foreign multinationals, are seeking to be carriers of inclusive and frugal innovations to cater for the consumption needs of the poor. However there are severe limitations in the ability of corporations to function effectively in achieving this and so there is a need for initiatives from social movements to explore this challenge to extend the development of capabilities of grassroots innovators, and to enable them to be self-sustained and financially stable. The third part of the paper argues that the support of social movements to empower the poor to become producers is not sufficient as there are systemic issues in production abilities and in the structure and nature of marketing of goods and services to a larger consumer base which need wider institutional support.

Institutional and technological innovations in polycentric order – escaping marginality
Franz W. Gatzweiler, ICSU-UNU-IAMP, Institute of Urban Environment, Chinese Academy of Sciences, Beijing, PRC.

This paper identifies the importance of innovations in the institutional environment to enable technological innovations to overcome rural poverty. The rural poor face exclusion and remoteness from the main stream economy. The issue to be addressed is how to remove this marginality which is based on low vertical connectivity, low horizontal integration, and a low potential to manage change because of risk avoidance and low resilience to economic challenges. A polycentric approach to building new institutions and social infrastructure will enhance the innovation capabilities of the marginalised population by supporting value addition to their innovative outputs, and provide appropriate incentives to engage in risk taking behaviour.

Democratising technology: the confluence of makers and grassroots innovators by Anna Waldman-Brown MIT, Fab Lab Network, MIT, Boston, USA

This paper addresses the need for the maker movement to embrace grassroots innovators for mutually beneficial collaboration. Currently the maker movements in the United States, Ghana, Nigeria and Kenya attracts elitist participants who ignore the informal sector while

celebrating the methods and frugal creativity of grassroots innovators. However there have been successful international collaborations with the informal sector for example with traditional weavers in Peru, electronic waster pickers in Togo, and the introduction of bee keeping in Ghana which has created new industries and new retail businesses. Among the recommendations proposed to bring the makers to the grassroots are: work with policy makers to facilitate the importation of new ‘maker’ technologies such as 3D printing, support for crowd funding transactions; encourage makers to promote vocational training; and consider localized prototyping of new products for localized markets

Honey Bee Network, Collaborators, IIMA

Chair: Vipin Kumar Director, National Innovation Foundation-India
Co-Chair: Ramesh Patel Secretary, SRISTI

Brig. P. Ganesham, Palle Srujana, Andhra Pradesh

Palle Srujana is a voluntary organization working for ‘aiding and promoting’ creativity at the grassroots level in the states of Telangana and Andhra Pradesh. It pursues the mission of National Innovation Foundation-India (NIF-India) in these as part of the nationwide Honeybee Network. They scout across the rural regions for knowledge and innovations often sourced through volunteers who work in schools and colleges. 15 management colleges are assisting with scouting and documenting innovations ensuring due recognition to the knowledge provider. The grassroots innovations (GRI) are provided support for validation and reengineering through the NIF-India. *Palle Srujana* also helps the innovators to get their technologies patented and take them to national and international level for recognition. The rural knowledge is disseminated horizontally, from land to land and village to village through *Chinna Shodh Yatra*, magazines in the local language, and participating in various farmers’ meets, visiting villages, etc. Groups of GRI are now saying – give us problems and we will provide the solutions.

Dr. Balaram Sahu, Pathe Pathshala, Bhubaneswar, Odisha and editor of Ama Akhapakha, the Odisha version of Honey Bee.

Dr. Balaram has been a member of the Honey Bee Network for the past 15 years and founded *Pathe Pathshala* a ‘people’s university on the move’. Classes are held for farmers, pastoralists, students and women, at their place, in their time and with their language. These classes are meant to diffuse small but effective, low input based skills, and technologies to the farming and rural community for easing their toils in livelihood options such as crop husbandry, livestock keeping, fisheries and other small skill oriented aspects of rural life. 8,000 people have been trained.

Pathe Pathshala also documents outstanding indigenous traditional practices of people from different walks of life and in remote areas such Maoist controlled districts. 3,200 innovations and traditional knowledge ideas have been documented, and 410 *Pathe Pathshala* awards have been given.

Sundaram Verma, Collaborator, Honey Bee Network, Kumawat, Rajasthan

Sundaram Verma is a progressive farmer from a village in Rajasthan who is known for his innovative approaches in agriculture among the local farmer community on one side and for his systematic working style among the scientific community on the other side. He has a particular expertise in various techniques of dryland farming and agro-forestry.

As a Honey Bee collaborator he scouts and organises scouting for innovations in crop improvement, dry land agriculture and forestry. He holds workshops with scouts and guides, visits school science, farmers’ and social fairs, holds meetings in villages and discussions with biodiversity conservator farmers and traditional knowledge holders. During his association with the Honey Bee Network he has linked about 1500 innovators and traditional knowledge (TK) holders from various places in Rajasthan, and collected over

10,000 examples of innovations and TK for the NIF database out of which over 10 have been recognized at different levels and categories. He disseminates traditional knowledge through print and electronic media. He has received funding from the Oil and Natural Gas Corporation (ONGC) Corporate Social Responsibility department for a pilot project on growing trees watered by only 1 litre of water, and has received several awards for his work.

P Vivekanandan, SEVA, Madurai, Tamil Nadu

As founder of SEVA in Madurai, Tamil Nadu, he has pioneered the development of the two main strands of SEVA's work in Tamil Nadu, which are: sustainable management of natural resources, and documentation and dissemination of indigenous knowledge and grassroots innovations. SEVA publishes the Tamil version of Honey Bee, and also build networks among women, herders, tribals and NGO's to strengthen grassroots groups

As a traditional animal healer, he has a particular interest in conservation of indigenous cattle breeds, especially the *malaimadu* breed for which he documents knowledge on the breed. He sources information about medicinal plants and diffuses information by training on campuses.

Open and democratic access to knowledge for grassroots communities

Chair: Sanjay Verma Faculty, IIM-A

Co-Chair: Arul George Scaria Faculty, National Law University, Delhi

Learning and creativity based use of informal knowledge in the horticulture sector of Jammu and Kashmir by Sheeraz Ahmad Alaie, PhD, Central University of Gujarat.

This is a study of apple production in the Kashmir valley, in particular the knowledge and innovations generated by the farmers. An example of disease treatments was given to highlight the importance of traditional or informal knowledge. The study adopted a regional innovation system approach, examining the interface between the formal and informal knowledge systems and institutions in the horticulture sector, in particular apple growing. The apple farmers are the core actors in the system and their knowledge is based on their lifelong experiences and learning from their working environment.

Innovative strategies for using social media, e-commerce and other platforms to link grassroots to global markets by Professr Ruma Agwekar, MBA Finance, SIBM, Pune University, Maharashtra



Prof. Ruma Agwekar discussed the possibilities of using social media, e-commerce and other platforms for linking grassroots to global markets. Five case studies (TiE, Brahmakumaris, SME Chamber of Commerce, UnitedBuzz and WE-Bizpad) were used to illustrate the range of possibilities. TiE is a non-profit organisation dedicated to fostering entrepreneurship;

Brahma Kumaris is an NGO based in Rajasthan that focuses on spiritual education and reflective practices; SME Chamber of Commerce focuses on the growth of SME's in the manufacturing and services sectors; UnitedBuzz is the exclusive networking site in India for the Manchester United Football Club; WE-BIZPAD is a common platform for generating business leads/exchange for businesswomen.

Open and democratic access to knowledge for grassroots communities by Arul George Scaria, National Law University, Delhi

Gaining access to knowledge resources is still a distant dream for the vast majority of people in India. This paper explored two questions – (1) Why do we need more open and democratic access to knowledge resources for grassroots communities? and (2) How do we ensure more open and democratic access to knowledge resources?

Access to legal research products was used as a case study. Innovative modes of communication and legal or policy changes are needed to ensure better access for grassroots communities. The discussion that followed the presentation touched on issues such as how to better democratise access to courts.



Dealing with citizen grievances in a 'Smart' City
by Dipti Gupta, FPM, IIM Ahmedabad, Gujarat

This presentation led to interesting debates on the definition of 'smart cities' itself, particularly in the context of the recent plans of the Indian government to build smart cities across India.

Spreading the good word: harnessing social media for diffusing grassroots frugal innovations by Chintan Vinod Shinde et al, SRISTI, Ahmedabad, Gujarat

The last presentation in the session was from Chintan Vinod Shinde, who highlighted the major findings from a recent study on the patterns of dissemination of innovations related information through social media. His example of the picture of an innovation (coffee maker) which received more than 900 shares, when shared by a person with just 65 friends, resulted in interesting discussions on the relevance of such studies for broader dissemination of grassroots innovations.

Coping Creatively with Climate Change

Chair:	Gurdeep Singh	Vice Chancellor, Vinoba Bhave University
Co-Chair:	Lillian Machivenyika	Director, CADS, Zimbabwe

CADS' experience in promoting agro-biodiversity in the face of climate change in Zimbabwe by Lillian Machivenyika et al, CADS, Zimbabwe

Counteracting malnutrition arising from the limited diversity of food and cash crops that are heavy users of water is being tackled by the Southern Africa Food and Nutrition Security Working Group 2014 under the auspices of the WPF (World Food Programme). CADS (Cluster Agricultural Development Services) in Zimbabwe is working to reverse malnutrition

rates by increasing the uptake of consumption of indigenous crops to create demand for farmers' growth of these, and reduce the dominance of maize which is 87% of cereal production. CADS undertakes nutritional analysis of traditional vegetables and cereals, promotes traditional foods recipe development through food festivals and cooking demonstrations, and supports market development for farmers. CADS also undertakes training and mass media promotional work, including participation in global trade fairs to promote foods from Zimbabwe. The focus of the organisation is on developing standards of nutrition and the creation of livelihoods. Much of the food processing is carried out manually, and the exhibition at this conference has shown the possibilities of mechanization.

Farmers' creativity in coping with climate risks: a study of paddy farmers in eastern Uttar Pradesh by Anamika Dey, Research Scholar, IIM-Ahmedabad

This is a study of the impact of flooding on the agriculture sector in Uttar Pradesh, and the coping strategies of farmers. A key element in these coping strategies is the diversity of types of paddy available to the farmers. Their portfolio of choices are bounded by socio-economic conditions as well as socio-ecological conditions.

In 1988, the map of varieties of paddy grown in this region was diverse, a similar map in 2014 shows the dominance of hybrids, with only 2 of the 40 varieties present in 1988 being grown.

The variables in monsoon rains include timing and the amount of rain. In rain-fed agriculture decisions have to be made at the onset of a monsoon about which variety of cereal is appropriate, and in the event of flooding, as occurred in 2013, which coping strategies will protect the farmers' livelihoods. Factors that come into play include the degree of support from kinship and village networks. Successful farmers can overcome flood damage by shifting to say winter varieties and benefit from subsequent favourable patterns of weather.

A key coping strategy is the setting up of a staggered community paddy nursery in which different varieties are grown for transplanting according to anticipated variations in rainfall. The seedlings that cannot be transplanted are used for fodder. This practice is prevalent in Bangladesh which experiences widespread flash flooding and submergence.

Early Stage Funding of Innovations

This interactive session was led by NIF personnel who explained how the Micro Venture Innovation Fund operates under NIF control. The fund of Rs 4 crore from SIDBI set up in 2003 supports innovations that have market potential, but for which a market does not yet exist. Over 180 ventures have been supported, and more than 70% of investment has been recovered from innovators, although payback is not expected. No collateral or guarantees are required. In the early days of the fund, large numbers of innovators were funded with small amounts – Rs 1.1 lakh was distributed among 21 projects. In 2013 only 3 innovators were funded with a sum of Rs 2,29,400. Projects can attract repeat funding. Successful ventures include a biomass gasification system which has now achieved a sales turnover of Rs 8.5 crore, rapid compost maker, a manual milking machine that has sold 3,500 units, and a sanitary napkin production machine. Apart from receiving funding, the innovators receive product and business development support. A second fund is about to be launched as a 'high risk fund' to support SME's.

Mahesh Patel, manager of GIAN, reported that GIAN is about to receive formal registration as a Technology Business Incubator which will have as a target 10 to 15 business launches per year. The key supports to be offered to innovators are: technology, business development and venture capital. GIAN's experience is that failure to develop into a viable business may

be due to the lack of entrepreneurial skills in the innovator, inconsistency in the delivery of the product as the innovator continues to tinker with it to gain improvements, serial innovators abandon current projects in favour of new ones, and centralized marketing adds costs to sales to the regions. A success story is Herbavate, a cream treatment for eczema, psoriasis. The water cooler “Mitticool” is also experiencing slow and limited expansion.

The idea of funding networks of individuals was discussed, as was the implication of g2G – grassroots innovations being passed to entrepreneurs for development for distribution to world markets. The value of market driven innovations was also discussed – sourcing these ideas from corporations may be a possibility. The importance of the proximity of a business incubator to a grassroots innovator, as it is the importance of open source technology were identified.

Technological track

Innovations in Healthcare Devices, Diagnostics and Service Delivery

Chair: Richard Fletcher Faculty, MIT, USA
Co-Chair: Keyur Sorathia Faculty, IIT-Guwahati

Human health and effect of Zn, Fe, Cu and Mn deficiencies in soil on micronutrient uptake pathways across soil-plant and animal or human systems by Dr. VP Ramani et al, Micronutrient Department, Anand Agricultural University, Anand, Gujarat

There is direct linkage between minerals from soils, plants, animals and humans through the food chain – this was the focus of a collaborative study between IIM-A, SRISTI, VS and the Micronutrient Department of Anand Agriculture University. The significance of such linkages was demonstrated in a village survey of high and low disease incidences. A further study is needed to evaluate the use of nutraceuticals derived from crops, fruits and vegetables from high nutrient soil for treating nutrient deficit soil.

Mobile technologies for global health applications by Dr Richard Fletcher, MIT and Massachusetts General Hospital, Boston, USA



A large fraction of the world's population now owns mobile phones and the use of mobile health accessories is also growing. These personal devices not only support our personal needs but also enable us to connect to other groups and other communities. Since these technologies are now becoming a permanent part of our daily lives, it is useful to consider how these technologies could be employed for use in global health and public health. In the short term future, we can

consider how mobile technologies could be used by health workers for decision support, patient screening, and managing resources, and also for self-care purposes. Dr Fletcher discussed the following examples:

- Cell phone as a diagnostic tool; camera-based heart rate measurement devices, stethoscope, other health sensors (for lungs, kidney etc.)

- Magic mirror (based on the change in colour of skin)
- Stress indicators based on pupil size of the eye
- Vein based biometrics, for example for palm/finger reading for the Aadhaar card in India
- Printed diagnostics for anaemia & maternity care: through a scan mobile app
- Non-invasive biosensors
- Neonatal screening (for the first 72 hours after birth)
- Biosensors for environmental monitoring (pollution, heavy metals, ECO MP LIVE)
- Emergence of behavioural medicine
- Mental health app: new modes of relief without drugs (meditation, exercise etc.)

While technology alone cannot solve global health problems, mobile technologies are an important tool to help enable new ways of delivering care and scaling best practices.

Conversion of 2D X-ray image into 3D, bone model using a novel algorithm by Vikas Karde, Mechanical Engineering Department, IIT-Mumbai

The need for a 2D X-ray image of a knee to be converted to a 3D image is essential for surgeons in making decisions about an operation. Its advantages and disadvantages compared with a CT scan were discussed. The image of a 2D X-ray can now be converted to 3D by a web demonstration and a tablet-based surgery planning app. The average error of the model is 1.1 mm and the device is good for osteotomy surgery. The system uses mathematical algorithms for the conversion.



A normal CT scan takes 500 cross section images whereas for an X-ray, 2 to 3 cross sections are enough for imaging, so patients are less exposed to radiation. It can also be applicable for post operational care.

Mobile identification of high risk pregnancy - novel approach to provide at the door ANC care and reduce maternal mortality by Shantanu Pathak, Science for Society, Mumbai

The device is commonly known as “CareMother” and is being used in more than 50 villages in Maharashtra. A video demonstrated how the system is being used in rural villages by low educated health workers. The system is a mobile application tool and solar powered portable medical devices kit costing Rs 5,000 only.



Novel approaches for inspiring innovations in healthcare by Keyur Sorathiya, IIT-Guwahati, Assam

This maternal health care instrument is computer based, compared to CareMother which is mobile based. Chetna is basically raising awareness among pregnant women about the benefits for them under the National Rural Health Mission (NRHM) and educating them about pregnancy care through a gesture based app. The patient needs to visit the nearest hospital where the system is installed. A video was shown of the gesture-

based entry of the patient to the app and related instructions for care. There is one ASHA

(Accredited Social Health Activist) worker for every 1000 population in rural areas, and these health workers can link the pregnant women with the nearest hospital where the device is installed.

SCINTILLA - a portable urine analyser by Prakash Parashar, IIT-Delhi

Protein in urea is a marker of many pathological conditions; and as there are 300 million potential patients in India due to various reasons, a low cost diagnostic tool is very beneficial. For example during pregnancy the blood pressure of women increases substantially and it subsides after delivery which is due to a high concentration of protein in the urine. The current test is manual or dip strip (less reliable), whereas the Scintilla analyser is fast and eliminates the need to carry the sample in a sterile condition to the lab. The Scintilla is



electromagnetic and uses a small flash of light to estimate the protein in the urine. An auto analyser test for protein costs Rs 50 to Rs 100 per test whereas this analyser costs Rs. 10 per sample or Rs. 25 to 50 at the door step. The device has a LCD based screen with battery power and can be easily used by a doctor. Its costs Rs 8,000 and is available in kit form.

Technological Innovation

Chair: Zhang Liyan

Faculty, Tianjin University of Finance and Economics (TUFE), China

Co-Chair: Solomon Darwin,

Executive Director, Centre for Corporate Innovation, UC Berkeley-Hass school of Business

Innovations for and at the grassroots in Russia

Olga Ustyuzhantseva, Tomsk State University, Russia

The Russian context is an important factor in discussing grassroots innovations. Relevant factors are: there is no absolute poverty, the informal sector as understood for the purpose of GRI is small – 18% of GDP, high levels of social dependency on the state, weak civil society – no NGOs, no public policy for GRI, and an educated population. Three cases of GRI were presented: an 82 year old serial inventor of rotary engines and agricultural machines, a housewife's development of a portable food heater which has been patented, and 3D printable gadget developed by a 26 year old.



Organizing volunteers and grassroots innovators: experiences in the development of Wikispeed for open source hardware by Shantam Shukla, FPM student, IIM-A

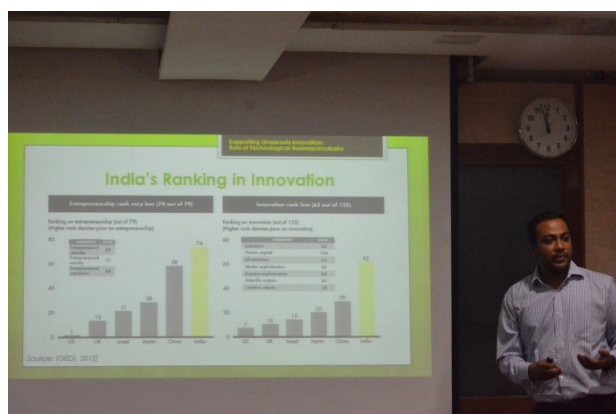


This is the story of how a small car, launched at the 2011 Detroit Auto Show, was developed by crowd-sourced interest and expertise accessing open source hardware. The concept of Wikispeed as an open source platform for building a small car was developed by Joe Justice in 2004. Challenges to successful open source hardware development include: the need for physical spaces (wiki shops) where volunteers can work in the shared workspace; the design needs to be modular and each development phase short and

simple that can be completed in a week, ownership of the design and development of each module needs to be agreed at the commencement of the cycle. The design, development and production of the car launched at the Detroit Auto Show involved 175 team members across 20 different countries.

Supporting grassroots innovation and entrepreneurship in India: reflection on two case studies from Gujarat by Saumya Ranjan Sahoo, Doctoral Student, EDII, Gandhinagar, Gujarat, Dr. Astad Pastakia, Development Consultant, Ahmedabad, Gujarat

The success rate of the commercialization of innovations supported by incubators such as GIAN are mediocre – of 200 projects supported by GIAN, only 40% have reached the market successfully. Through two case studies – Mitticool (successful) and Notion (unsuccessful), factors that seem to contribute to success are discussed. Factors that seem to inhibit success are: lack of support from close family members, quality of design input, quality of finance and business development support, and the innovator's life/business goals. Mitticool benefited from continuous investment in research and product development, and took a short time to get to the market. Whereas the Notion innovator lacked support from his family who thought he should be doing something else, suffered from weak R & D investment and took a long time to get to the market.



A study for the conceptualization of technological innovation in the rural Indian context by Sonal Sing and Bhaskar Bhowmick, Indian Institute of Technology-Kharagpur, West Bengal



In this exploratory study, cases in the handicraft, artisan and handloom/cottage industries were studied to identify their technological innovations. Three domains were identified as the locus of innovations – the production of the object, its marketing and the involvement of the community. This finding will form the basis of a larger study.

Smart micro-grid: a unique way to enlighten India by Lipi Chaya, PhD Scholar, Nirma University, Ahmedabad, Gujarat



Micro-grids enable consumers to meet some or all of their electricity needs by generating their own power through wind, solar, geothermal, micro turbines etc., reducing the reliance on fossil fuel. An example is Grampower in Gujarat (www.grampower.com) which was launched by a young student, who on his return from the USA to his home village decided to find a solution to the lack of electricity supply which hindered the children's ability to do their homework in the evenings, and involved trips to the nearest village which had electricity to recharge

mobile phones. Grampower's target market is off-grid communities or villages with less than six hours of power supply. The technology includes smart switches, automation, power storage and sensors that automatically fix and predict power disturbances.

Interaction between grassroots innovators and the formal sector in the creation and diffusion of technological innovations in rural China by Ren Yating, Liu Ruihan, Tianjin University of Finance and Economics, PRC

This study of 1,885 farmer innovators and their interactions with the formal sector identified that most interactions took place at the diffusion stage of the innovation. The formal sector is characterized by three groups of actors: the government which is a main support for finance, universities that provide technical support and enterprises that provide market and patent purchase support. The government and the innovators themselves are usually the initiators of interactions, universities and enterprises are usually responders to the innovators.



Evolutionary economics, innovations snail, triple helix and other processes in the economy. Nikolay A Badulin, Innovation Technology Department, Tomsk State University, Russia



This paper offered a review of the concepts of evolutionary economics, the innovations snail, triple helix and other processes. Evolutionary economics is generally understood to deal with the study of processes that transform the economy for firms, institutions, industries, employment, production, trade and growth within, through the actions of diverse agents from experience and interactions, using evolutionary methodology. Evolutionary economics analyses the

unleashing of a process of technological and institutional innovation by generating and testing a diversity of ideas which discover and accumulate more survival value for the costs incurred than competing alternatives. The triple helix model was derived by Henry Etzkowitz to define interactions among university, industry and government as the source of the origination and/or the development of incubator movements, interdisciplinary research centres and venture capital, whether private, public or social. These organizational innovations are as important to the flow of innovation as technological advances. The innovations snail is a metaphor for the slow process of materializing innovations from the innovator to the market. The implications of these concepts were discussed in relation to grassroots innovations.

Gandhian Young Technology Innovation (GYTI) and beyond: linking academics, enterprises and investors

Chair:	Shailendra Mehta	Vice Chancellor, Ahmedabad University
Co-Chair:	Mahesh Murthy	Founder, Pinstorm Rajnish Shrivastava
	Rajnish Shrivastava	Director, NIT Hamirpur
Discussant:	Sunil Parekh	Board Member, NDBI-NID & CIIE-IIM-Ahmedabad
	Calvin Kebati	Student Innovation & Industry Liaison Lead, JKUAT, Kenya

Missing links for fostering student ventures based on academic student innovations: insights from GYTI Awards by Team Techpedia at SRISTI and GYTI team 2012, 2013 and 2014, Hiranmay Mahanta, Nisarg Mehta, Adhish Patel, Chetan Patel, Ishan Patel, Tadsrah Shah , Pathik Sharma , Jainil Bhatt , Honey Bee Network Volunteers

This session, chaired by Prof. Shailendra Mehta and co-chaired by Prof. Rajnish Shrivastava, adopted a highly interactive and unique approach that evoked interesting discussions among all the participants in the session.



The session started with some introductory remarks from the chair and the co-chair. This was followed by a highly insightful presentation from Hiranmay Mahanta on the findings from an empirical survey conducted by the Techpedia team among the Gandhian Young Technology Innovation (GYTI) Awardees of the last three years, on different factors influencing innovation and entrepreneurship. The results of the survey can be accessed here (www.techpedia.in).

This was followed by a highly interactive discussion with four GYTI award innovators, who were sitting among the audience. The thought provoking questions from Prof. Mehta and other participants in the session and the cheerful responses to those questions from the young award winners provided many interesting insights on how diverse local factors and challenges influence the evolution of great innovations at the grassroots. This discussion was followed by a thoughtful presentation from Calvin Kebati from JKUAT, Kenya. The session ended with some concluding remarks from the chair and the co-chair.

Design for Making a Difference: Devising Sustainable Solutions for Low Income Communities

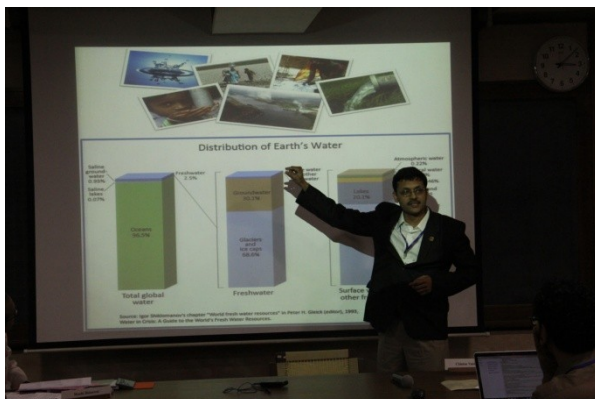
Chair:	Shashi Buluswar	Executive Director, Institute for Globally Transformative Technology, Lawrence Berkeley National Lab, Berkeley, USA
Co-Chair:	Amos Winter	Faculty, Dept. of Mechanical Engg., MIT, USA
Discussant:	Chintan Vaishnav	Faculty, MIT, USA

Design for multiple life cycles: a teaching-learning pedagogy for designing products for multiple life cycles by Amaltas Khan & Puneet Tandon, Indian Institute of Information Technology, Design & Manufacturing, Jabalpur, Madhya Pradesh

Design for multiple life cycles maximises the utility of resources used in developing a product by planning its multiple life cycles during its design phase. Designers are required to identify the users, the various contexts of use of the same product, and redesign it so that the user can identify the next use of the same product after completion of one task. An example was discussed to highlight the value of this approach for rooting students in the value of sustainability and resource efficiency, and possibly as a means for communicating design knowledge to the user

Between open hardware and grassroots innovation: the case of the Global Village Construction Set by Justin Pickard, STEPS Centre & Georgina Voss, SPRU, University of Sussex

This case which has its origins in Missouri, USA, offers open source ecology of 50 types of machinery and equipment to be found in a 'village'. The Global Village Construction Set (GVCS) is a modular, DIY, low-cost, high-performance platform that enables fabrication of the 50 different industrial machines that it takes to build a small, sustainable civilization with modern comforts. The key features of the set are: open source of 3D designs, schematics, instructional videos, budgets, and product manuals, and open collaboration with technical contributors; low cost, modular, user-serviceable, DIY, re-cycling of metal, high performance, flexible fabrication, and industrial efficiency. The presenters identified the case as an example of participation as a form of distributed user-led design which is a feature of grassroots innovations.



Green technology for a clean pond by Pradeep Sane, Manager (Industrial Engineering) Oil and Natural Gas Corporation (ONGC), Vadodara, Gujarat.

Pradeep Sane presented a very interesting solution to a problem which ostensibly seemed to be about controlling the dumping of waste around ponds, but in fact the more important cause of the stagnant pond was algae. Various hydroponic measures were taken to reduce algae and rejuvenate the life of the pond.

Low income communities and crowd design: an approach for problem scouting by Aguinaldo dos Santos, Design and Sustainability Research Centre, Federal University of Paraná, Brazil

The presentation included a discussion on the appropriate use of five approaches to design on a continuum from designer centred to user centred through immersion by the designer. Crowd sourcing works in the space between companies and communities and is the basis of the Sustainable Maker Project, which is a consortium of organizations and universities that has an online platform (www.innovatives.com) based on the principles of open innovation and connecting people to develop sustainability-related solutions.



Design, development and implementation of the First Flush System by Sourabh Bhati and Rajiv Gupta, Birla Institute of Technology and Sciences (BITS), Pilani, Rajasthan



Professor Ravi described this project of rainwater harvesting first funded by the World Bank in 2003 and now covers six villages. In general discussion he highlighted the importance of rainwater as a resource, and that renting of roofs for water harvesting could be a source of income. The specific problem he discussed was how to divert the first flush of rainwater which is highly contaminated. He devised a system which not only performs well but also is more affordable in terms of purchase and maintenance costs, and is easy to use.

Eco-friendly toilets for a sustainable world by VV Rango Rao, innovator, and G. Shankar Narayan, doctoral student, IIT-Hyderabad, Shankar Narayan Architects

VV Rango Rao has developed a natural stone slab material from quarry waste (US patented) which has many uses. He discussed how he has developed a design for constructing toilets that can be put up in six hours by two workers, with additional materials sourced locally. The whole project can be managed by a local stone mason at a low cost. The roof of the cubicle, also made of stone slabs, can take solar panels for lighting the toilet. The base has a water sump from which water is transferred to the toilet by a pedal pump. The waste can be connected to treatment plants.



Design education: empirical investigations of design theory in practice in a specific context by Dipanka Boruah & Dr Amarendra Kumar Das, IIT-Guwahati, Assam

The case of a pomegranate de-seeder was discussed to illustrate the problems of developing a grassroots innovation into a mass market product, during which the grassroots innovator may become disheartened as the professional processes of CAD, fab lab, and marketing inputs change some of the characteristics of the original invention. Designers working with GRIs, have to understand the stark context of grassroots products, and need to learn from the GRI, who without a formal education solves a variety of problems through innovation, and then contribute by integrating design to make these innovations into marketable products.

Science and Technology: Connecting Higher Education with the Grassroots

Chair: Vasant Gandhi Faculty, IIM-Ahmedabad
Co-Chair: Vijay Paul Sharma Faculty, IIM-Ahmedabad

Farmer participatory research approach in farm mechanization by MD Vora, College of Agriculture & Technology, Anand Agricultural University, Gujarat



The paper is about an experiment conducted with paddy farm workers by final year engineering students who compared the costs of a) manual reaping with a sickle with b) a small self-propelled reaper and by c) a reaper mounted on a mini-tractor provided by the university. The crop was an acre of sorghum. The sickle method took 27 to 28 man days to harvest one hectare, the mechanized method (mechanized reaping tool) took 1.2 days, and the tractor 0.6 days. The relative costs/benefits of

the two approaches, at current labour costs, seem to indicate that mechanization reduced costs by 60%. The conclusion drawn from the results of the comparison indicated that the hourly machine capacities of harvesting by the self-powered and mini-tractor operated reapers were equivalent to 35 to 45 and 18 to 23 human-hours respectively.

Characterizing the grassroots innovation process, to develop value-driven case studies for engineering pedagogy by Geetanjali Date and Dr. Sanjay Chandrasekharan, Homi Bhabha Centre for Science Education, TIFR, Mumbai.

Geetanjali Date proposed that socially relevant technology should be included in the undergraduate engineering curriculum. She gave the example of a grassroots innovator A. Muruganantham who has engineered a sanitary napkin maker at a cost of just Rs 75,000 and napkins are sold for Rs 1. Such a machine is designed to solve a social concern and he has also given these machines to self-help groups on a profit sharing basis. Another example given by Ms Date was farm equipment made by a boy from Chikmangalur in Karnataka that was designed to scare away boars from fields. Such case studies could be integrated into the engineering design curricula and developed by the collaboration of students and grassroots innovators working together at the level of class and course projects.

Linking grassroots innovation with technology and applying sustainable environment technology to industrialising grassroots innovation by Eng. Q.C. Kanhukamwe and Eng. A. Phiri, Harare Institute of Technology, Belvedere, Harare

This paper explores the potential of linking grassroots innovations with technology and applying sustainable environmental technology to industrializing grassroots innovations in Zimbabwe. The innovations should include sectors such as health, water purification, sanitation and hygiene as well as the banking sector. He gave the example of the Blair toilet that was a revolutionary innovation in sanitation in Zimbabwe. He spoke of the role of academic institutions and government in solving human needs and how they need to be innovative and creative.



Mason guide tools for masonry construction in mitigating the effects of earthquakes by Rajnish Shrivastava, and Dr Hemant Kumar Vinayak, National Institute of Technology, Hamirpur, Himachal Pradesh



This paper presents earthquake resistant building construction guide tools to help masons, the guide is copyrighted. Dr Vinayak demonstrated a simple paper rotating tool that helps masons identify which parts of a construction are earthquake resistant. The tools and an operator's guide have been developed based on a survey of existing construction practices in Hamirpur. The developed tools are further used for capacity building of construction workers in training

programs and workshops on safe construction for earthquakes organised by national, state and district level disaster management authorities.

Dr Vinayak also demonstrated a snakes and ladders board game created for school children to make them aware of what to do in the event of an earthquake. The same board game has been replicated in Bihar and Delhi for issues like floods.

The Q&A session at the end of the presentations focused on the use of word "jugaad" and how it should be used with care in various contexts.

Farm and Non-Farm Innovations: Generation and Diffusion (1)

Chair: Raghuvir Chaudhary Director, Grambharti Amrapur Trust
Co-Chair: Dinesh Awasthi Director, Entrepreneurship Development Institute of India (EDII)

Dynamics of technology commons: the case of the Bullet Santi by Mahesh Patel, National Innovation Foundation-India, Ahmedabad, Gujarat

This is a case of collaborative entrepreneurship based on the principle of a technology commons which allows unmet needs to be served effectively.

The technology of the Bullet Santi 'tractor' is in between a bullock and fully fledged tractor. The grassroots innovator for this machine, Mansukhbhai Jagani, started working with NIF in 1991 to develop its design and manufacturing. Over 10,000 units have been sold, over 200 fabricators/farmers are manufacturing it. Various versions have been developed by farmers to adapt to their needs and local conditions. The machine fabricators are clustered in a different location to most of the users in eastern Gujarat. Diffusion to Kenya is now underway through a USAID project.

Know-how required for assembly of the machine includes the various options for each of the components such as: type of tyre, suspension system, engine, transmission unit, gear box (recycled from scrapped cars), axle adaptation. Challenges facing the continued development of the Bullet Santi are: lack of standardization of parts, limited resources for innovation, after sales support, the informality of the networks which works in India but does not support export trade which requires formal documentation, legal issues (such as the mini-tractor is not authorised to be driven on public roads).

Proposed developments include the role of corporations who can supply standardized components or a kit. Standardization needs to comply with BIS norms, retain the relevance of second hand components and leave scope for derivative designs.

The learning gained by NIF in this project includes: the importance of the concept of ethical replication, the need to overcome the inability of innovators to meet market demand, the need for the provision of an opportunity for innovators to upscale to entrepreneurs.

Social and economic impacts assessment of mushroom production in Uganda by Xiaping Wei et al, Guizhou Academy of Agricultural Sciences, PRC; Mushroom Training and Resource Centre, Kabale, Uganda; Institute of Food Research, Norwich, UK.

This project aims to develop mushroom production to improve local farmers' livelihoods and empower local women, and to enhance cooperation between communities. This is a case of technology transfer from China to southwest Uganda in respect of mushroom cultivation. Among the reasons for the poor productivity in growing mushrooms in Uganda are problems with water and electricity supplies, and primitive production methods in large huts in which spore transfer is contaminated and inefficient.

This project, having started in 2014, is ongoing, and has reached the stage of needing to identify the most successful mushroom farmers in Uganda and to learn from them, in particular in sourcing low cost methods for de-contamination of spore, perhaps by using fire or the sun's heat.

An approach for the optimisation of agricultural parameters and resources using wireless automation by Pari S. Acharya et al, Dharmsinh Desai University, Nadiad, Gujarat

This is a study of the use of wireless sensor networks (WSN) for precision agriculture by optimizing water resources in particular to gain the highest yield. The aim is to develop automated solutions that are simple and user-friendly, for example in local languages and with use of animations; can be customized to suit different climates and geography; are scalable; enhance crop yield; and reduce human effort. The equipment monitors soil moisture, wind speed and direction, solar radiation, temperature and humidity. It collects the information through sensors that are placed around a field and sends it to a central PC/laptop in the farmer's house. The hardware currently costs Rs 18,000 to 20,000.

Traditional knowledge and farmer innovations in the central and eastern Himalayas by Prakriti Mukerjee et al, Smallholder Innovation for Resilience (SIFOR), International Institute for Environment and Development (IIED), London, UK

This is a study of farmer innovations in 5 villages in Central and Eastern Himalayas. Differences in farmer innovations based on traditional knowledge were found between the two groups of villages mainly due to differences in economic and social developments, for example, the Eastern villages had higher rates of literacy, declining importance of agriculture, and fewer instances of farmer innovations.

Problems identified included absence of the use of traditional seeds as farmers were being 'forced' to use hybrids, intrusion of wild animals, increasing deforestation, increase in dependence on the government for food, migration of youth. However on the positive side, in the central area, numerous innovations had been identified and the communities were cooperating in protecting crops from wild animal intrusion.

The research methods used included walks through the villages, observations, informal discussions with indigenous knowledge holders, questionnaires, 29 in depth interviews, 30 semi-structured interviews and prior informed consent from knowledge holders.

Prevalence of food insecurity among small holders in rural Bangladesh, an empirical study by Tanvir Shatil and Md Shakil Ahmed, Research and Evaluation Division, BRAC, Dhaka, Bangladesh.

This study aims to identify the triggers of food insecurity among small (land) holders in rural Bangladesh. In their sample of small holders, most owned less than one third of an acre. Those households who faced problems of malnutrition and food insecurity had less occupational diversity and weaker social capital, and their problems were compounded by loans from different microfinance organisations. Policy makers need to understand that not all small landholders are protected from food insecurity.

Farm and Non-Farm Innovations: Generation and Diffusion (2)

Chair: Vasanth Shetty Dean (Vety) and OSD, Veterinary College,
Karnataka
Co-Chair: Sanjeev Saxena Chief Scientist, Indian Council of Agriculture
Research (ICAR), Delhi

Farmers' rights and sustainable agricultural development by Hardev Chaoudhary, National Innovation Foundation-India, Ahmedabad, Gujarat

This paper highlighted the importance of the Protection of Plant Varieties and Farmers' Rights Act 2001 which grants farmers the right to save, use, sow and re-sow seeds, to share information about new varieties with prior consent from the farmer, to access seeds at a reasonable price, and to be able to register his variety. NIF has filed 27 varieties for registration of which 3 have been successfully registered, HMT Paddy Variety is one of these. NIF is also supporting the marketing of this variety. Under the 2001 Act, the farmer is recognised as a breeder.

Evaluation of indigenous veterinary medications for curing bovine ephemeral fever in regions of Himachal Pradesh by Dr Alok K Sharma et al, College of Veterinary & Animal Sciences, HP Agriculture University, Palampur, Himachal Pradesh

Five of the co-authors of this paper are traditional healers whose herbal medications were tested for efficacy in treating bovine ephemeral fever (BEF) in comparison with conventional allopathic treatments. The results, after tests in 13 veterinary hospitals and a farm were favourable.

Effective treatment of BEF is critical to the livelihood of small farmers as 90% of cattle are subject to this seasonal, vector borne disease. Use of allopathic treatments has been banned after the disappearance was noticed of the vulture population who feed on cattle treated with the allopathic medicine. Herbal medications can be resorted to with confidence that they are effective and safe for the food chain.

Effect of dietary supplementation of AHP/FA/MM on performance and protection against bacterial infection in commercial broilers by Vasanth MS et al, Veterinary College, Hassan, Karnataka.

The effects of a herbal powder (AHP/FA/MM) on growth performance and protection against bacterial disease in commercial broilers were found to be very beneficial. The evaluation involved two groups of day old chicks, one fed with the herbal powder @ 2g/day/50 birds for seven days, and the control group was fed without the herbal supplement. At the sixth week, the birds fed with the supplement had increased body weight and decreased feed consumption. This is an NIF supported project.

Clinical validation for mastitis in animals by Dr. MS Bhadwal et al, Faculty of Veterinary Sciences & Animal Husbandry, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu.

Mastitis causes heavy economic losses to dairy farmers as it affects the quality and quantity of milk production. The herbal medicine proved to be effective as a 'first aid' treatment until allopathic medicine can be administered, but not as an effective replacement for allopathic treatments. This is a NIF supported project.

Participatory technology development in indigenous veterinary medicine – experience of TANAVUS by Sudeepkumar NK et al, Department of Livestock Business Management, Madras Veterinary College, Tamil Nadu Veterinary & Animal Sciences University (TANUVAS), Vepery, Chennai

The importance of converting tacit knowledge of indigenous veterinary medicine to documented, scientifically validated and widely disseminated knowledge and practice was discussed in this report. Remote villages in Tamil Nadu were accessed by various institutions – veterinarians, botanists, and pharmacy colleges – to document farmers' knowledge. Farm trials and laboratory analysis validated 153 practices, 16 diseases were identified, and 44 healers were consulted. Studies included effective treatments of diarrhoea within 4 days and of ectoparasites within hours.

This wealth of tacit knowledge needs to be urgently documented, validated scientifically, and disseminated as best practice through the extension system. This is a NIF supported project.

Dr Dinesh Awasthi, Director, EDI, concluded this two part track on Farm and Non-Farm Innovations: Generation and Diffusion by noting that the institutional environment for generation and diffusion of innovations is now more positive. Agri-incubation centres are nurturing innovations, TBI's are being institutionalized throughout the country offering technology consultancy and business development services. The track of a successful innovation from concept to commercialization proceeds via incubation and test marketing. The next major challenge is to establish the vendability of an IP asset.

Open & Democratic Access to Knowledge for Grassroots Communities (2)

Chair:	Sanjay Verma	Faculty, IIM-A
Co-Chair:	Arul George Scaria	Faculty, NLU (Delhi)

An electronic platform for facilitating financial trading of non-exclusive licenses of technology by Akhilesh Gupta, Kamal Rabha, Center for Industrial Technology & Innovation Economics, Mumbai

There is a need for a simple, transparent and cost effective approach to assist grassroots innovators for commercializing their innovations based on a simple electronic exchange for facilitating non-exclusive trading of technology licenses similar to any other electronic exchange for stock trading. The research involves developing a model whereby the trading of technology licenses is based on market based pricing and on standardised terms creating transparency. Such an exchange is likely to be cost effective and suitable for grassroots innovators due to the transparent model, standard licensing terms, and no-fee listing of technology. If implemented this could serve as a catalyst for the promotion of the innovation in the country.

The discussion that followed the presentation focused primarily on the feasibility and desirability of such a platform.

Utility of user networks for development communication: an ICT social network driven approach for diffusion of innovation by Rahul Sudhakar Mane, Research Associate, Communications Division, Mudra Institute of Communication, Ahmedabad, Gujarat.

The question addressed in this presentation is how to support the adoption of innovative agricultural practices through communities of social ICT networks. In the societal framework, diffusion depends upon interpersonal communication, geographical proximity, institutional and individual coercion and pressure of social networks. In the context of

agricultural practices, the question is whether “communities in social ICT networks” have the potential to bring people together from various communities and also from various stakeholder domains.

Cultural track

Cultural Diversity and Innovation (1)

Chair: Sudha Gopalakrishnan Executive Director, Sahapedia, Delhi
Co-Chair: Susantha Goonatilake President, Royal Asiatic Society, Sri Lanka

Preserving traditional art through social business: A case of Mithilasma-Madhubani paintings by Ankur Joshi & S K Tapasvi, Policy & Governance, Management Development Institute (MDI), Gurgaon, Haryana



The paper describes how traditional art can be preserved with support from a social business such as Mithilasma (www.mithilasma.com) a small folk art organisation working for the preservation and promotion of Madhubani paintings, the traditional art of the Mithila region. The Mithila region falls across modern Nepal and north Bihar. Ankur Joshi described how the organization was set up as a social enterprise to promote the paintings, felicitate the artists and hold exhibitions.

Since the region has many electricity issues, the organization has given the artists solar lamps under its “light for art” programme.

Folk route: changing preferences in urban spaces by Utpala Desai, PhD (Indian Culture), JG College of Performing Arts, Ahmedabad, Gujarat

This is a case study of Nishith Mehta and his entrepreneurial efforts through his production company Musica Productions to promote lesser known Indian folk and tribal music. He combines traditional music with modern performance technologies for music festivals in urban settings and for digitised recordings. The first such endeavour was in 2007-08 when fusion music of tribal and folk with an Algerian singer was digitalized as a CD. This was followed by Deshaj Sur, a festival of regional folk music in 2013 in Ahmedabad. By 2014 the endeavour has matured into a series of experimental music fests called Folk Route/Tribal Route in open air spaces and amphitheatres. These occasions are the first time rural folk and tribal singers from all over the country are exposed to the technology of microphones and sound systems. Their exposure at such venues earns them recognition and bookings for further performances and so enhances their earnings capability.



Intangible heritage transformations- Patachitra of Bengal exploring modern new media by Dr. Lopamudra Maitra Bajpai, Symbiosis Institute of Media and Communication, Pune, Maharashtra



Patachitra is an ancient folk art of Bengal that is popularly known as scroll paintings on “patta” or cloth. In the exhibition of their work, the painters also sing about the subject matter of the painting. This kind of folk art can be found in West Bengal, Odisha, Bihar and Jharkhand. The uniqueness of the paintings is that Muslim and Hindu workers both create paintings on Hindu mythology like Ramayan and Mahabharat as well as stories of historical significance. They now also make paintings on relevant issues like AIDS, polio vaccination awareness and women’s education to name a few. A publishing house from Chennai has also

engaged Moina, a patachitra artist to create a story about tsunami.

The effect of mainstream global media has both positive and negative effects on this artistic tradition. It may reduce the participation of the artists, his/her music, rhythm as well as the impromptu methods of storytelling because of competition from other media, and the loss of the younger generation artists who have left for the cities. However Patachitra from Bengal has found a global reach especially through the personal websites of various folk artists, but the music and story-telling that accompanies this art is being lost.

Intervention framework for transforming survival appropriations of music-skilled rural artistic and innovative persons with disability into sustainable livelihoods by Govind Dhaske, Indiana University School of Social Work, Indianapolis, USA and Prashant Sude, National CSR Hub, Tata Institute of Social Sciences, Mumbai

Dr. Dhaske’s presentation was essentially about an organization that not only provides shelter to the rural disabled but also hones their skills to enable them to earn their living. The rural cultural entrepreneurship by various rural artists skilled in music and other art forms is facing a crisis. This is non-profit programme provides support for the organization, skill development, and promotion of music-focused artistic entrepreneurship of rural people with disabilities. Through TISS, this NGO has gained support from the CSR of Public Sector Enterprises who have engaged groups of musicians for some of their programmes.

Education to sustain craft traditions by Judy Frater, co-founder, Kala Raksha Vidhyalaya, Kutch, Gujarat

Kala Raksha Vidyalaya Institute was founded in 2005 as a design institute for artisans to help rural handicraft artists nurture their art in the current context. In eight years 124 artisans have graduated from this institute. In 2012 the Somaiya Trust joined in and they formed Somaiya Kala Vidya which aims at educating artisans based in Kutch in Gujarat, to increase their business acumen. The biggest challenge is literacy and language. The business educators do not



understand how to teach business to an illiterate person. However, the institute started with practical training and now they give out PG degrees. The designer weavers of Kutch are acting as mentors to weavers from less exposed weavers from other parts of the country under the auspices of Somaiya Kala Vidya.

Cultural Diversity and Innovation (2)

Chair: Sudha Gopalakrishnan, Executive Director, Sahapedia

Co-Chair: Pravin Mishra, Faculty, MICA

Sowing the seeds right: the struggle for cultural preservation vs. “cultural losses” in a globalized world: an innovation framework by Ravi Poovaiah, IIT-Bombay

The altered perspective under which we seek to understand innovation will demonstrate that every society advanced or not, possesses technology, but not all technology translates into innovations, nor is that a necessary precondition for the flowering of society. Prof. Poovaiah demonstrated the idea in the context of eastern and western ways. She characterized the eastern way not in geographical terms but as those societies that are culturally oriented and west as those which are technologically oriented. She also discussed how an innovation called “Jellow” was created for Down’s Syndrome children to aid them in their interaction with other people.

Creativity & innovation of the traditional craftsmen of Kashmir handmade Pashmina - perspective from the grassroots level by Asma, Central University of Jammu



The art and craft of making Pashmina shawls, indigenous to the Kashmir region of India, is a perfect combination of innovative process and aesthetic creativity which has been perfected by the communities for over 600 years. This traditional knowledge of making pashmina is a long held secret, as it is only the artisan communities of the Kashmir who have the skill and knowledge to create the softest and lightest Kashmir Pashmina, that is famed world over and has been

successful in obtaining a geographic indication (GI) for the name “Kashmir Pashmina”.

However the Pashmina industry in Kashmir is facing serious challenges due to undue competition and deskilling by mass production by power looms, piracy of designs, loss of dignity of labour, destruction of individual creativity, short sightedness of government policies, and knowledge propagation is still informal in nature. This has caused the artisans to discontinue this ancient art of weaving pashmina. Measures are being undertaken slowly by the government to reverse these trends and provide protection to the industry, however more needs to be done to recognize these artists and give them a status as designers and creative people.

Educational track

Civic Innovation in Education (1)

Chair: Ankur Sarin Faculty, IIM-Ahmedabad
Co-Chair: Elizabeth Mehta Founder Director, Mukangan

Continuous evaluation as a transactional network: a feedback loop of teacher educators, teachers and students by Elizabeth Mehta & Meenu Thomas, Mukangan, Ahmedabad

Muktangan (muktanganedu.org) is an educational trust focusing in the provision of child-centred inclusive English medium schooling to underprivileged children, taught by teachers from the same community who then become change agents. In Ahmedabad there are seven such schools. This presentation focused on the importance of development of the teachers in child-centred teaching methods. Mukangan provides one year's training to students who are later absorbed as teachers. The training includes their role as teachers, as community members, and as faculty following the Gujarati board syllabi.



The conceptual development of the teachers is given emphasis and feedback to teachers is an important part of their development. There is a weekly meeting with teachers where this feedback is discussed, and includes assessments of students' understanding of the curriculum. The approach is non-hierarchical, collaborative, continuous and developmental.

Vigyan Saralikaran Prakalp by Indu Parashar, Indore, Madhya Pradesh



Teaching of science with the support of poems or ballads was adopted as a strategy to counter the problem of less time being given to the teaching of science subjects due to the emphasis given to the teaching of English. The ballads are supported by animated film to help understanding. The principal adopted is that scientific knowledge is not linear as presented in textbooks, but is all around us.

Schools and textbook publishers in Indore have supported this approach. Ten schools and 2,400 textbooks reaching 20,000 students is the current scale of the adoption of this innovation. Academic results show that there is no difference in attainment between students of different socio-economic backgrounds who studied science with this approach.

Can teachers learn from children, and build upon their curiosity, compassion and empathetic value system? by Akanksha Agarwal, Design for Change, Ahmedabad

The presenter is the Research Head of Design for Change, a movement founded in Ahmedabad that empowers children to be the source of change they wish to see in this world. Based on a simplified design thinking process, the students are asked to feel the problem that bothers them, imagine a way to make it better, do the act of change, and share their story of change.



All the material that schools or organisations want to use in adopting this programme are available on line with no charges. Individuals and organisations in 38 countries have implemented the programme. A one year training course for teachers will be available as open source.

The benefits that schools who have adopted the Design for Change programme are: a change in the role of teachers to being more of a facilitator, students express their feelings more clearly, there is greater sharing in the process of decision making, and greater collaboration between students and teachers.

Pratham Open School of Education by Renu Seth, Pratham, Mumbai



Pratham is a NGO founded in 1995 in Mumbai and now has a nation-wide coverage – 20 out of 29 states. It has developed low cost, replicable models that can be adopted by other organisations, and has thousands of volunteers who implement learning interventions at the grassroots level. The volunteers are trained and monitored by Pratham. They are provided with teaching-learning materials and books and are mobilized to reach children both in school or unable to use school facilities, and

youths who have dropped out of the education system.

The children they target are those not being schooled because of: economic problems (28%), learning difficulties (39%), problems of access or mobility, or for girls because of marriage (10%). One of the biggest problems Pratham faces is retention of children which is often due to the attitudes of the parents. By taking the schooling into the home, parents can also begin to appreciate the value of the education.

Civic Innovation in Education (2)

Chair: Ankur Sarin

Faculty, IIM-Ahmedabad

Co-Chair: Seshagiri Madhusudhan

Education Specialist, UNICEF, Chhattisgarh

RTE Watch: A civil society engagement to strengthen RTE Implementation in Chhattisgarh
by Seshagiri Madhusudhan, Education Specialist, UNICEF, Chhattisgarh

The realization of the Right to Education Act is a function of the capacity to fulfill duties and the capacity to demand rights. The actors involved are: Government, to provide active support and involvement, and implement all the administrative decisions that are needed to promote change; Civil Society Organizations who will facilitate the 'watching' of RTE and promote collective action on the ground to make a difference; UNICEF, for capacity building and funding support where necessary; others, such as the media; political representatives, teachers' unions who are expected to get actively involved.



The areas to be watched for the proper functioning of the education system according to RTE norms are: 1) access and infrastructure, community involvement, 2) what happens inside the classroom and classroom processes, 3) what children are learning as measured by learning outcomes with understanding.

Civil society and education reforms in India by Praveen Khanghta and Bikkrama Daulet Singh, Central Square Foundation, New Delhi (www.centralsquarefoundation.org)



This presentation on the work of Central Square Foundation is an example of how civil society can support improved learning in schools. The actors in civil society are identified as: parents, community based organizations, NGOs with a technical/focused theory on change, and think tanks/ academics/ researchers. Their actions are necessary to address the crisis in India's education system which has high drop-out rates: 97% of children enter Class 1, but only 35% reach Class 12. Poor quality of learning is evident at the end of primary school, when most of the children lag 2 to 3 years behind the expected level of learning. CSF aims to bring about change through supporting

entrepreneurship, networking and policy reform. Their initiatives include setting new standards in affordable schools, training teachers and school administrators, use of information technology, and advocating for policy reform.

The story of Roshni: a humble attempt to light the lamp of knowledge by Dr. Savita Bhagat, Founder, Roshni Educational Society, & Arun Bhagat, DAV Centenary College, Faridabad, Haryana.

The focus of this educational NGO founded in 2007 is children of construction and domestic workers and other slum children in Faridabad. They currently school 250 children in two spaces loaned to them, using volunteer teachers who are trained by them. The collaboration with DAV College



provides them with space, teaching resources and students who in their spare time teach the slum children. Each child is provided appropriate support according to their circumstances. Support is given for entering the educational mainstream, vocational education, or education through the National Open School. The emphasis is on nurturing, achievement of quality educational outcomes, and use of co-curricular and ICT activities to boost confidence and impart values.

Education through an integrated, micro-level approach by Virendar Khatana, Project Director, Joint Initiative for Village Development (JIVA), Rajasthan.

JIVA is an integrated community development programme supported by John Deere Foundation and implemented by PYXERA Global, a US based NGO, and local partners in three rural villages in Sakrawas Panchayat, Rajsamund District in Rajasthan. This report is about the improvement of the quality of and engagement in education in the three villages by establishing Education Resource Centres. The centres provide after school tutoring, organise extra-curricular and creative activities, involve stakeholders such as teachers, parents, children (through child parliaments) and government officials, and improve the physical infrastructure of schools in the villages.

Since June 2013, two dozen girls have chosen to aim for 12th standard, nearly 50% of 126 drop outs have been reintegrated back into the community's public schools which have benefited from provision of desks, chairs and mats, new toilets.

Mobile matters: BRAC experiences in mEducation by Wahid Newton, Program Manager, BRAC Education Program, BRAC, Dhaka, Bangladesh.

This paper describes a project to launch a mobile education service to 36 secondary schools with support from BRAC Institute of Languages. Support is offered from 6pm to 9pm every day for English and Maths for classes 6 and 7 which are experiencing 60% drop out rates. This is a development from a British Council supported project to use mobile phone tutoring support to help adolescent girls develop English skills to improve their employment prospects in the garment sector.

Initial feedback indicated that girls in particular value the service, some parents are dubious about daughters speaking to strangers, and some teachers do not encourage students to use the service.

Civic Innovation in Education (3)

Chair: C. K. Koshy Member, Governing Board, Gujarat Grassroots Innovation Augmentation Network (GIAN)

Co-Chair: Ankur Sarin Faculty, IIM-Ahmedabad

Educational transformers: dare to dream by Anvit Phatak, Pune University, Maharashtra

The presenter spoke about the value of a child centric curriculum. The points discussed were how to redesign the system, which syllabi to focus on, more teacher training, better use of technology, how to engage students, role of parent teachers associations, and accreditation.



The discussion was in the context of the challenges of achieving large scale implementation of educational reforms which require a system to be in place which is rigid enough to ensure implementation, yet flexible enough to retain the sight of the purpose. The transformation of a school into a learning organisation should be able to showcase not only the end product, but also provide a model of the process of transformation. Reform should make institutions literate enough to understand what reforms to adopt and what to refuse.

Plugging leakage of vulnerable student supply chain: an innovative interventional initiative by Narayan B. Iyer et al, Indian Development Foundation (IDF), Mumbai



This is a report of a study undertaken by the IDF to counteract high school drop-out rates by an intervention called Bal Gurukul System, which was first launched in 2005 in Rajasthan and subsequently over five years was introduced into 170 locations and now covers 8,500 students nationally. Issues of slum children's education, pressures created by completion of the syllabi and dealing with slow learners, and class contact hours are addressed by provision of classes organised by IDF which potential drop out or already

dropped out students attend alongside public schooling or in Jaipur, instead of public schooling. They are given proper coaching and encouragement to achieve a transformation. The cost is supported by IDF.

Shift from structured to unstructured education system by Sachin Mandavgane, Department of Chemical Engineering, Visvesvaraya National Institute of Technology, Nagpur, Maharashtra.

Rote learning, examination patterns, highly structured curriculum kill independent thinking and smother innovative ideas. This is a report of innovations implemented in teaching undergraduate students which involved a shift from teaching what to think to how to think, minimum 'classroom teaching', participatory learning, a student mentor programme, and course material to focus on problem solving. The presenter proposes that the entire education system should be based on this approach.



Relevance of Gandhian education system and economic model in contemporary times: a case study by Malay R. Patel, IIM-Indore, Madhya Pradesh.

The case study is TinyTech Plants established by V.K. Desai in Rajkot, Gujarat, to implement Gandhian principles of economic development through the establishment of cottage industries operating with low-cost rural machineries which are accessible, useable, and affordable for entrepreneurs. This approach is also scalable to other rural communities to develop an output to meet mass market needs, and it is sustainable in terms of financial self-sufficiency of village communities.

VK Desai, a fervent Gandhian, set up TinyTech plants to comply with the tenets of a Gandhian education system which should be based on personal, real time life experiences, be self-supporting and local craft centric, and which essentially enables an individual to earn a decent living and thus cuts the root of unemployment. The case shows the possibilities of motivating young people towards sustainable entrepreneurship in the rural development of India.

Civic Innovation in Education (4)

Chair: K B Jinan Visiting Faculty, NID-Ahmedabad
 Chair: Ankur Sarin Faculty, IIM-Ahmedabad

Innovation in education: introducing creative training in language, intellect, and originality by Prasad Sundararajan, Chandragupt Institute of Management Patna Chajjubagh, Patna, Bihar



The presenter's 'Little Genius' project is based on the concept of creative entelechy which refers to the realisation and actualisation of a potential for creativity as contrasted with its presence. This concept supports the implementation of the UN Convention on the Rights of the Child Article 29 on the Aim of Education which states that education shall aim at developing the child's personality, talents, and mental and physical abilities to the fullest extent. In order to achieve this, students need to be trained in creative

language competency, development of their intellect and originality in thinking.

The changing role of the teacher in building environmental leadership skills amongst students - experiences from student environmental action projects by Annie Gregory, Centre for Environment Education, Calorx Teachers' University, Ahmedabad, Gujarat

Seven examples of children's projects under the Paryavaran Mitra Young Leader for Change scheme were presented to illustrate the quality of learning the students gained from undertaking meaningful environmental action projects rather than from sitting in a classroom. In this programme, students from rural and urban areas prepare and implement action projects on environmental issues in their vicinity. Among the benefits for the students were: applying concepts learnt in school to the real environment, making a difference to a community, communicating with diverse audiences, using different media and messages, encountering different attitudes and perspectives, documenting traditional knowledge, resourcefulness, skill building for earning a livelihood, and learning to be in others' shoes. By participating in such a project the teachers learn how to develop skills in the students in planning, implementing, problem solving, and working in a team, and to redefine their roles as facilitators of learning



Creating conditions for creativity in schools by responding to the inherent nature of the child and the biological nature of learning: lessons from indigenous cognitive conditions and the re-imagining schools initiative at Sadhana Village School, Pune by KB Jinan, National Institute of Design, Ahmedabad, Gujarat

This paper explores the differences between indigenous knowledge and learning which has a holistic, experiential approach, compared with 'modern' knowledge and learning which is linear, rational and kills curiosity and aesthetic sensibility by a process of mechanization and fragmentation. The Sadhana Village is a non-profit organization focusing on the mentally challenged and rural people in Pune district, which has adopted natural learning processes in the primary school. Natural learning processes involve the child developing its knowledge and understanding as it engages with the world, by studying the way the world looks, the quality of its materiality and the various phenomena that occur around them. This holistic perspective of the world awakens the holistic nature in the child.

Teachers as Transformers: The Classroom as the Grassroots (1)

Chair:	Vijaya Sherry Chand	Faculty, IIM-Ahmedabad
Co-Chair:	Poornima Varma	Faculty, IIM-Ahmedabad
Discussant:	Anupam Basu	Head, Centre for Education Technology, IIT-Kharagpur

This session started with Prof. Anil Gupta releasing three innovative books aimed at helping teachers and educators help their students enhance their learning. The authors of the books were also present; one of them was Bhavesh Pandya whose presentation follows..

My Favorite School - multi grade and multilevel learning system through short stories without the use of compound consonants by Bhavesh Pandya, CRC-CO Deesa, Banaskantha, Gujarat

Bhavesh Pandya was a teacher in a rural school where there were just two teachers for six classrooms. Faced with challenge of low attendance and poor grasping of the learning material by his students, he saw that the 'multi grade-multilevel pedagogy' suggested by the state education department was failing miserably. Going deeper into the reasons, he identified that the students could not understand the language (Gujarati, their mother tongue) and hence, they were unable to grasp other subjects also. Going further, he found that consonant-clusters (*jodakshar*) were the culprit which the children could not read. To solve this, he created a new TLM (Teaching-Learning Material) called *Gamti Nishal* that avoided the use of these consonant clusters. He wrote stories in *Gamti-Samachar* a magazine he started, which cut across the subject boundaries of Maths, Science, Environmental Education, Language etc. These short stories were used as a tool for improving reading and learning skills with positive results. They were used as reference materials in teacher training programmes and were published in textbooks for standards 1 to 8.

Edusafar- IT as a tool for teacher networking, information sharing and learning processes by Kamlesh Zapadiya, Shree Fulzar Sim Primary School, Jasdan, Rajkot, Gujarat

This presentation was about the establishment of a successful website (www.edusafar.com) that helps teachers and aspiring teachers to network for teaching solutions and knowledge development. Kamlesh came in contact with six like-minded teachers through the internet and then held a meeting in Ahmedabad to set up the project www.edusafar.com. The site is designed for teachers to help solve their problems in teaching, curriculum development, managing students, etc. Now they have around 25000 page hits every day. The website also helps teachers become familiarised with Facebook, email and other ICT technologies such as watching YouTube offline on a mobile phone. Many teachers have difficulty in passing the CCU exam that is mandatory to become a teacher, this site helps them with guidance for this exam. They have also created a WhatsApp group which now contains around 16000 like-minded teachers.

Vidyadham @ Boru-individualised and peer learning with the help of information and technology by Mehul Suthar, Vidyadham Boru Primary School, Mansa, Gandhinagar, Gujarat

Mehul Suthar is the principal of Vidhyadham School. In 2011 the teachers decided to adopt ICT to uplift the school in its achievements. Use of IT based content and teaching and learning processes made education more interesting which resulted in improvements in the regular attendance in classroom, an increase in the confidence level of both the students and teachers, quick access to web-based information for teachers which simultaneously increased their independence in sourcing material. The other major outcome was that the learning among the students was enhanced due to peer learning processes and also helped in making assessments and feedback faster by use of digital answer sheets and various kinds of analyses.

The IT gadgets were used to supplement the teachers who were absent for a day or two in school as the whole class could be managed by students themselves or another teacher. This innovation has set an example and has motivated donors to come forward and contribute for supporting IT related matters and other activities. The school has been provided with 81 laptops by INTEL Corp. Grade 8 and 9 students have a laptop each that have been made child-friendly with rounded corners and special keyboards. The school also has all requisite facilities like wifi and 30 to 40 charging points. Students also use laptops for test papers and reference books. The number of students who were irregular in their attendance has reduced to a great extent and they learn easily too.

Chairman's comment: This is a high cost model with each classroom costing 35 lakh. There are other low cost models in the range of Rs 80,000-1 lakh, such as one developed by teachers like Sandeep from Maharashtra who are converting classrooms into learning hubs. Sandeep's peer network is not only mobilizing resources from the community or civil society, without depending on governments, but is also creating content. There is potential for using a network of teachers to collaborate in the classroom and convert technology into education.

Be Nachiketa – Voluntary Teachers' Network by Anand Thakar, Primary School Vadiyayala Pay Centre, Una, Junagadh, Gujarat

Be Nachiketa is a co-curricular programme for primary school children who need support for listening, speaking, reading and writing skills. The project was set up and is being run on a voluntary basis by a group of 25 teachers who organise activities such as music, art, creative writing and craft. They selected 12 schools for their pilot project. Expert teachers teach these subjects on one Saturday every month to children of *maldaris*, vendors, farmers and such people, in the belief that through co-curricular skills, the children can also get a better education. A girl has written a Haiku poem based on Ramayana through this project. The group of teachers use their own money to fund this project.

Chairman's comment: The skills other than reading and writing are not the focus of state education and despite inclusion of Continuous and Comprehensive Evaluation (CCE) in the Right to Education Act, the state has no plan of action on this aspect. This *Be Nachiketa* model is unique because it involves experts and not just the teachers. The entire funding is by the community. This kind of learning directly feeds into the reading and writing capabilities of students and the state is clearly missing this point.

Peer teacher-driven network for learning: State Innovation and Research Foundation-(SIRF) by Sidharam Mashale, Solapur, Maharashtra

Starting as a voluntary group of three or four teachers inspired to form a *dhadpad manch* by an education officer in 1997, the State Innovation and Research Foundation (SIRF) is today a

registered voluntary network of innovative government school teachers. The initial innovation of the group was the 'teachers' clinic' by which good teachers would visit different schools at the weekends and solve educational problems. Later, with support from IIM-Ahmedabad, the activities expanded to about 3000 innovative teachers. This a voluntary network and has completely depended on funds pooled in by the teachers themselves. Initially there was no support from government but this has changed. Women who were earlier hesitant to join the project have been encouraged and now out of 3000 members, 1000 are women. The education department in Maharashtra has distributed reference books created by this project to around 60,000 schools. This is one model where no IT has been used and yet, the peer network is very strong.

Sagar Shala - a school for migrant children and children of the shifting fisherman community by Dharmendra Kumar, Yusuf Meherally Centre, Bhadreswar, Mundra, Kutch, Gujarat

Working in the remote areas of Kutch with the most vulnerable communities of Muslim fishermen and the salt pan workers, the Yusuf Meherally Centre (YMC) has been helping more than 1000 children access education since the 2001 earthquake. The challenge these children face is of the annual migration by their families and its unpredictable nature. In fact, the organization understands their issues so deeply that it runs separate programs for both these communities because the nature of their emigration is different and hence, the challenges faced by the children from both communities are very different.

In 2002, as part of their recovery and rehabilitation work after the earthquake, YMC set up *Sagar shala* schools on the shores – the workplace of the fishermen and salt pan workers - an initiative that helps these children get an education. They also run a dispensary, have set up hostels for children and are starting a Barefoot College inspired by Bunker Roy. The *Sagar shala* schools collaborate with state schools to enable the children to qualify to sit examinations even though they have moved about with their parents. The fishermen stay near the coast for nine months during which time the children attend the *Sagar shala*. The salt pan workers continually migrate which is a challenge for the educators. Out of 36 schools, 16 are for salt pan workers' children who are the first generation of salt pan workers to access to education.

Teachers as Transformers: The Classroom as the Grassroots (2)

Chair:	Poornima Varma	Faculty, IIM-Ahmedabad
Co-Chair:	Vijaya Sherry Chand	Faculty, IIM-Ahmedabad
Discussant:	Anupam Basu	Head, Centre for Education Technology, IIT-Kharagpur

Quality in school education: real fuel for India's growth engine by Mohammad Mushir Khan, First Year MBA student from Birla Institute of Technology and Sciences-Pilani, Rajasthan

This paper is based on a three month research project in Chandrapur which is now part of the newly formed Telangana state. The findings were that the quality of education is very poor, for example, children of class 8 could not read textbooks of class 2. The Government's requirement for compulsory education until standard 9 (age 14) seems pointless in this context. Measures recommended by Khan to improve the quality of education are: increased allocation of governments' budgets for education, a parents' awareness programme for child education, creation of counsellors' posts, performance and attendance measures, a day a week for co-scholastic activities.

21st century teaching technique to transform passive classrooms to student centric learning centres: the case of Nagpur Interactive Creative Education (NICE) Program by Sujit G. Metre, Datta Meghe Institute of Management Studies, Nagpur, Maharashtra.

This presentation was about a new technique of education developed by Dr. Mahota which was introduced into Nagpur schools in 2008. The technique requires students to read the portion allotted to them, discuss it in small groups, present their allotted portion to the remaining students in the classroom, and answer questions asked by other groups. . This technique ensures that students engage in purposeful reading, speaking, listening, thinking and writing skills, and develop a complete understanding of the materials in the textbooks. Improved concentration, self-confidence, self-discipline and better retention are also benefits. The role of the teacher as facilitator reduces their burden.

The experiment was conducted on 50 lakh students belonging to class 5 onwards in the state of Maharashtra, and was found to be especially useful in schools which have a shortage of teachers. The Department of Education, ZP Nagpur (Secondary Board) has implemented this technique for all schools in Nagpur District under the Nagpur Interactive Creative Education (NICE) Program, with a focus on classes 5 to 10. The Nagpur NICE experience has scope for propagation, replication and validation in higher learning institutes also.

Use of dramatization in teaching at primary school level for the Gujarati subject by Dr. Ashish Thaker, Revaba Sarvajani College of Education, Mehsana, and Yupal Shukla, V M Patel College of Management Studies, Ganpat University, Gujarat

This presentation started by inviting five to six people comfortable with the Gujarati language to create a small play. This exercise was conducted to emphasise the need for the use of dramatics in educating young minds. Use of dramatics activates the emotions of the actor, cultivates natural discourse, and brings about dynamism and interest in the events. These special characteristics of drama make the message easily understandable. Especially in language teaching dramatization may be useful method and it should be explored, and is currently being used for teaching the Gujarati subject as primary level. Presenter described a few lines in Gujarati that can be interpreted in several ways, for example *Gol Khavay* (*Gol* means jaggery and also round) *Game te kaam kar* (Do whatever you like and do work that is not so good). He went on to depict how dramatic a simple line like “There lived once a king” can be made. The researcher is an author of more than 25 one-act and multi-act plays.

Exploring agency and multiple expression by Alia Kamal, Institute of Education Development, BRAC University, Dhaka, Bangladesh

This presentation was about an arts program in a low income school in Bangladesh, which was designed to improve self-esteem and give free vent to their creative imagination. The program was also supported by facilitators who could help the researchers as well as the school children. The children began enjoying school due to this program and attendance levels increased too.

Doctoral Colloquium (1)

Chair: David Martin
Co-Chair: P. M. Shingi

Founder, M CAM, USA
Head, FLAME Centre for Executive Education, Pune

The starting point is to identify the research topic and field of enquiry, and rise to the impulse for inquiry as it may turn into a career. The process often begins with an unarticulated assumption in which the incomplete absence of knowledge leads to research, to questions which have to be reframed. Answers to several questions need to be considered: Who is my audience? Who is going to find that research? Who is the audience of the research



– grassroots workers? Are we really free to research? Who is funding to create that kind of knowledge? Funded research creates a commodity of information, it does not build knowledge.

India is following an industrial model of research in which the dominant approach is applied knowledge with short term implications. In the last 270 years, since Adam Smith, a linear world view has prevailed, a colonial view on energy, matter and civil society in which an idea is not anyone's to discover, and there is no free sharing of research results. We should try to keep away from the language of conquest. Education is to learn, to imbibe, to perceive, and research should lead to the generation of new knowledge which has a real application and is not judged solely by the number of citations. The dissemination of the results should be open and encourage collaboration. Real research is concerned with the formation and dissemination of knowledge.

During the research process, persistence in asking questions is necessary, and consideration needs to be given to the problem of access to information. Ease of access equates to popular knowledge. A balance is required between the formal and informal structure of the acquisition of information. How we are going to use human resources, as tools? The importance of research ethics arises here.

Several different approaches to research and their implications were discussed:

Specialist to interdisciplinary : expert to integrative

Research starts with an idea of a specialist, but it is important to have the capacity to support interdisciplinary research. In the domains of cybernetics, socio-economics, computational models require monolithic expertise. The researcher needs to develop a transitive awareness in order to make useful inferences between observations which in time may generate new understandings.

In the broad ecosystem, a linear process is followed which often makes the error of assumption. The data measures normally violate the assumptions, so the conclusion of the research is seldom applicable because we started with assumptions.

The differences between qualitative and quantitative approaches are artificial as all metrics are based on qualitative judgments. All research is qualitative, especially when it is said to be quantitative. Precision does not make it quantitative.

Historical research is carried out for the dissemination of knowledge.

Relevant versus intriguing findings relate to the intent of the research.

Doctoral Colloquium (2)

Chair:	David Martin,	Founder, M CAM, USA
	Vishal Gupta	Faculty, IIM-Ahmedabad
	Viswanath Pingali	Faculty, IIM-Ahmedabad



Further considerations of research questions and research methods were discussed:

Research should be focused on ethical questions - what issues is my society facing?

Should I follow what the world wants and contribute in those journals? Or should I start something for society?

Are we asking relevant questions?

How do we frame better questions?

Is the cost of the research a consideration?

To go your own way or not and the issue of power and politics with your supervisor/supervising committee - 80% PhDs face this dilemma

Do I have a bigger vision?

Tangential literature should be read.

How to undertake research in a changing geo-political scenario?

Is social engagement a pre-condition for my research?

If the focus is on grassroots innovators, open source solutions need to be generated for real world problems.

Is there an indigenous model of leadership to be explored?

There is a fallacy of independence or dependence upon theoretical frames.

There is an enormous amount of waste around research methods.

Coherence of thought is very important. A doctoral scholar needs to be trained to look for precision which the research community will appreciate, and this will lead to better writing.

The language used should be interesting to a wide range of readers, not only to academicians.

Self-evidence and reality should appeal to the consumers of the research.



Key Highlights – ICCIG 3

Development of the grassroots innovation movement

1. There is a need to prepare a road map for the replication of the Honey Bee Network (HBN) and associated practices as developed in India, to other countries in Africa, South America, ASEAN, SAARC, BRICS and so forth. The replication needs to take into account appropriate adjustments for the institutional setting and related economic, geographical, social and political contexts.
2. The road map needs to identify the resources and institutions that underpin a successful HBN, such as the sourcing of volunteers and like-minded partner organisations.
3. The mechanisms for institution building to support the grassroots innovation movement need to be elaborated, including the roles of formal institutions.
4. The development of interlinked electronic platforms is required that will support global access to the open source databases in multiple languages, and facilitate the augmentation and transfer of traditional knowledge and know-how.
5. Periodic conferences, hosted on rotation by ‘member countries’, will support the consolidation of developments and provide an opportunity to further develop strategies and structures to strengthen the ‘globalisation’ of the HBN, in scale and scope.
6. The development of an institutional mechanism for bringing together traditional forms of sciences and technologies is required.

Developing the grassroots innovation knowledge base

1. The identification and mapping of cultural diversity is required to support/provide a platform for culturally based/focused creativity and innovation, preceded by clarity being given to the scope of ‘culture’ in the HBN context. A cultural database needs to be set up. Shodhyatra are a useful mechanism for collecting cultural practices
2. Increased efforts are required to codify/document tacit knowledge and place on open source platforms which will support open and democratic access to knowledge resources.
3. Mechanisms for greater involvement of grassroots innovators from various fields in the augmentation and transfer of traditional knowledge and knowhow are needed.
4. Innovative community-driven sources of livelihood need to be recognised and encouraged.
5. Cooperation among grassroots innovation thinkers across the world is needed to develop in particular shared knowledge and experiences of linking the grassroots with state of the art technology. This is needed to produce ‘affordable excellence’ through high technology, low cost solutions that have the potential to have an impact on global markets.

Design issues

1. A culture of empathetic design needs to be developed which is already a feature of informal sector innovations. Inclusive design needs to be emphasized in practice in

the formal sector. One mechanism for achieving this would be the development of lifestyle design courses for different sectors e.g. farmers, grassroots innovators, etc.

Taking grassroots innovations to the market

1. The value of grassroots innovations to the global economy is that they support conservation-led growth which needs to balance consumer-led growth in the longer term to protect natural resources from depletion. Ecosystem services, frugal design, and the circular economy reflect the potential of grassroots innovations to contribute to conservation-led growth. The strategising of marketing and branding of grassroots innovations into the mainstream will in the longer term challenge the current dominant consumer-led market structure.
2. Grassroots innovations are currently producer-led with ill-defined or narrowly defined potential markets. A shift needs to be made to market-led grassroots innovations to incentivize innovations by including the market in the value chain. A greater emphasis on gathering market intelligence or pushing grassroots innovations into the market is required. This may be accomplished by 'grassroots marketing scouts' whose role is to identify potential consumers of existing grassroots products and services, and alert GRI of market needs not yet met.
3. Appropriate testing of innovations prior to diffusion involving elaborate user trials is necessary to ensure quality and safety criteria are met.
4. Greater use of partnerships with formal institutions, companies, organisations is needed to support GRI product/market development effectively in terms of time to market and scale of sales.

Education issues

1. A policy and mechanism to engage GRIs with the formal education system is needed to ensure that awareness of traditional knowledge is included in children's educational experience, and to encourage children to be GRI's.
2. Create a culture of innovation in village level schools.
3. Include innovative cases in the curricula and leverage social media for networking among teachers.
4. A portal is needed for innovations in the education system by people (such as administrators) other than teachers. Innovations in the educational system are needed to provide institutional support for innovative activities by teachers in their classrooms.

Suggestions for future conferences

Clarity of the focus is needed: for the grassroots, by the grassroots and with the grassroots. Real time translation is needed to enable fuller participation and understanding. A greater emphasis on traditional practices in the agenda would be welcomed.

Glimpses of Exhibition of Innovation and Shodhyatra Gallery



