

Message from the Chairman



Dear IEEE Members,

It is always amazing to note how fast the time flies. It seems that I have completed writing the message for the last issue of IEEE IC Newsletter just the previous day. Now it is time again to write to all of you for the second issue of IEEE ICNL in 2018. At the same time it gives me great pleasure to reach out to you with the IEEE ICNL on a regular basis. My sincere thanks to the ICNL Editor for doing a marvelous job with tremendous consistency.

In the last message, I expressed our thanks and appreciation to IEEE Gujarat Section for holding the first face-to-face (F2F) meeting of IEEE IC in 2018. This time I am duty bound to express my heartfelt thanks to IEEE Pune Section for being the wonderful host to the second F2F meeting of IEEE IC on 23rd June 2018 at Pune. It was a great meeting with very encouraging participation from all concerned. Particularly praiseworthy is the professionalism showed by Pune Section in all aspects of the organization of this meeting.

As announced in the last issue of IEEE ICNL, the MiniPOCO 2018 was held on 20th May 2018 at Visakhapatnam, Andhra Pradesh organized jointly by IEEE India Council and IEEE Hyderabad Section. The workshop was supported by IEEE Region 10, IEEE Meetings, Conferences and Events and quite a few IEEE Sections in India. Over 70 participants joined from nearly every leading Indian city, representing many leading Academics institutes and Industries. On behalf of IEEE IC I extend my sincere thanks to all concerned for organizing such a relevant and meaningful workshop.

The national level IEEE Women in Engineering Symposium 2018 was held at the Hope Foundation's International Institute of Information Technology, Hinjewadi, Pune, on 22-23 June 2018. This Symposium was jointly organized by Women in Engineering Affinity Group, IEEE India Council and Women in Engineering Affinity Group IEEE Pune section. This symposium was yet another example of commitment towards excellence by the IEEE Volunteers, particularly WIE leadership. My warmest thanks to the organizers of this beautiful event.

In the sidelines of this WIE Symposium, "Late Shri Pralhad P Chhabria Award" was presented to the awardees on 23rd June 2018. Mr. Dina Kholkar, Chair, IEEE Pune Section, Mrs. Aruna Katara, President, Hope Foundation, Mr. Suahs Merchant, Vice Chair, CREDAI, PUNE Metro, Dr. Rajashree Jain, Vice Chair, WIE AG, IEEE IC, Mrs. Lekha Phijo, Chair, WIE AG, IEEE Pune Section and the undersigned were present during the award ceremony. It is a great beginning and I look forward to many distinguished awardees in future.

IEEE India Council in association with IEEE 5G Initiative, IEEE Bangalore Section and IEEE ComSoc Bangalore Chapter organized a 2 day "IEEE 5G Technology workshop" on June 29-30, 2018 at Hotel Sterlings Mac, Bangalore. This workshop was supported by Department of Telecommunication(DoT), Govt. of India, Telecom Standards Development Society of India (TSDSI), Cloud Computing Innovation Council of India (CCICI) and AP/MTT Bangalore Joint Chapter. The workshop provided a forum to researchers, engineers and industry experts to present and discuss recent research breakthroughs, technical advancements and new findings in 5G Technologies. Main objective of this workshop was to bring synergies between the Government, Industry and Academia, which was achieved admirably well. Once again I express thanks from the core of my heart to the organizers of this outstanding program.

International Conference on Smart Electric Drives and Power System was held on 12-13 June 2018 at the G.H. Raisoni College of Engineering Nagpur. This conference was technically co-sponsored by the PES Chapter of IEEE IC and IEEE Nagpur Subsection. My thanks to PES Chapter for making their presence felt nationwide.

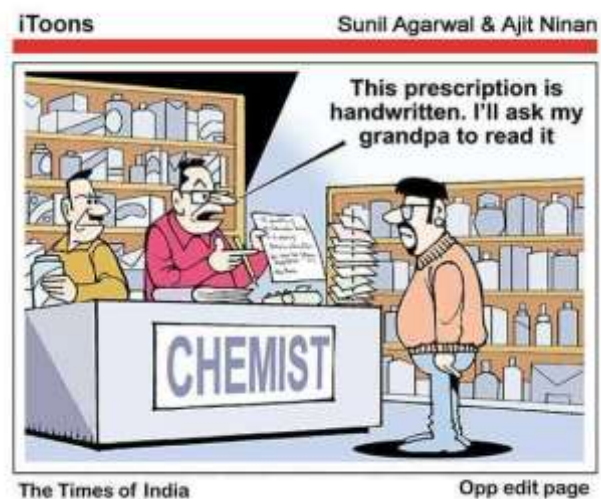
IEEE India Council in association with IEEE Bangalore Section and IEEE TEMS Bangalore Chapter is organizing a 2 day "IEEE Workshop on Intrapreneurship" on July 28 & 29, 2018 at Hotel Sterlings Mac, Bangalore. This workshop is for Industry Professionals working in large/medium industries, PSUs and R&D Organizations. I look forward to another top notch event.

All India Students-Young Professionals-Women in Engineering (AISYWC) 2108, themed "Aspire, Ideate, SYNchronize, Widen thoughts and Capture the Goal" is a flagship event of IEEE India Council, hosted this year by IEEE Bangalore Section at VVIET Mysore. AISYWC will be a 3 day event from Sep 28 to Sep 30, 2018. We are expecting more than 350 participants attending the congress. I appeal to all the sections to make this program a great success.

From the above-mentioned programs already organized during the last three months of this year and the programs which are forthcoming, the vibrancy of IEEE IC is amply evident. It is all due to active participation of IEEE volunteers from the length and breadth of the country. I appeal to all to keep up the good work.

With warm fraternal greetings,

Sivaji Chakravorti
IEEE IC Chair 2017-2018
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Start-ups – Founders Cardinal Rules

- Rule 1 - Founders will hire experts when required, rather than a DIY approach.
- Rule 2 - Customers will always pay for services and so will Founders.
- Rule 3 - Founders will work on increasing the transaction value and customer base.
- Rule 4 - Founders are in Business for Profits and not for Charity (free services).
- Rule 5 - Founders will use their network to grow their business.
- Rule 6 - Founders will have a clear strategy supported by realistic financial goals and exit valuation.
- Rule 7 - Founders invest in good mentors to guide them in their business.
- Rule 8 - Founders cannot change the world, though they can make it a better place.
- Rule 9 - Founders will operate with all leadership roles in the team (full time/part time).
- Rule 10 - Founders whose business is not profitable will sell out or close out.

Source & courtesy: [https://www.linkedin.com/pulse/startups-founders-cardinal-rules-dr-ls-subramanian-/](https://www.linkedin.com/pulse/startups-founders-cardinal-rules-dr-ls-subramanian/)



Message from Editor

H.R. Mohan, hrmohan.ieee@gmail.com

Dear readers,

We are happy to present the second quarter issue of India Council Newsletter (ICNL) for the year 2018. This current issue of ICNL in 72 pages has 13 articles (exceeding the last issue record of ten), along with few events reported by some sections and society chapters. We thank the chairs of the sections and the conveners of the events for sending the reports as per guidelines and IC Chair Dr. Sivaji and IC Secretary Dr Preeti for their coordination. However, it is noted that not all major and special events are reported for inclusion in the newsletter. It will be great if our request for activity reports are gets a better response. For the forthcoming issue, we hope the major activity reports from all the sections will be sent directly to the newsletter email id at ieee.icnl@gmail.com as per the guidelines published in the newsletter and also available at <https://goo.gl/DcVPmx>

Dr. Sivaji Chakravorti, Chair, IC in his message has given the highlights of the face-to-face IC execom meetings held at Pune, miniPOCO 2018 held at Visakhapatnam, WIE Symposium and the presentation of the "Late Shri Pralhad P Chhabria Awards" at Pune, "IEEE 5G Technology workshop" organized at Bangalore, International Conference on Smart Electric Drives and Power System held at Nagpur. While requesting for wider participation in the IC events -- "IEEE Workshop on Intrapreneurship" being held at Bangalore, All India Students-Young Professionals-Women in Engineering (AISYWC) 2108 planned at Mysore, he has thanked the volunteers for making India Council a vibrant OU of IEEE.

ICNL thanks the authors who have been very response for our request and contributed the following informative and interesting articles included in this issue. These articles relate to both technical and management aspects of interest to our members and readers. We look forward to similar contributions of articles from our members and readers in the forthcoming issues.

- Improving Computer Programming Competence: The Parikshak Approach by Dr. M. Sasikumar
- Managing Distress due to Dispersion and Diversity in Organizations by Dr. Sandhya Shekhar
- Energy Management Using Blockchain Technology by Mr. Venkat Kumar Tangirala
- Rainwater Harvesting – The Success Story of Chennai by Dr. Sekhar Raghavan
- The Art of Data Science by Mr. Krishna Balasubramanian
- Unmanned Aerial Vehicle - A Sky Boon by Dr. Ganesh Subramanian
- Deep Learning in Artificial Intelligence by S. Manikandan and Dr. M. Chinnadurai
- Agile, Cloud, Mobility, DevOps in Software Testing Career by Mr. Srinivasan Desikan
- Change Management: Two Questions to Ask When Responding to Change by Mr. G. Sankaranarayanan
- Emerging Education Patterns by Dr. C. Chellappan
- Next Generation DNA Led Analysis - Challenges and Threats by Dr. Amit Kumar
- Cognitive IoT Systems – the Future of IoT by Dr. Balamuralidhar P and Dr. Arpan Pal
- Atal Innovation Mission by Mr. R. Ramanan

We are happy to have published the following excerpts from books with the permission of the authors & publishers.

- Leading Science and Technology: Vision for the Future from the book Leading Science and Technology: India Next?
- Chapter Takeaways at a Glance from the book Industry X.0: Realizing Digital Value in Industrial Sectors

IT in Apr-Jun 2018 by Prof. S. Sadagopan, Director, IIIT Bangalore is a part of our regular column in ICNL and provides a broad overview on various important happenings in the IT and Telecom sectors in India. We are sure that readers will find the information and the related links provided in the column "Information Resources" compiled by the editor Mr. H.R. Mohan will be of interest to ICNL readers.

We have also included brief reviews of three books -- Leading Science and Technology: India Next?, Industry X.0: Realizing Digital Value in Industrial Sectors and Human + Machine: Reimagining Work in the Age of AI. We request the readers to make note of the call for participation announcements of events including the INDICON 2018 (at Coimbatore), WIE ILS 2018 (at Kochi) and get benefited.

ICNL thanks the various Internet sources, inshorts (<https://www.inshorts.com>) for the information nuggets and Mr. Sunil Agarwal and Mr Ajit Ninan for their thought provoking cartons.

IEEE Hyderabad Section Events

MiniPOCO - 2018



IEEE Hyderabad Section and IEEE India Council has continued its leadership role in conference organizing by successfully conducting the Fourth Conference Organizers Workshop on 20th May 2018 with support from IEEE Region 10, IEEE Meetings, Conferences and Events and other IEEE Indian Sections.

Over 70 participants joined from nearly every leading Indian city, representing many leading Academics institutes and Industries. This workshop was designed to serve the needs of the IEEE conference organizer through education, discussion, and access to experts. Emphasis was placed on some of the most important issues for conferences in the changing world, such as ethical practices, publication in IEEE Conferences and Journals and conference best practices. It is important to note that this is one of the largest volunteer led conference education activities across IEEE, and IEEE Hyderabad and India Council has committed to continuing this series on a regular basis. Uttar Pradesh, Gujarat, Kerala, Pune, Kolkata, Hyderabad, Bangalore and Delhi IEEE Sections partnered and supported miniPOCO 2018.

MiniPOCO 2018 was comprised of talks from experienced IEEE Conference Organizers and panel discussions with focused sessions and opportunity for participants to exchange ideas, success stories and challenges with other trained and experience IEEE Conference organizers. The program was designed to foster a sense of community and create a global support network. Programme dealt with dynamic issues associated with conference organizing with current challenges and themes selected to meet changing needs and advancements in technologies. The workshop discussed most important issues for the conferences in the changing world. Issues like Conference timelines, Conference finances and ethical practices, Publications in IEEE Conferences and Journals, Conference best practices were discussed.

This workshop discussed most important issues for the conferences in the changing world. Issues like Plagiarism, Publications in IEEE Conferences and Journals; Conference best practices were discussed during one-day workshop at Vishakhapatnam. Resource persons for this workshop were Kevin Hanft and John Tracy from IEEE MCE USA, Dr Lance Fung - Murdoch University, Dr SN Singh – Vice Chancellor- MMMUT, Deepak Mathur – ONGC Ahmedabad, Anil Roy – DAICT Ahmedabad, Atul Negi - University of Hyderabad, Amit Kumar - BioAxis DNA Research Centre Hyderabad, Maruthi Pathapati - Vidcentum R&D Hyderabad, S Lakshminarayana - NSTL and Jacek Zurada - IEEE CIS. This event was also co sponsored by Region 10 of IEEE and received appreciations from IEEE Region 10 and Conferences team in USA. Attendees felt satisfied participating in miniPOCO 2018 and marked positive feedbacks with a recommendation to organize such workshops for longer duration.

Glimpse from 2018 miniPOCO Vizag – More available at

https://www.facebook.com/pg/ieeehyderabad/photos/?tab=album&album_id=1749187411805994

Report by Dr Amit Kumar

Google announced 'Pie' as the name for Android 9.0 operating system. Android 9.0 Pie version includes AI-powered adaptive battery system and navigation system featuring a single home button, among others.

IEEE YP: Workshop on Data Science



IEEE Young Professionals, Hyderabad Section jointly with Sree Vidyanikethan Engineering College organized a workshop for young faculty on “Data Science” during 19-23 June 2018.

The workshop coverage included: Understanding the Data; Machine Learning Classification; Time-Series Analysis; Tools and Technologies for Data Science; Data Visualizations and Statistical Analysis; Big Data Analytics using Spark; Hands-on Training on Machine Learning Algorithms; Neural Networks; and Tensor Flow. The interactive and hands-on sessions were the highlights of the workshop.

All the participants expressed that the training in new foundational science, theoretical results, methods, applications and tools of data science was beneficial. Around 60 members participated in the workshop. The workshop came to an end with distribution of certificates, and feedback from participants in the valedictory session.

Report by: Mr. Saurabh Jain & Dr. S. Fahimuddin

IEEE YP Meet



IEEE Young Professionals, Hyderabad Section along with IEEE Vizag Bay Sub Section had organized the YP Meetup at Hotel Palm Beach Vishakhapatnam on 19th May 2018. The meet started with a presentation by Mr. Saurabh Jain, YP Chair highlighting about YP in general. Subsequently, Deepak Mathur, Dr. Lance Fung, Dr. Amit Kumar, Dr. Atul Negi and Dr. Vinit Kumar addressed the gathering about challenges and opportunities for YPs and briefed on various activities of IEEE which may help to mold the careers of professionals. There was discussion on how social media can help in grooming individual's career. Young Professionals of IEEE Hyderabad Section actively participated and shared their views in the event.

Defence Minister Nirmala Sitharaman launched the 'Defence India Startup Challenge' in Bengaluru recently, under which she gave 11 open challenges to startups for the defence sector's technological needs. The challenges include giving ideas and prototypes for see-through armours, development of 4G/LTE-based Local Area Network (LAN), laser weapons, and unmanned surface and underwater vehicles.

IEEE Madras Section Events

Launch of the book “Digital Circuits & Design, 5e”



IEEE Professional Communication Society, Madras Chapter, IEEE Computer Society, Madras Chapter, Computer Society of India, Chennai Chapter and Oxford University Press, India jointly organized a program on 9th Apr 2018 for the launch of the book “Digital Circuits & Design, 5e”, authored by Dr. S. Salivahanan, Principal, SSN College of Engineering, Chennai and Past Chairman of IEEE Madras Section & Dr. S. Arivazhagan, Principal, Mepco Schlenk Engineering College, Sivakasi. Dr. M. Anandakrishnan, Former Vice-Chancellor, Anna University & Former Chairman, IIT-Kanpur formally

launched the book and offered felicitation and highlighted the need for quality textbooks for use by the student community and the role of experienced faculty in authoring them. Following the book release, a presentation will be made by the authors Dr. S. Salivahanan & Dr. S. Arivazhagan on “Digital Circuits and Design – Inception” tracing the evolution of the subject and the inspiration in bringing out different editions of the book. At the beginning, Mr. H.R. Mohan, chairman, IEEE Professional Communication Society Madras Chapter welcomed the gathering and briefed about the activities of PCS and how it has encouraged authors in the past by organizing the launch programs. Dr. P. Sakthivel, Chair, IEEE Computer Society introduced the Chief Guest Dr. Anandakrishnan. by Ms. Swapna Arulraj, Sr. Project Editor (Higher Ed, Trade & Professional Learning), Oxford University Press, India spoke about the book and introduced the authors. At the end, Dr. Poonkuzhali, Chair, CSI Chennai proposed the vote of thanks. The book launch event was attended by about 125 participants comprising of students, faculty and professions.

National Technology Day with conference on “IoT Application”



IEEE Industry Applications Society Madras Chapter & IEEE Technology and Engineering Management Society Madras Chapter in association with L&T Smart World and Communication celebrated the “National Technology Day” with a Conference” on “IoT Application” on 11th May 2018 at Chennai L&T Construction HQ Campus.

The conference commenced with the inaugural session & lighting of digital lamp by the dignitaries. Mr. R Srinivasan, EVP & Head, Smart World & Communication (SW&C) and Vice Chairman, IEEE IAS Madras Chapter welcomed the delegates and set the context for the conference highlighting the significance of IoT and its impact on Industry and the Nation. He mentioned that the annual IEEE conference is organized by SW&C to celebrate 11th May as National Technology Day to mark India’s technological advancements.

In his keynote address, Mr. S. Rajavel, Sr. VP & Head, Water, Smart World & Communication and Chairman, IEEE-IAS Madras Chapter appraised the gathering, of various IoT initiatives adopted by his division at L&T and quantified the financial benefits in terms of increased efficiency due to savings in time.

Mr. H.R. Mohan, Chairman, IEEE TEMS Madras Chapter delivered a talk on the Digital Transformation which has become an imperative in the context of rapid technological developments, competitive environment for the enterprises and the growing urbanization scenario of the country.

Mr Lokesh Payik, Chief of Business-Digital Enterprise, Robert Bosch Engineering & Business Solutions, in his presentation showcased the benefits of Industry 4.0 - Flexible, Smart and Connected Industry and Manufacturing. The screening of a video demonstrating connected, smart and flexible lean manufacturing shop floor of the future was well appreciated by the audience. The session elaborated on digital supply chain, convertible equipment, shop floor management systems, predictive maintenance and adaptive testing.



Mr. S. Balaji Kasiram, Head-Digital (Technical), L&T Construction, enlightened the audience on IoT interventions L&T's construction business has adopted. A live case study of smarter decision-making, enabled through analytics from IoT devices installed to track performance of Plant and Machinery, equipment and workers, was demonstrated.

Mr. Kiran Kumar, Solution Architect from SW&C, L&T Construction highlighted how IoT is making our cities smarter. The various IoT based solutions like smart parking, solid waste management, public Wi-Fi, weather sensors, smart lighting and intelligent traffic management were explained along with their benefits to enhance the quality of life.

The event management was carried out digitally with free guest Wi-Fi facility, e-gate pass, e-registration desk, online feedback forms etc. As an innovation, digital tree plantation certificates were given as mementos to the speakers and dignitaries. This enables them to track the growth of the bountiful tree planted in their name through their respective certificate nos, It was widely appreciated by the IEEE members and the dignitaries.

The conference ended with the vote of thanks by Mr. N. Gunaseelan, Vice Chairman, IEEE TEMS, Madras Chapter. The conference was well attended by more than 130 delegates comprising of engineering students, academicians, research scholars, scientists, Industry professionals and IoT enthusiasts and was highly appreciated.

INDICON 2018

The 15th IEEE India Council International Conference (INDICON 2018) is being organized by the IEEE Madras Section during December 15-18, 2018, at Amrita Vishwa Vidyapeetham, Coimbatore, with technical support from the Indian Institute of Technology Madras.

With the theme of "Harnessing Technology for Humanity", INDICON 2018 promises to bring Together a tremendous and rich diversity of authors and participants from academia, research institutes, government and industry to share ideas and new perspectives on a wide range of topics in science, engineering and technology. INDICON 2018 will have interesting plenary sessions, thought provoking keynote addresses, knowledge enhancing tutorials, enterprising workshops, stimulating student paper contests, invigorating industry exhibits and stalls and very importantly, paper presentations of highest quality.

Conf. Homepage: <http://indicon2018.in>

Call for Papers: http://indicon2018.in/Assets/cfp_details.jpeg

Contacts: Organizing Secretary, Email: info@indicon2018.in Whatsapp: +91-7094929945 (after 1800hrs)

IEEE PES India Council Events

Tutorial on "Best Practices on Earthing System"



IEEE IC PES Chapter along with Silicon Institute of Technology, Bhubaneswar organized a one day tutorial on "Best Practices on Earthing System" on 27th May 2018 at Bhubaneswar. The tutorial was designed to discuss various issues related to earthing in safe and reliable operation of power systems. The topics discussed include:

- Philosophy, Design and Safety on Earthing System
- “Myths” and Mis (Concepts) on Earthing in Electrical
- Basics on Earthing System
- Case Studies on Safety Aspects for Earthing System
- Earthing: A Systematic Solution
- Solution for critical Earthing

The tutorial also held a panel discussion in which various practical issues related to earthing and their mitigation were deliberated by subject experts.

Mr. Sangram Keshrai Swain, Additional Secretary, Energy Department, Govt. of Odisha, Prof A K Tripathy, Chair, IEEE India Council PES chapter, Er. A K Das, Member, OERC, Prof. S K. Mishra, Director, SIT addressed the gathering.

The expert speakers at the tutorial included:

- Er. K.L. Sahoo & Er. P.K.Pattanaik, Experts from Inter-tech, New Delhi
- Experts from BRUHAT Engineering and Services LLP, Bhubaneswar
- Experts from Maa Sharda Structures & Suppliers Pvt. Ltd. Gwalior

The tutorial triggered lot of interest among practicing engineers. Practical demonstrations and case studies were liked by the participants.

The tutorial which attracted 113 registered delegates was sponsored by IEEE India Council PES Chapter (Technical), IEEE Bhubaneswar sub-section, IEEMA, Inter-Tech, New Delhi and BRUHAT Engineering and Services LLP, Bhubaneswar

Report by: Prof. Ashok Kumar Tripathy, tripathy.1948@gmail.com

Facial recognition software is set to be used at the 2020 Tokyo Olympic and Paralympic Games for the first time in the event's history. The system, provided by Japanese company NEC, will be used to identify over 300,000 people including athletes, volunteers, and media. The procedure will involve people holding a card with their facial data at security check points.

IT in Jan-Mar 2018



Prof. S. Sadagopan
Director, IIIT-Bangalore
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General

- European data privacy law GDPR kicks in on May 25, 2018
- Brexit Bill (that allows Britain to leave European Union) becomes a Law on June 26, 2018
- International Yoga Day on June 21, 2018 celebrated globally for four years adds to India's soft power
- India achieves 100% electrification on May 1, 2018 with all villages connected to the grid; getting electricity to 100% households would be the next challenge
- India's Defence public sector unit BEL starts operation in Vietnam in June 2018
- April 2018 saw North and South Korea brooking peace and Indian PM and Chinese Premier talk of cordial relations; US President Trump announces Iran nuclear deal on May 9, 2018 and meet North Korean President in June on June 12, 2018 and North Korea is reportedly giving up "go nuclear" path
- Several Government of India websites including Defence Ministry website saw a cyber-attack on April 6, 2018

Technology

- Indian Space organization **ISRO** launched IRNS 1I on April 12, 2018
- Flying car **Kitty Hawk Flyer** from **Google** with 20 mph speed, 20 min flying time and up to 10 feet high (needing no license) was demonstrated on June 4, 2018
- **India has 5 super computers** among the Top 500 list released on June 23, 2018
- **Google I/O** (May 8 -10, 2018), **Microsoft Build** (May 7 - 9, 2018) and **Apple WWDC** (June 4 - 8, 2018) demonstrated amazing technologies / products in the making; AI is at the center-stage
- **Microsoft** announces \$ 5 Billion investment in IoT
- **Delhi** vehicles run on **BS VI** fuel from April 1, 2018, two years ahead of plan to move by 2020

Markets

- **Microsoft** surprises everyone by buying **GitHub** for \$ 7.5 Billion on June 4, 2018
- **Wal-Mart** acquires 77% stake in Indian e-commerce start-up **FlipKart** on May 9, 2018 for \$ 16 Billion taking FlipKart value to \$ 20 Billion, making it the world's largest acquisition in e-commerce space
- Stockholm-based **Truecaller** acquires Indian payment start-up **Chillr** in India enabling Truecaller payment integration in India on June 13, 2018
- **Schneider** acquires Indian automation major **L&T Automation** division for \$ 2 Billion on May 1, 2018
- **PayTM** Bank gets ₹ 3,000 Cr. (\$ 445 Million) from **Softbank** on April 2, 2018
- Aneel Bhusri founded **Workday** buys **Adaptive Insights** for \$ 1.55 Billion on June 10, 2018
- French IT services company **Teleperformance** buys **Intelenet** for \$ 1 Billion in India in June 2018
- **HCL Tech** (India's No 4 IT Services company) buys German firm **H&D** on June 27, 2018

Products

- **Apple** announces **iOS 12**, **Watch OS 5** and **MAC OS Mojave** on June 4, 2018
- **Google** upgrades its flagship e-mail **Gmail** in April 2018, said to be a major upgrade since 2011; launches **Neighborly**, a hyperlocal app in India on June 25, 2018
- **OnePlus 6** launched in May 2018 in India crosses 1 Million sales within 22 days!

- **Nokia** released **Nokia 5.1**, **Nokia 3.1** and **Nokia 2.1** in Moscow on May 29, 2018
- **Huawei** (Huawei's most ambitious phone) and **Asus ZenFone Max Pro** (best value for money phone) were launched in India in April 2018

Indian IT Companies

- **TCS** posts good results for 3Q18; annual revenue for FY 2017-18 crosses \$ 19 Billion; market capitalization crosses \$ 100 Billion on April 23, 2018 and ₹ 7 Lakh Crores on May 25, 2018; announces buyback of Rs 15,000 Crores worth shares on June 15, 2018
- **Wal-Mart** acquires 77% stake in Indian e-commerce start-up **FlipKart** on May 9, 2018 for \$ 16 Billion taking FlipKart value to \$ 20 Billion, making it the world's largest acquisition in e-commerce space; **FlipKart** moves to its new campus in Bangalore with 8.75 Million square feet space to accommodate 7,600 staff
- **L&T InfoTech** joins **Billion Dollar club** in 2018 after crossing \$ 1 Billion turnover on March 31, 2018; opens **Johannesburg** facility with 250 seats in June 2018
- Ritesh Agarwal founded Indian room aggregator **Oyo** starts Chinese operations in May 2018 (earlier in Dubai, Malaysia, Nepal, Indonesia)
- **HCL** acquires **c3i** for \$ 60 Million on April 5, 2018; forms JV to acquire US-based **Action** (with the world's fastest columnar database product Action Vector) for \$ 330 Million in April 12, 2018
- NASDAQ-listed Indian IT Services biggie **Cognizant** enters the prestigious **Fortune 200 club** (at 195th position) on May 21, 2018; acquires Belgian Analytics & Advisory company **Hadera** on May 3, 2018;

MNC Companies in India

- **Analog Devices** expands India operations in April 2018 taking headcount from 450 to 1,000 in its new 1,75,00 sq. ft. facility in Bangalore; its Founder and Chairman, 83-year old EDA veteran **Ray Stata** visits Bangalore to launch the new facility, the third largest for the parent company
- **Benz India** rolls out 1,00,000th luxury car manufactured in India on May 28, 2018 while Suzuki rolls out 20,00,000th car on July 4, 2018!
- Chinese mobile major **Xiaomi** has 3 plants - Sri City, Sriperumbudur and NOIDA - in India with a capacity to produce 2 phones every second!
- **Apple** starts assembling iPhone 6S in India in Bangalore Wistron facility in April 2018
- **Automation Anywhere** (RPA biggie) to double India count and add 700 in Bangalore
- **Amazon** expands operations in India; warehouse headcount goes to 67 in April 2018
- **Uber Lite** (less than 5 MB) App with local Indian language support introduced in India in June 2018
- **Cisco** acquires **Julys Systems** in India in June 2018

Education & Research

- NIRF (National Institutional Rankings Framework) 2018 list of top ranking Institutions announced on April 2, 2018; IISc, IITM and IITB are the Top 3 Institutes. IITB (162), IITD (172) and IISc (190) make it to the Top 200 Global Universities in QS World University Ranking 2019 released on June 2, 2018
- This is the quarter for a range of Admission Test results; the "big daddy" amongst them, JEE Mains examination saw 11,48,000 students taking the exam in May with nearly 1,30,000 qualify to take JEE Advanced Exam held on June 4, 2018 with expanded list of 31,980 short-listed on June 12, 2018 (the list was 18,138 on June 4, 2018) for 10,988 seats across all 23 IIT's! NEET, the Admission Test for all medical colleges was held for the first time in all Indian States in May 2018 with 13,26,725 students competing for nearly 90,000 MBBS / BDS seats!

People

- On June 26, 2018 12-year old **R Pragganandhaa** from Chennai becomes the world's second youngest **Chess Grandmaster**
- **Debjani Ghosh** takes charge as **NASSCOM President** from R Chandrashekar on April 2, 2018
- Biocon Founder & Chair **Dr. Kiran Mazumdar Shaw** invited to join the Governing Body of **MIT** for a 5-year term starting July 2018
- Social activist and **Sulabh** International founder Dr. **Bindeshwar Pathak**, gets Japan's prestigious **Nikkei Asia Prize** June 6, 2018
- Chennai-born **Dhivya Suryadevara** anointed as **CFO of General Motors** on June 11, 2018; interestingly, GM has a woman CEO! Indira Nooyi, CEO of Pepsi Cola is another Chennai-born CEO of Fortune 500 corporation!

- Four self-made Indians - **Ola Founder Bhavesh Agarwal**, actress **Deepika Padukone**, Microsoft CEO **Satya Nadella**, and **Cricket Captain Virat Kohli** – make it to **Time Magazine 100 Most Influential People list** of April 2018

Telecom

- **Vodafone-IDEA** (the merged entity of Birla owned IDEA with Vodafone India) is close to a reality on June 18, 2018 with DoT clearance almost there; it will be the largest telecom service provider in India with 427 million customers
- **Bharti Infratel** merging with **Indus Towers** on April 25, 2018 making it one of the largest tower companies in the world, with 163,000 towers

Startup scene

- Indian hotel room aggregator **Oyo** has 100,000 rooms in its inventory by June 2018; Taj group has just 17,000, the power of technology!
- **Siemens** acquires Los Angeles based IOT / Building Automation Start-up **J2 Innovations** in May 2018
- **Hero** Electronix (Part of Delhi-based auto major Hero group) acquires Gurgaon-based IOT start-up **Zematix** in May 2018
- **ABB Technology Ventures** acquires Bangalore-based IOT-based Dairy Automation startup **Stellapps** on June 1, 2018
- **PayTM** buys **Cube26** in June 2018
- Scandinavian company **Truecaller** acquires Indian payment **Chillr** in India in June 2018
- India's online travel aggregator **ClearTrip** acquires Saudi startup **FlyIn** in June 2018

Interesting applications

- Dibrugarh in Assam becomes the **400th Railway Station** on June 7, 2018 to get **free W-Fi** as announced by **Google CEO Sundar Pichai** way back in in 2016; executed in partnership with the public sector **RailTel** the service has 8 million unique users every month, a "lighthouse" project indeed
- **E-Way bill** for inter-State movement of goods under GST launched in Karnataka on April 2, 2018, the first State to do so; by June most States have implemented the same, including for intra-state goods movement.
- HPCL commissions **FastLane** - automation of fuel pumps with payment systems - using AGS Transact technology at 35 petrol pumps in June 2018 in Mumbai to start with; cost of pumped fuel will directly debit bank accounts and minimize fuel diversion

Interesting numbers

- Government of India achieves **fiscal deficit target** of 3.5% for financial year 2017-18
- Automotive major **Maruti Suzuki** cumulative production in India of cars crosses **200 million** in May 2018!
- **India's forex reserves** touch \$ 425 Billion for the first time in April 2018
- Mobile wallet company **PhonePe** gets 100 million subscribers by May 2018
- Reliance **Jio**'s customer base touches 200 Million in June 2018

Professor Sowmyanarayanan Sadagopan is the Director of IIIT-Bangalore. He has been writing these columns since 90's with a focus in IT from an India perspective. These are his personal views. He can be reached at ss@iiitb.ac.in

These monthly / quarterly / yearly columns had appeared in Times of India, Financial Express for many years. IEEE India Newsletter also carries these articles regularly in the past few years.

UCLA researchers have developed an artificial intelligence (AI)-based device that can analyse data and identify objects at the "actual speed of light". To develop the device, they created a physical artificial neural network modelled on how the human brain works. The system identifies objects based on the light that the object reflects rather than waiting to form the image.

Information Resources



Compiled by

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eBook: The First Ten K R Narayanan Orations: The rapidly transforming Indian economy has thrown up a number of possibilities as well as several challenges with profound implications for India's vast population as well as globally. The K R Narayanan Oration Series at the Australia South Asia Research Centre in The Australian National University has been devoted to in-depth examination of this important issue by leading experts. The present volume collects the first ten essays in this series. Contributors include Dr Raja Chelliah, Dr U R Rao, Prof. Jagdish Bhagwati, Mr P. Chidambaram, Dr C. Rangarajan, Lord Meghnad Desai, Prof. Pranab Bardhan, Dr Vijay Kelkar, Dr M S Swaminathan, and Dr K. Kasturirangan. The essays cover a broad array of topics from various aspects of economic reforms, the political economy of India's development, the role of agriculture in India's food security and the role of space research in India's economic development. His Excellency Dr Narayanan and his successor as President of India, His Excellency Dr A.P.J. Abdul Kalam, have provided introductory messages to the orations. [Free Download](#)

eBook: The Moral Economy of Mobile Phones: The moral economy of mobile phones implies a field of shifting relations among consumers, companies and state actors, all of whom have their own ideas about what is good, fair and just. These ideas inform the ways in which, for example, consumers acquire and use mobile phones; companies promote and sell voice, SMS and data subscriptions; and state actors regulate both everyday use of mobile phones and market activity around mobile phones. Ambivalence and disagreement about who owes what to whom is thus an integral feature of the moral economy of mobile phones. This volume identifies and evaluates the stakes at play in the moral economy of mobile phones. The six main chapters consider ethnographic cases from Papua New Guinea, Fiji and Vanuatu. The volume also includes a brief introduction with background information on the recent 'digital revolution' in these countries and two closing commentaries that reflect on the significance of the chapters for our understanding of global capitalism and the contemporary Pacific. [Free Download](#)

eBook: Opening Government: Transparency and Engagement in the Information Age: Transparency and citizen engagement remain essential to good government and sound public policy. Indeed, they may well be the key to restoring trust in government itself, currently at an all-time low in Australia. It is ironic, then, that this has occurred at a time when the technological potential for information dissemination and interaction has never been greater. This book, "Opening Government: Transparency and Engagement in the Information Age", explores new horizons and scenarios for better governance in the context of the new information age, focusing on the potentials and pitfalls for governments (and governance more broadly) operating in the new, information-rich environment. Its contributors, a range of international and Australian governance academics and practitioners, ask what are the challenges to our governing traditions and practices in the new information age, and where can better outcomes be expected using future technologies. They explore the fundamental ambiguities extant in opening up government, with governments intending to become far more transparent in providing information and in information sharing, but also more motivated to engage with other data sources, data systems and social technologies. [Download](#)

FontCode: Hiding information in plain text, unobtrusively and across file types: By imperceptibly changing, or perturbing, the shapes of fonts, Columbia researchers have invented a way to embed hidden information in ordinary text, without the existence of the secret message being perceived. The method, called FontCode, both creates font perturbations, mapping them to a bit string, and later decodes them to recover the message. To ensure robust decoding when font perturbations are obscured, researchers introduced redundancy using the 1700-year-old Chinese Remainder Theorem, and were able to demonstrate that a messages can be fully recovered even with a recognition failure rate of 25% (and theoretically even higher). FontCode works with all fonts and, unlike other text and document methods that hide embedded

information, works with all document types, even maintaining the hidden information when the document is printed on paper or converted to another file type. While having obvious advantages for spies, FontCode has perhaps more practical application for companies wanting to prevent document tampering or protect copyrights, and for retailers and artists wanting to embed QR codes and other metadata without altering the look or layout of a document. [Full Post](#)

eBook: Global Water: Issues and Insights: This book brings together some of the world's leading water researchers with an especially written collection of chapters on: water economics; transboundary water; water and development; water and energy; and water concepts. [Download](#)

Amazon, Apple, Google, and Microsoft Battle for K-12 Market, and Loyalties of Educators: Dominant Players Revamp School Options for Digital Devices, Operating Systems, and Most Recently, Procurement. If there's a common thread that unites the rival technology giants Apple, Google, and Microsoft in the education market, it's this: They're big. The three major tech companies—along with Amazon, a relatively new player on the scene—go head-to-head in vying for big chunks of school business, most notably in sales of devices and operating systems, and they try to forge their own paths in others. At the same time, all of them are best known for their work outside education, through their sales to consumers, businesses, or both. [Full Post](#)

Huge List of 65 Computer and IT Certifications: Becoming IT certified in a specific skill or product is a way to prove that you have the necessary knowledge to perform a job in a given field or a job that uses specific technologies. Earning certification is a good way for computer science graduates and entry-level IT professionals to improve their resume. Employers often look at a candidate's computer and technology certifications in order to assess whether or not the individual is a viable candidate for a position. From Official Microsoft certifications to cyber security and Linux exams, Webopedia compiled this alphabetical list of different certifications related to computer technologies with a brief explanation of each certification and links to help interested learners find additional information. [Know them](#)

From AT&T To Xerox: 73 Corporate Innovation Labs: Innovation is critical for established companies to stay relevant in the face of disruption. Here's our list of corporate innovation labs. Corporate innovation is critical for established companies looking to stay relevant in the face of disruption from up-and-coming start-ups. With industries being unbundled left and right (supermarkets, banking, cars — just to name a few) more companies are opening up in-house innovation labs every day. Sometimes corporate innovation goes wrong, and we've written about corporate innovation theater before. Now here's our list of innovation labs, both newly formed and well established, working to turn new ideas into new opportunities at long-lived companies. [Know these innovation labs](#)

Informatics for information professionals: Are you a librarian or other information professional (or soon-to-be) who's comfortable with numbers? If so, you might want to take a serious look at the growing career path of informatics. Although it's already become a key driver in the medical and healthcare industries, the use of informatics is now also providing decision support in law firms, libraries, corporations, government agencies, and pretty much any organization able to gather and make use of data. In fact, notes Brad Rogers, LibGig Director of Recruiting, "An increasing number of employers are looking for informatics and other data-analytics skills across all industry verticals as companies rely more on data for decision support." [Read the full story](#)

What is a data scientist? A key data analytics role and a lucrative career: Data scientists are responsible for discovering insights from massive amounts of structured and unstructured data to help shape or meet specific business needs and goals. The data scientist role is becoming increasingly important as businesses rely more heavily on data analytics to drive decision-making and lean on automation and machine learning as core components of their IT strategies. Becoming a data scientist varies depending on industry, but there are common skills, experience, education and training that will give you the leg up in starting your data science career. [Read the full post](#)

AICTE & NPTEL sign MOU to recognise NPTEL MOOCS as FDPs for faculty promotion under CAS: Copy of the agreement/MOU is at https://www.aicte-india.org/sites/default/files/MoU_NPTEL_AICTE.pdf
Notification from AICTE and the details reg. NPTEL courses is at <https://drive.google.com/file/d/1BLdGg2Yz4f1MGTFqVCyvO1JireESdt8s/view?usp=sharing>

Mr. H.R. Mohan, the author of this column, Information Resources, on a regular basis, once in five days publishes blog posts on "interesting Reads" – a compilation of informative and interesting resources. You can access these posts at <http://infoforuse.blogspot.com> Further, these posts are also sent by email to the members of the google group – scitech-trends@googlegroups.com If you are interested in joining, you can send an email request for inclusion in the google group, to hbmohan.ieee@gmail.com

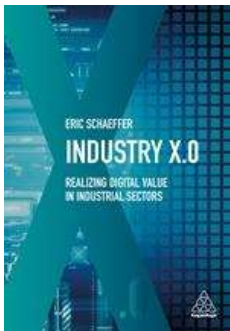
Book Reviews



Leading Science and Technology: India Next?

Author: Varun Aggarwal, Co-founder, Aspiring Minds. Publisher: SAGE India. Edition: 2018. Paperback Pages: 312 Price: INR 595

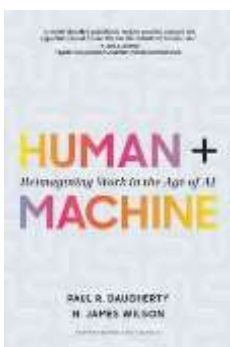
In a world buzzing with artificial intelligence, gene therapy, 3-D printing, and brain implants, where does India stand? India is not yet a front-runner in creating new knowledge and world-changing inventions. India does not even feature among the top 10 countries in scientific research. In this book, the author with hard facts and plenty of personal anecdotes argues that India would risk its economic progress, technology industry, and social development if it does not lead in research and innovation. He deliberates on how we can make India a leader in science and technology and uses a data-based approach to highlight the various limitations of India's research ecosystem. He demystifies how discoveries and inventions happen through stories and personal experiences. The book provides concrete, well-reasoned steps to build a "Scientific India." This is essential for India's success and for serving the cause of human progress. The author, after identifying the issues on why India is weak in science and research base, provides potential solutions. We are happy to inform the author and the publisher have given permission to publish the chapter 10 -- "Leading Science and Technology: Vision for the Future", of this book in full in two parts. The 1st part appears elsewhere in this issue. This book is a must read by all researchers and policy makers.



Industry X.0: Realizing Digital Value in Industrial Sectors

Author: Eric Schaeffer. Publisher: Kogan Page by Redline Verlag, Münchner Verlagsgruppe GmbH, München, Germany. www.redline-verlag.de Edition 2017. Hardcover. Pages: 192. Price: \$34.95

This book (Industry X.0) takes an insightful look at the business impact of the Internet of Things movement on the industrial sphere. The author combines deep analysis with practical strategic guidance, and offers tangible and actionable recommendations on how to realise value in the current digital age. Based on extensive research and insights into the six core competencies that have been identified by Accenture, It explores critical aspects of the Industrial Internet of Things (IIoT), discussing and defining them in an engaging and accessible manner. These include managing smart data, handling digital product development, skilling up the workforce, mastering innovation, making the most of platforms and ecosystems, and much more. Meticulously researched and clearly explained, this book makes a stringent case for companies to actively shift mind-sets away from products, towards services, value and outcomes. Complemented by a wealth of case studies and real world examples, it provides invaluable, practical 'how-to' advice for business organizations as they embark on their journeys into the era of the IIoT. We are happy to inform the publisher has given permission to publish the concise summary of takeaways of its nine chapters and the same has been published elsewhere in this issue.



Human + Machine: Reimagining Work in the Age of AI

Authors: Paul R. Daugherty & H. James Wilson. Publisher: Harvard Business Review Press. Edition: 2018. Hardcover: Pages: 264. Price: \$32.00.

In this book (Human + Machine), the authors, Paul R. Daugherty and H. James Wilson, the leaders from Accenture show that the essence of the AI paradigm shift is the transformation of all business processes within an organization--whether related to breakthrough innovation, everyday customer service, or personal productivity habits. As humans and smart machines collaborate ever more closely, work processes become more fluid and adaptive, enabling companies to change them on the fly--or to completely reimagine them. AI is changing all the rules of how companies operate. Based on the authors' experience and research with 1,500 organizations, the book reveals how companies are using the new rules of AI to leap ahead on innovation and profitability, as well as what you can do to achieve similar results. It describes six entirely new types of hybrid human + machine roles that every company must develop, and it includes a "leader's guide" with the five crucial principles required to become an AI-fueled business. It provides the missing and much-needed management playbook for success in our new age of AI. The authors believe AI will cause disruption, and many people will need education, training and support to prepare for the newly created jobs. To support this need, they are donating the royalties received from the sale of this book to fund education and retraining programs focused on developing fusion skills for the age of AI.

Improving Computer Programming Competence: The Parikshak Approach

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Programming competence: challenges

There are a number of concerns about the quality of students coming out of our engineering and MCA colleges, in the area of information technology or computer science. Lack of programming proficiency is one of the major ones. Ability to design and implement a computer program is a key competence required of an IT professional. He/she should also be able to debug a given program and get it working as per the specifications.

This is important for many reasons. The basis of the IT and CS fields is programming a computer to do a given task. Even if one is looking at higher level tasks like design, architecture, etc., a strong foundation in programming is a must to do these well. Tasks like testing and debugging is also very hard without this base.

Usually when programming languages are taught, the focus is on the language features, and covering as many intricate constructs of the language as possible. So, a C programming student is expected to understand what `**(a+b)` and the like means, no matter if any sensible programmer is likely to write such code. Students can give some kind of responses if asked what a particular construct does, but are lost in recognising the right use of such constructs in a program, or in writing a program using that construct. In our interviews, I used to ask students short programming problems like counting number of 0s in an array, finding length of a string, etc. I had named them 20-20 problems taking a cue from the game of cricket. The core of such programs is just 2-4 lines of code. Very few students are in a position to even attempt such programs, and fewer still can produce a sensible code.

Programming needs to be taught as problem solving in courses. Programming constructs, libraries and the like are to be introduced as tools for solving problems. This is rarely done, with the stress on the features and intricacies of the language, with the result that students know the language constructs, but find it difficult to use them correctly in their programs. The places where students learn to code are the programming labs.

Programming labs in colleges

Most college programs, say BE/ME/MCA include programming labs. Sometimes these are co-located with the corresponding theory course, and sometimes, one is left to learn a language only using a lab course. These lab courses are meant to achieve the capability of writing programs for given problems using a specified programming language. However, this objective is rarely achieved for multiple reasons. The labs are usually of a fixed duration with everyone crowding around. The teacher will get very limited time to look at each student's work and assess it systematically. Beyond the lab time, the work is accessible neither for the faculty nor the student. The challenges of mass copying are, well, the less said the better.

Assessing a program provided by a student is not a trivial task. Ideally the teacher has to:

- compile the program and check for basic errors,
- run the program with adequate number of test cases to see if it is working as expected,
- check the quality of the code (layout, use of variables, etc), and documentation,
- and preferably check the efficiency of the algorithm used in terms of time and space.

Over and above this, if the problem involves UI design or external interfaces, then additional checks for these are also required to be done.

All these are too difficult to carry out effectively within the limited lab hours. Without regular and continuous assessment and feedback, the labs are of limited use in teaching/learning effective programming practices.

What is Parikshak?

It is in this context, we would like to introduce a solution (actually, more of an approach) called Parikshak to help in this. Parikshak is a system designed and implemented and actively used at NCST, the predecessor of CDAC Mumbai, from late 1980s!! NCST faculty recognised the need for programming competence from then, and ensured that every student coming out of their training programs possessed this competence.

Parikshak, the software system which supported this, is essentially a program grading system. It has a simple editor which the user can use to write programs, and when ready, it can be submitted to grading. The grader evaluates the program against a number of pre-set test cases, and reports how many cases the program ran correctly, and how many failed. The user can revise the program and resubmit, repeating this cycle any number of times, till the time allocated for that problem is over, or he is satisfied whichever is earlier. See figure 1.

A registered teacher can create questions and exams, enrol students, and monitor the test while in conduct as well as after the exam. See figure 2. Students version of code is maintained every time a submit is made, enabling the teacher to track the student's development of the solution. The system offers logins for students to check their status, and to take any exam assigned to them.

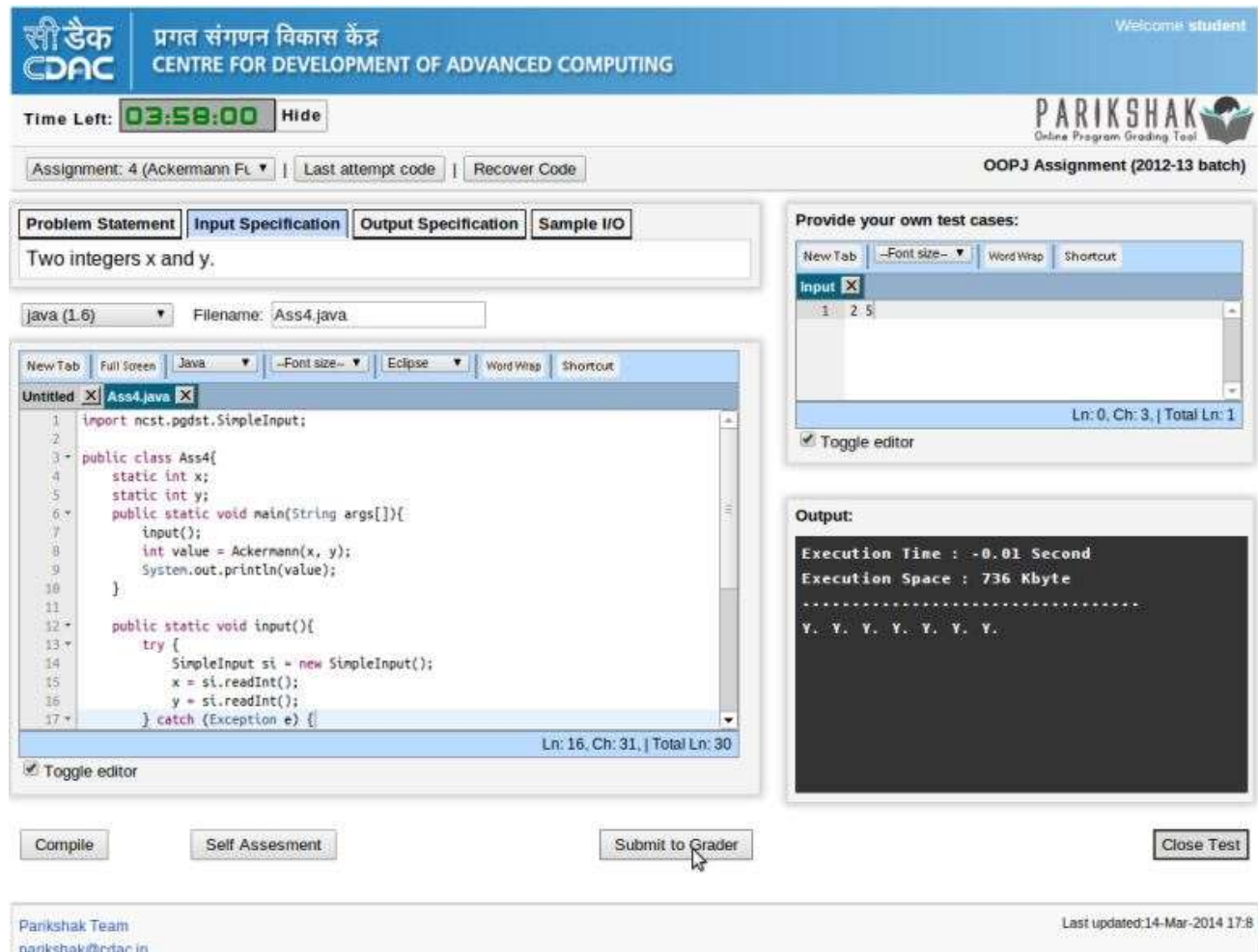


Figure 1: Student Interface

The system which commenced as a set of shell scripts in the late 80s at NCST – remember there was no GUI or Web then -- has evolved over the years into a comprehensive web based system with rich features today, as the figures show. Recommended mode of usage is to access it on the web from the URL parikshak.in (requires a license), from any computer or tablet running any standard web browser. No machine specific installation is required. Where Internet access is a constraint, an option to setup a local installation over campus LAN is also available.

The web based version has been in operation only for a few years, mostly in silent mode though, with hardly any publicity. As of now, the portal has over 8000 registered users from over 70 organisations including a few companies and many academic institutions. About 100 questions are available open to all. Taking note of the suggestions from many of our users, and friends who have gone through Parikshak based examinations with us, we are now opening up the system to interested organisations.

HOME | QUESTION | TEST | PROFILE | GROUP | PENDING REQUEST | RESULT | LIVE MONITOR

PARIKSHAK
Online Program Grading Tool

Question Type: ☒ General ☐ Debugging ☐ Snippet
Category: Other

Accessibility: PRIVATE
O/P Filter: Trim whitespaces

Problem Statement
Name Based Friendship Compatibility

We have been asked to develop a facebook application which decides friendship compatibility between two users based on their first names on facebook. The core program behind this application needs to count number of character differences in the two given names.

Now, you have to write this small program to count number of character differences given two first names.

Faculty Code
CharDifference.java

```

1  import java.io.IOException;
2  import java.util.Scanner;
3  import java.io.BufferedReader;
4  import java.io.InputStreamReader;
5  import java.util.Scanner;
6  import java.util.Scanner;
7  import java.util.TreeSet;
8
9  /**
10   *
11   * @author: prakash
12   */
13  public class CharDifference {
14
15      static int difference(String string1, String string2) {
16          int diff = 0;
17

```

Input Specification

Two strings separated by a space

Output Specification

Number of character differences (not common characters) as an integer

Sample Input/Output

Input

Max Execution Time
00 : 10 (min : sec)

Search Tags
character,
string

Please Provide Test Cases:

1 2 3 4 5 6

Testcase1:
jagdish tomy

Hint:
Level:

Submit Cancel

Figure 2: Teacher creates a question

Parikshak approach

Around this system, an approach to use it has evolved keeping in mind the issues mentioned above. Given the tendency of the students to directly start typing code in an IDE, when given a problem to solve, our approach enforces a ‘thinking’ or ‘writing’ phase where the student has only pen and paper, and is expected to study the problem in detail, create an approach, decide the key elements of the solution and build up test cases. Students who use this phase effectively have a higher chance of completing the problem well. Since IDEs provide shortcut to many tasks, often students lack an understanding of what is happening behind. I am reminded of one student who in an interview said “press F9”, when asked how do we compile a C program. So, we advocate working without IDE when learning to program.

To prevent students from altering the program according to specific inputs, Parikshak does not reveal the input cases used for testing the program. However, users are allowed to create their own test cases, and test their solution before submitting. This is meant to encourage careful planning and design of test cases when working on a problem.

As mentioned above, checking a program for correctness involves multiple aspects and is time consuming. Parikshak resorts to a test-case based comparison of outputs in this regard. Teachers create a set of test cases (5-8 per program is recommended) and load them in Parikshak (See figure 2). While preparing the test cases, teachers should minimise guessing opportunities, and ensure that as wide a variety is followed covering boundary cases also. Teachers are also

required to write the correct or master program. Apart from providing a base for comparison, this will help teachers to get a realistic estimate of the time and effort required to build the solution.

Comparing outputs of two programs has its own challenges. Minor changes in output format – inserting a blank, putting a prompt, etc – can make simple comparison fail. A two-pronged approach is adopted to address this problem. On one side, additional filters are provided to make the comparison proper on a problem to problem basis. These include remove white space, trim white space, substring finding, etc. On the other side, we instruct teachers and students to stick to specification with respect to output.

A bunch of such guidelines go to define the Parikshak approach. More details of this were presented in the T4E conference in 2010 at IIT Bombay [1].

Students find the Parikshak style challenging, primarily because they never are required to approach a problem from statement to complete working solution in one go. And usually debugging a program is a highly ignored component in labs. Students are often tempted to redo the program from scratch than debug a program. Putting time limits prevent this to some extent.

Using Parikshak to address the problem

Colleges

For colleges, Parikshak can provide an effective way to organise the programming labs. Parikshak portal already has a lot of programming problems; many of them are freely usable. (Teachers creating a problem have the option of making it open to all, or keeping it private). A set of problems can be selected at the beginning of the term, and enabled as an assignment or exam, for the specific students. Teachers can also create new problems as per the syllabus and add them. Students can now attempt them as per their choice, whenever and wherever they like.

SE : Run time error in student code
FE : Run time error in faculty code

Student: 130840320042

Test Name: DAC (2013-08) Tree Assignment III

Test Result: 5 / 8

Test Type	No of Problems	Start Date	End Date	Duration	Attempt Limit	Attempt
ASSIGNMENT	Show Problems	10 Sep 2013 (17:22)	21 Sep 2013 (20:30)	03:00 (hh:mm)	40	13

Pass:
Fail:
Not Attempt:

Attempt: 1Time: 10-09-2013 20:16IP: 202.141.152.17Attempt Result: 0 / 8

Attempt: 2Time: 11-09-2013 17:34IP: 202.141.152.17Attempt Result: 0 / 8

Attempt: 3Time: 11-09-2013 20:48IP: 202.141.152.17Attempt Result: 1 / 8

Question	Compilation	Language	Test Case Result	Result	Source	Time (Sec)	Space (Kbyte)	Submit Time
Determine whether Family Tree relation exists or ...	true	C++	X Y X X X X		View	0.01	4496	11-09-2013 23:36
Construction of a Family Tree	true	C++	Y Y Y X Y		View	0.01	4492	11-09-2013 22:22
Assignment 12: Tree Inorder/Preorder print	true	C++	Y Y Y		View	0.01	4437	11-09-2013 22:20
Assignment 12: Tree Inorder/Preorder print	true	C++	Y Y Y		View	0.01	4448	11-09-2013 22:19
Construction of a Family Tree	true	C++	Y Y Y X Y		View	0.01	4496	11-09-2013 21:57
Construction of a Family Tree	true	C++	Y Y Y X Y		View	0.01	4492	11-09-2013 21:42
Construction of a Family Tree	true	C++	Y Y Y X Y		View	0.01	4488	11-09-2013 21:36
Construction of a Family Tree	true	C++	Y Y Y X Y		View	0.01	4492	11-09-2013 21:35
Construction of a Family Tree	true	C++	Y X X X Y		View	0.01	4488	11-09-2013 21:34
Construction of a Family Tree	true	C++	Y Y Y X Y		View	0.01	4488	11-09-2013 21:28
Construction of a Family Tree	true	C++	Y Y Y X Y		View	0.01	4496	11-09-2013 21:24
Construction of a Family Tree	true	C++	Y Y Y X Y		View	0.01	4496	11-09-2013 21:21
Construction of a Family Tree	true	C++	Y Y Y X Y		View	0.01	4496	11-09-2013 21:21

Attempt: 4Time: 12-09-2013 12:03IP: 202.141.152.17Attempt Result: 1 / 8

Attempt: 5Time: 12-09-2013 14:57IP: 202.141.152.17Attempt Result: 0 / 8

Attempt: 6Time: 12-09-2013 20:42IP: 202.141.152.17Attempt Result: 0 / 8

Attempt: 7Time: 12-09-2013 21:59IP: 202.141.152.17Attempt Result: 0 / 8

Attempt: 8Time: 13-09-2013 15:33IP: 202.141.152.17Attempt Result: 1 / 8

Attempt: 9Time: 13-09-2013 21:10IP: 202.141.152.17Attempt Result: 1 / 8

Attempt: 10Time: 14-09-2013 17:26IP: 202.141.152.17Attempt Result: 1 / 8

Figure 3: Detailed student log for a teacher

Teachers can monitor the activity online (while the lab is on) or offline, and find out what problems are being attempted mostly, or rarely, and common problems or mistakes people make. This can be used to plan effective discussions in the class, including specific feedback. At the end, the teacher can get a complete record of the student's activity in the term (See figure 3), and this can be used to decide the grades in a transparent way. Overall, this approach can significantly enhance the lab experience for the students and the teachers.

Individual

Currently Parikshak supports individuals only through an institution. However, work is on to allow individuals to register and practice programming. This will allow interested students to practice programming as problem solving, for a variety of problems. They can reuse code from session to session, access previous solutions, and get test results on their code, without depending on the teacher's presence.

Going further

As teachers, students, and employers in the space of IT, we are concerned with the quality of learning of students. Of particular concern, is the ability to build working programs effectively. We feel Parikshak or tools with similar functionality can go a long way in improving the "programming as problem solving" capability of our students. It is best to run your programming labs under the Parikshak environment as mentioned earlier. Parikshak is available at a nominal cost from CDAC Mumbai.

References

[1] A methodology for enhancing programming competence of students using Parikshak, Rane-Sharma, A.; Sharma, C.; Raman, R.K.V.S.; Sasikumar, M. International Conference on Technology for Education (T4E), 2010, July 2010.



About the author: Dr M Sasikumar is currently Director of CDAC Mumbai. He has been with CDAC since 1987 after completing his BTech from IIT Madras. He completed his Post-graduation from IISc, Bangalore and Doctorate from BITS, Pilani. His areas of interest are Artificial Intelligence, and Educational Technology. He has co-authored two books, one is with Prentice Hall on Parallel Computing. 6 students have completed their PhD under his guidance. He has initiated and nurtured a number of projects in the area of AI and E-learning during his career. He has over 100 publications so far. He is programme committee member in a number of international conferences, member of Board of Studies and advisory board for select institutions. He is fairly active in social media like Facebook, LinkedIn, and Research Gate..

Zero-Carbon City

There are 10 principles that are proposed to create an **eco-city**. The developers of Dongtan have used them in order to create a carbon-free city.

- Revise land use priorities -- Create green, and safe mixed communities
- Revise transportation priorities -- Favour foot, bicycle, cart and transit over auto
- Restore damaged urban environments
- Create decent, safe, and economically mixed housing
- Nurture social justice and create improved opportunities
- Support local agriculture -- Create community gardens
- Promote recycling and resource conservation
- Work with businesses to support ecologically sound economic activity
- Promote voluntary simplicity
- Increase awareness of the local environment

Source & Courtesy: https://en.m.wikipedia.org/wiki/Zero-carbon_city

Managing Distress due to Dispersion and Diversity in Organizations

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Abstract

Two significant phenomena are having an impact on almost all organizations across the world. The first is the geographic spread of the business foot-print (either on account of globalization or deeper penetration into local markets) and the second is virtualization or the performance of business activities through the virtual medium either on account of the dispersion of organizational activities or on account of the push towards online business models. The demands on managers in these new age organizations are multifarious and call for an order of magnitude increase in the level of dexterity to anticipate issues and optimize performance. Strangely the tools used have not changed very much and organizations are managing more by intuition and individual expertise rather than by re-calibrated methodologies and proven frameworks that have a higher probability of reducing risk and ensuring success in a highly dynamic environment. The article provides a glimpse of a few conceptual frameworks that have been evolved after extensive research across many organizations. These can be customized and deployed in the context of any business regardless of its size or domain. The article highlights the fact that there is too much at stake for organizations to attempt to survive in this new milieu merely through trial and error. Success needs to be anchored on tools and techniques that are reliable, just as potential failure needs to be flagged through structured, early warning mechanisms.

Introduction

Not too long ago an organization (let us call it the ‘Good Old Organization’ or GOO) meant one big homogeneous work group, with usually a father figure as the head of the organization, clear hierarchies, work culture and practices as determined by the leadership, a preponderance of a certain geography in which the company would operate, a single dominant language of communication among most employees, and customers that you could actually see and talk to. Not anymore. Today organizational dispersion has become a norm. What is more, an organization is no longer one single organization. Often it is a clutch of organizations working together to deliver a solution through a combination of products and services. Cost and quality being the primary determinants of survival, organizations have necessarily got to resort to geo-sourcing. They collaborate with supply chain partners, based entirely on business interests, regardless of their geographic origin. Since all these dispersed physical entities have to work together to deliver business results, they necessarily have to be virtually linked. And thus the Virtual Organization (VO) is now a reality.

It is not physical dispersion of the value chain alone that has led to the virtualization of the Good Old Organization. The primary mantra for organizations has been growth. While charting the course for such growth, organizations have not restricted themselves to “known territories”. They have relentlessly pursued market opportunities with an explorer’s zeal, regardless of the geographies they are in. The pursuit of global opportunities and the need to scale up rapidly through new collaborators and partners has seen an exponential increase in the geographic spread as well as the levels of heterogeneity within organizations. Organizations are also constantly looking to forge alliances with other businesses based on their geographic presence and knowledge of local markets, besides increasing their own foot-print in new markets, leading to both organic and inorganic growth. In this massive outreach to the customer, they have reached out both physically and virtually. The virtual outreach has most often out-paced its physical counter-part. Businesses are fiercely competing with each other to increase their online presence in pursuit of additional market share. Therefore the virtualization of markets is also driving geographic dispersion! This has resulted in organizations becoming a lot more heterogeneous as compared to the largely homogeneous structures that were predominantly the characteristic of the GOO.

In a number of ways, a Virtual Organization (VO) is **The Great Equalizer**. Technology has enabled even small start-ups in developing nations to have the reach and resources that are comparable to large conglomerates. Success in such an environment is no longer predicated on the quantum of resources and infrastructure alone, but by the manner in which these new possibilities in a physically dispersed but virtually interlinked world are being intelligently leveraged. On the other hand, the phenomenal power and potential of the VO has made brick and mortar giants quickly chart out their virtualization strategies for rapid growth. A recent example is that of Walmart that ceded its business in UK to acquire a virtual pure-play like Flipkart in India, with the objective of quickly capturing market share in developing markets.

With dispersion comes diversity. Most organizations today have suddenly grown into a potpourri of multiple cultures, capabilities and practices. They are spread across multiple geographies with people speaking different languages and having different management styles. With decentralized structures, hierarchies have blurred. The customer cannot necessarily be “seen” but can be “heard” loudly and rapidly through the virtual medium and social networking sites. The

pace of business has moved from being a comfortable trot to being a relentless gallop. The GOO has rapidly metamorphosed into the brave new VO. But have management techniques kept pace? Has the management in these new age organizations seamlessly shifted gears to cater to the demands of the new model or are they struggling to cope by trial and error?

Extensive interactions with a cross-section of organizations have revealed that they appear to be grappling with similar questions. Is there some way CEOs and CFOs can scientifically predict if a foray into a new geography is going to be viable? If their organizations have already grown both organically and inorganically, are their tools available by which they can detect vulnerabilities? Do the levels of heterogeneity become counter-productive when they cross some threshold? How then would organizations balance this against the need to grow? Are there ways to measure and manage these differences? Are there ways by which CFO's can predict if things are going wrong much before the top-line or bottom-line patterns start emerging? Can such problems be diagnosed and fixed pro-actively? Do traditional brick and mortar organizations blindly jump into the online bandwagon? How much of virtuality is good for them? How do they decide what goes virtual and what stays physical?

Organizations seem to be managing businesses largely using traditional management techniques, perhaps with some tweaking here and there. Given the need to grow, distances and diversity are being managed by intuition rather than by structured models and methodologies. However this is often inadequate. For, in the VO, one has to manage not just the people to people interface but also the virtual interfaces with the associated imponderables as well. Success stories abound, as do unmitigated disasters! In recent years some in-depth research has resulted in the development of a gamut of frameworks and tools¹ to help managers find scientific answers to the questions voiced earlier. A brief description of a few (of the many) conceptual building blocks are shared below. These lay the foundation for organizations to create templates in the context of their specific organizations and develop virtualization strategies where risks could be assessed objectively and managed in a manner that increases the probability of success.

Understanding and Measuring Distances

In making that leap from the GOO to the VO, organizations find that they have to learn how to manage distances – not merely physical distance but virtual distances as well. Sustainability of competitive advantage in such dispersed organizational arrangements is going to depend not on cost considerations alone but on an organization's ability to operate seamlessly across multiple organizational boundaries. However, often, organizations focus almost entirely on bridging geographic distance, little realizing that geographic dispersion and the agglomeration of different entities having to work together gives rise to a whole host of other distances. The first step is to understand what kind of distances could potentially arise within an organization or between an organization and its partners. Conversations with business leaders revealed some of the distances that they have been dealing with in their organizations. These can be referred to loosely as Virtual Distances. Some of these are capability distance, cultural distance, organizational distance, trust, temporal distance, social distance and environmental distance. Several factors can contribute to each of these distances. Structured instruments are available for actually measuring each of these distances within and across organizational boundaries.

Understanding the VIPs!

It is one thing to talk about distances. One could argue, that it is quite another to figure out when, where and how these virtual distances are to be measured. In any physical distance, the location for measurement is quite clear. However, is it possible to identify appropriate location(s) while assessing virtual distances? After all, no organization is a monolithic homogeneous entity. As a first step it requires structural stability and tenacity while still affording the flexibility that a VO by its very definition is intended to facilitate.

The structure embodies the physical entities that combine to form the Virtual Organization. A VO entails inter-linkages across business locations that could be dispersed. The Primary Organizational Unit will be the organization that represents the core of the business activities. This will have virtual extensions into other units which might represent non-co-located facilities of the same organization or its suppliers or retailers or distributors or other value chain partners or geo-sourcing entities or customers or alliance partners or any combination of these depending on the manifestation of the virtual organization.

¹ These are available in the author's book 'Managing the reality of virtual organizations' published by Springer

The V.I.Ps (Virtual Interconnect Points), are quite literally and metaphorically very important, for they are integral to understanding and managing V.Os. The concept and its importance are explained below.

- Virtual Interconnect Points (or VIPs), are the points of interconnection between two or more dispersed physical entities of the virtual organization. These form the gateways between what could often be two very different or disparate organizations or organizational entities. These reflect points of high sensitivity to relative differences between the two sides.
- Identifying VIPs within an organization is relatively easy. If a business activity has moved from a physical interaction to a virtual interaction, or alternatively has been configured as a virtual one right from the outset, there is a strong likelihood of on-going interaction or exchange between two physical entities at either end of this virtual connection. Unlike in GOOs where the members are collocated and have a higher probability of having adequate working knowledge of each other, the extent of mutual knowledge may not be as high in virtual connections. Identifying these VIPs becomes the first step to managing this ambiguity and preventing potential problems.
- Across the VIP there are likely to be multiple types of virtual distances. As discussed earlier, these distances could be on account of various factors. For eg. A perceptible difference in knowledge and skill levels might lead to capability distance, a difference in management styles or business processes could lead to high levels of organizational distance across the VIP and so on.
- While there is likely to be homogeneity of factor characteristics within each side of the VIP, there is always a strong likelihood of heterogeneity across the VIP.
- Each VIP is likely to be characterized by a different set of distance factors that get manifested in each case.
- The success of the seamless working of the VO would lie in:
 1. Identification of all the possible VIPs of the V.O. These need to be prioritized based on:
 - a. Interconnections that are expected to have a very high virtual distance (on account of any one or more factors) across the VIP.
 - b. Criticality of the business function
 2. Identification of all the relevant distance factors across the prioritized VIPs
 3. Effective mechanisms to deal with the distance factors for seamless integration across the VIP.s

While the concept outlined above can be used as a generic framework for all types of virtual organizations, the VO strategy will need to be customized specifically in the context of each organization. Organizations will be able to garner better competitive advantage through better synchronization strategies across their VIPs.

Assessing the Robustness of the VO - The SoI

As the saying goes, a chain is as strong as its weakest link. It would appear that in the context of Virtual Organizations, the strength of the virtual linkages determine the sustainability and the longevity of the VO. Therefore, it would be useful to determine a measure of how strong these linkages are. We call this the Strength of Interconnect (or SoI). The SoI can be directly correlated to the sustainability of the linkage between two organizational entities that form the VO, which in turn depends on the degree of compatibility across the two sides of a VIP. Compatibility need not necessarily be only in terms of the extent of similarity across the VIP on each of the distance factors. Rather, it would be determined by the extent of synergy between the two. While similarity in multiple dimensions, especially on people, process and technology is important compatibility could be predicated on other aspects as well. As in the case of human relations, in an organizational context too, compatibility is more to do with alignment and synergy. The degree of compatibility can be seen as the ease or willingness of one side of the VIP to align itself with the other in order to make it a near-seamless interconnect. One of the key influencers of compatibility could be the directional dependence between the two sides of the VIP. A uni-directional dependence essentially means that one entity can function with a fair amount of independence, except during periods of interaction which may not be frequent. A bi-directional dependence on the other hand connotes a much higher level of interactivity between the two sides, a greater level of interdependence and therefore a more difficult proposition to manage in terms of ensuring higher levels of SoI. For eg. If the virtual extension is by way of a customer interface point, then the parameters on one side of the VIP are pretty much pre-determined and therefore inflexible. In such a situation, there is little control over the 'behavior' of members on one side of the VIP. The other entity viz., the service provider has to ensure all the necessary changes to ensure complete compatibility with the customers' requirement or expectation on the other side of the VIP, be it by way of technology pre-requisites, interface mechanisms, content or even behavioral patterns. Take on the other hand an organization setting up a new manufacturing unit in a different country. This would entail significant knowledge transfers across the locations. Distance factors like language and work practices, become integral to determining the relative ease or otherwise of accomplishing the desired outcomes. Soft factors like Trust and Cultural synergies or distances (as the case may be) and the propensity to adapt are being increasingly recognized by organizations as important factors that they need to take into account while working out their globalization strategies. The good news is that instruments are now available to objectively measure and assess these soft factors that were hitherto considered to be rather fuzzy and very often swept under the carpet.

A Framework for linking SoI to Distance Factors

It would be rather simplistic to assume an inverse correlation between virtual distance and SoI. The analysis and inferences need to be a lot more granular if this has to aid managerial decision making. Distance has to be viewed in conjunction with the ease and cost of bridging it. If the cost of bridging a distance exceeds the benefits that are likely to accrue out of the virtual association, then the business decision obviously needs to be revisited. In this context, it would be useful to classify the distance factors based on ease of explication. Some factors can be easily documented, with interventions being planned in a structured manner if required. Examples of these would be business process, technology usage, infrastructure, organization structure etc. On the other hand there could be factors that lend themselves only to a tacit understanding and it may not be easy either to quantify or explicate them unambiguously or plan interventions to bridge them. Examples of such distance factors would be culture, trust, motivational levels, management style etc. There could be other factors like Knowledge or Skill levels, where the classification itself could vary depending on the process maturity for managing knowledge asymmetries within organizations. Over a period of time some organizations develop and hone their ability to quickly address these asymmetries and distances rapidly. So while there could be one organization or business unit that classifies this as a factor with a high level of explicability, there could be another organization that could classify it as being low. Table 1 gives an indicative classification of a few of the distance factors. (This is not an exhaustive list).

Table 1: Indicative Classification of Some Distance Factors

S.N.	Distance Factor	Ease of Explication (Low/Medium/High)
1	Business objectives	H
2	Business Process	H
3	Technology	H
4	Organization Structure	H
5	Infrastructure	H
6	Knowledge Levels	M
7	Task orientation	M
8	Motivational levels	L
9	Management style	L
10	Trust	L

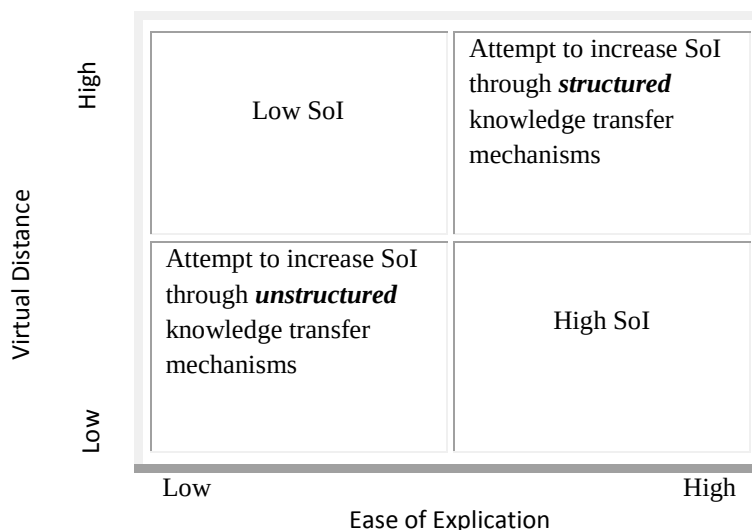


Figure 1: SoI Assessment Framework

As mentioned earlier compatibility across the VIP does not necessarily have a negative correlation with the degree of disparity or the magnitude of the distance factor. It is entirely possible that in a majority of the cases, especially those where the dependence is largely unidirectional in nature, one side can leverage the higher levels of factor maturity on the other side. For instance, if an organization is looking to forge an alliance to tap into high end expertise in another

organization in a niche area that is synergistic to its business, then the magnitude of the capability distance could actually have a very positive connotation. If the ease of transferability of this factor is high, then the SoI (or the Strength of Interconnect) can potentially be increased easily as well. The classification of the distance factors based on the ease of explication is useful because the higher the ease of explication, the higher the ease of transferability and alignment across the VIP. We can therefore arrive at the following framework (Fig. 1)

SoI would depend not only on the magnitude of the virtual distance but also on how easily or otherwise the distance can be bridged. Normally, it is easier to plan interventions to bridge distances in the case of factors that can be explicated easily. Technology can often be used very effectively to bridge such distances. If the distance factors are tacit and therefore fuzzy, the SoI would be lower. However organizations can evolve mechanisms and build channels to share unstructured information to create greater synergies across the VIP, provided the magnitude of the distance is not too high. An assessment of the feasibility and the cost of bridging the distance can aid managerial decision making. This could be used either before the commencement of a virtualization initiative to aid a go / no-go decision or for any mid-course corrections during the life of a project.

The stakes are high and expert judgment and intuition alone may not be sufficient to guide business decisions. Clearly the need of the hour is a robust bunch of tools, techniques, methodologies, triggers and decision aids that can help top management shift gears smoothly from the good old organization to the agile virtual organization¹.

¹These issues are addressed in the author's book 'Managing the reality of virtual organizations' published by Springer



About the author: Dr. Sandhya Shekhar's work focuses on helping organizations manage the challenges of growth and global dispersion whilst leveraging market and innovation opportunities. She also works with educational institutions in India and abroad, both in an advisory capacity as well as a visiting faculty. Her competency areas include IT driven Business Strategy, Knowledge Management, Virtual Organizations, Innovation and Entrepreneurship, Enterprise Solutions, Business Process Optimization, Software Engineering and E-learning. She has occupied various C-level positions in the last two decades. She has worked at the confluence of industry and academic fraternities helping to build and scale a vibrant innovation ecosystem, in her former role as the first CEO of IIT Madras Research Park. Earlier she has worked as Director, Asia Pacific Consulting, Gartner Inc.; CTO - BconnectB.com; Head, Knowledge Management Research - Aptech; and Group Consultant - NIIT. She is an alumna of IIM Bangalore and IIT Madras. An author of several books, papers and articles, her latest book titled 'Managing the reality of virtual organizations' published by Springer has received worldwide acclaim. She serves as an independent director on the Boards of Bimetal Bearings Ltd. and IP Rings Ltd., and also serves on several advisory boards.

Nothing Is Permanent In This Life

Whatsapp killed BBM
Youtube killed DVD
Bluetooth killed Infrared
Xender killed Bluetooth
CDs killed Cassettes
Android killed Windows phone
Uber killed Yellow Cab
Phone killed Post Office
SMS killed Letter Writing
Email killed Fax
Civilization killed Culture
Computer killed Typewriter
E-card killed Hallmark Card
Maggi killed Dawa Dawa
Money killed True Love
Internet killed Library
Google killed Dictionary
Wikipedia killed Encyclopedia

iToons

Sunil Agarwal & Ajit Ninan



The Times of India

Opp edit page

**No condition is permanent in this world.
Be humble**

Energy Management Using Blockchain Technology

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Intl. Business Development Lead for ImpactPPA Inc.

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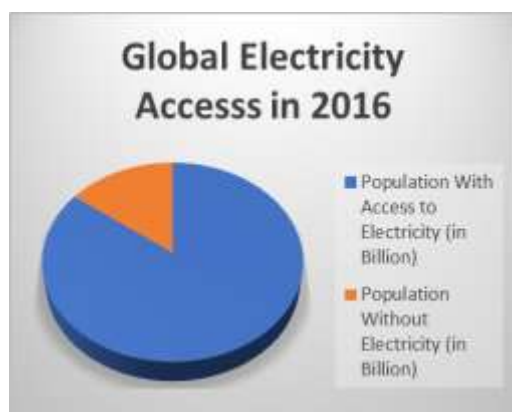
Electricity is one of the most important breakthroughs that science has given to mankind. It has become a part of modern life and it's hard to imagine a world without it. Electricity has played a vital role in rapid industrialization and modernization of humanity. Most aspects of modern day life rely on machines and equipment that are powered by electricity. To a larger extent, the world has been dependent on fossil fuels for the majority of our electricity production. In the last few decades, global energy consumption rates have grown at an exponential rate causing the extraction and burning of an unprecedented amount of non-renewable fossil fuels. The increased reliance on non-renewable fossil fuels has had many unintended negative consequences, most notably are the irreparable damages to earth's climate and elevated levels of pollution.

Universal Electrification by 2030

In September 2015, the United Nation's General Assembly adopted the 2030 Agenda for Sustainable Development that includes 17 Sustainable Development Goals (SDGs). Building on the principle of "leaving no one behind", the new Agenda emphasizes a holistic approach to achieving sustainable development for all. One of those goals is to Ensure access to affordable, reliable, sustainable and modern energy for all by the year 2030. What we need to understand in order to achieve this goal is:

- The task we have at hand, then
- Chart out a path to achieve the goal

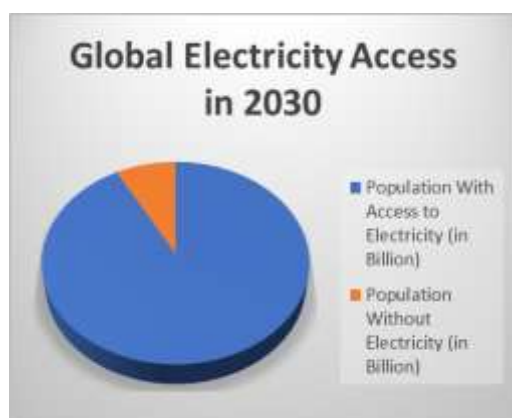
Understanding the task



According to the 2017 data sheet published by Population Reference Bureau, the world population in 2016 was about 7.46 billion. The same report estimates that the world population will be about 8.5 billion by 2030.

According to the Energy Access Outlook report published in 2017* there are still 1.1 billion people (14.37% of the world's population) without access to electricity. Out of those 1.1 billion people, a majority are from Sub Saharan region (590 million) and India (239 million).

* Energy Access Outlook published by the International Energy Agency in 2017



The IEA estimates that even by the year 2030, there will still be 674 million people living without access to electricity which will be about 7.93% of the world population in 2030.

What's alarming about those numbers is that 600 million out of the 674 million people without access to electricity will live in Sub Saharan Africa, majority of them in rural areas, while India will achieve universal electrification by 2022-23.

This estimate is based on the study of the implementation for the below factors in the most affected regions:

- Spread of electrification to newer areas via:
 - Newer mega power grids establishment
 - Acceptance of renewable energy as mini grids or off grid systems
- Modernization of old grids and equipment to curb transportation losses and improve efficiency, and
- Corresponding growth of population during the given time frame in urban and rural areas

The availability of electricity for everyone will no longer be the only metric used to measure the achievement of sustainable development goals by the year 2030. The UN has set more qualitative goals than quantitative ones.

In order to achieve sustainable development and inclusive growth of developing nations the UN believes that everyone on earth needs access to affordable, reliable, sustainable, and modern energy.

The Path Ahead

In order to achieve universal electrification by 2030 we need to create a multi-pronged approach:

- Increasing Power Generation by setting up newer mega, mini and off grid systems
- Better Energy Management for improved utilization of the power that we currently generate

Increased Power Generation

Mega Grids

Up until recently it was believed that mega power grids were the best and most efficient path to electrification of the world. A power grid, once in production, is able to provide energy to a substantial number of people, not just for personal use, but for industrial and commercial as well. But there are some glaring issues with using Mega Grids:

- **Its time consuming.** From planning, to building, and finally production - power grids of this size can take decades to start producing the power required to fulfill the needs of the local population.
- **Its costly.** To commission a power grid from scratch, the amount of money and land required, along with the resources needed to maintain and operate the grid, can cause the costs to run into the millions.
- **Its Polluting.** These grids are often run primarily off of fuel sources like coal, diesel, and/or gas, especially in developing countries. Running these Mega Grids on these fuel sources causes significant damage to the earth in the form air, water, and land pollution.
- **Resources guzzling.** Apart from the money and man power required to operate and run the grids, it is also putting extra pressure on the limited supply of non-renewable energy sources that we have left.

Due to the above stated issues, a mega power grid is not a sufficient to answer all electricity-based requirements in a swift, cost and resource efficient manner.

Decentralized solutions including mini and off grid systems

The major short fall of electricity is in non-urban, rural areas. The reason being is that centralized solutions like power grids and large-scale hydro lack the proper infrastructure to provide energy transmission to remote locations. Infrastructure like high tension power lines, power sub stations, transmission lines etc. are costly and historically inefficient. By using decentralized mini-grids and off grid systems we can reduce the need for substantial infrastructure, creating accessible and efficient energy solutions that can be utilized in the rural areas that are in need.

The implementation of mini grid and off grid systems, which are together considered as decentralized energy solutions, is crucial for bringing energy to the unreached and underserved. As technology costs continue to decline, off-grid and mini-grids systems are becoming an increasingly cost-effective solution in rural areas relative to mega grid extensions. As a result, over 20% of those who gain access to electricity by 2030 will do so from off-grid systems and 11% will do so from mini-grids, accounting for almost two-thirds of those living in rural areas who gain access.

Decentralized energy solutions alone are not enough to provide energy to all those in need. In order to reach all of the unpowered we need to increase efficiency, which is why we need better energy management system.

Role of Energy Management

To reduce the gap between the demand and supply of reliable, affordable, and clean energy, there is a need to be a plan to optimize the existing energy production and consumption in the world. The main objective of this energy management should be based on:

- Users to have permanent access to the energy they need
- Resource conservation
- Climate protection
- Cost savings

With a proactive, organized and systematic coordination of procurement, conversion, distribution, and use of energy, the above objectives can be achieved.

Energy management at its core is a challenge to systematize. We need to change the way we envision power grids and the way Energy Providers interact with consumers. The key to reducing the current gap between energy providers and consumers is to create a collaborative effort for streamlined and efficient energy delivery and consumption.

ImpactPPA and Blockchain by ImpactPPA

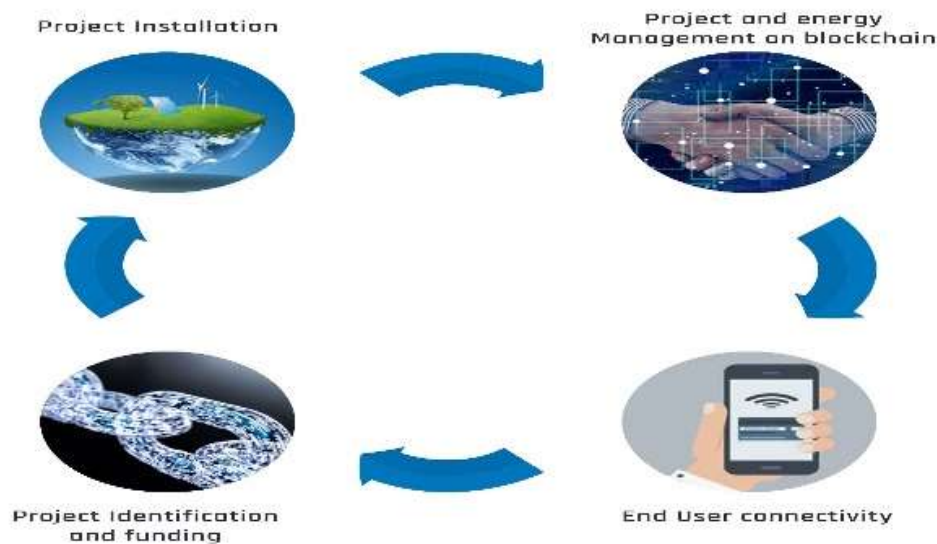


Fig: ImpactPPA is using Blockchain technology to promote access to renewable energy and enhanced energy management solutions.

ImpactPPA intends to shatter this bottleneck. We have developed a way to use the blockchain to empower the world, literally and figuratively. Our SmartPPA revolutionizes energy funding and dramatically accelerates the delivery of clean, renewable energy to the most remote regions of the globe. Tapping into the vast potential of the blockchain and cryptocurrencies, we disrupt and reimagine the energy project funding paradigm by decentralizing PPAs and eliminating layers of intermediaries between funding and consumption of energy. Blockchain, being a transparent system of record keeping brings in complete new synergies in the way records are kept and decisions are made using those records. The tools for accessing the platform are open and available for any project, anywhere in the world, and they are managed by the crowd.

ImpactPPA brings the power of blockchain and decentralized energy solutions where the need for clean energy solutions is most dire i.e. places where access to electricity does not exist, places where electrical power is inconsistent, places where electricity is expensive and places where companies and governments are migrating to clean renewable energy. ImpactPPA's innovative approach brings together capital and consumers in a way that is direct, responsive, and expedient. Apart from project funding, our platform also enables the consumers to purchase directly from the energy producer and hence removing all middle layers within the system.

Using Smart Contracts and a token-based, stake-weighted marketplace, ImpactPPA disrupts and reconfigures the current energy funding paradigm to provide governments, utility companies, municipalities, corporations, small businesses, villages and individuals with timely and direct access to clean renewable energy. Additionally, ImpactPPA topples the colonial system by empowering those who require energy and connecting them directly with those who fund the projects. Decisions on funding are taken out of the hands of the few at the top and instead distributed to the greater stake-holding community. The social impact that will result from ImpactPPA's toppling of an outmoded and unresponsive financial system cannot be ignored or over-estimated. For the first time, both the recipients of aid and the community that provides that aid will have a voice in the process.

The ImpactPPA Technology

Built on the Ethereum platform, we have created a decentralized energy platform using Smart Contracts and its energy protocol, the SmartPPA. The SmartPPA (Power Purchase Agreement or Personal Power Agreement) is the lynchpin of the system. It allows anyone, anywhere to create a proposal for a project of any size. The SmartPPA specifies the raw energy requirements of the applicant—whether it is an individual business owner who wants reliable energy to keep a factory running or a nation seeking to electrify whole communities. Upon execution of the agreement, ImpactPPA connects that applicant with the necessary funding for the project. That funding comes from the purchase of crypto assets by socially-conscious individuals who wish to make a difference in the world. The Token-holding community defines the merit of each project and facilitates the execution of the approved SmartPPA. The technology solutions required for a specific SmartPPA are outsourced to the most qualified provider, and the needed energy generation equipment is delivered and installed, either by the supplier or by a third-party engineering, procurement and construction (EPC) entity. The consumer of electricity pays for the power consumed on a simple “pay-as-you-go” model. Payment is made on a mobile device or in local fiat through a proxy via the project-specific GEN Credits which are minted when the PPA is approved. ImpactPPA makes this transformational technology available to developing countries using Smart Contracts and the blockchain community.

Blockchain-enabled energy finance and distribution provides:

- A disruptive funding model utilizing the crowd
- A decentralized mechanism for quickly supplying renewable energy products
- Automated processes for project identification and delivery
- A secure platform for transactions
- A trusted resource that is open and transparent

ImpactPPA's Smart Contract defines an energy financing structure that allows stakeholders to monitor the deployments of the Company's products worldwide and share in the knowledge that clean renewable energy is improving the lives of those whom the ImpactPPA technology is serving.

To Conclude

This shift towards project funding and energy management using ImpactPPA's Ethereum based technology will stimulate more decentralized energy solutions, ultimately facilitating our transition away from carbon-emitting electricity generation. Through its SmartPPA platform, the Company is developing a solution that decentralizes project finance and the issuance of PPA's (Power Purchase Agreements).

The ImpactPPA model of providing energy to this unbanked and unconnected population will lead to a host of additional technologies and services that benefit the Company as well as end users of the technology. The “payment rail” created by the GEN Credit will allow for 3rd parties to ride on top of ImpactPPA's energy generation, allowing for: clean water, healthcare, education, ISP and communication... Additionally, giving these unbanked populations access to a digital identity through credit and data will help them ascend to the middle class. ImpactPPA falls directly in line with the UN's goal to electrify the world with clean, reliable, renewable energy.

First Energy Project executed on BlockChain @ Les Irois, Haiti



Relevant links

- Rethinking Distributed Energy via the Blockchain – Chipin Web Magazine: <https://www.chipin.com/impactppa-ico-distributed-energy-blockchain/>
- How Impact PPA Is Going to Revolutionize Energy Using Blockchain <https://hackernoon.com/how-impact-ppa-is-going-to-revolutionize-energy-using-blockchain-9ddb6ea5b33a>



About the author: Mr. Venkat Kumar Tangirala is a graduate in Electronics & Communications Engineering from Vellore Institute of Technology in India. He has more than 19 years of experience in the renewable energy and IT sectors and has held management roles in various industries, including information technology, BlockChain, Defence, Manufacturing, and Alternative energy.

Mr. Tangirala is currently President of WindStream Energy Technologies India Pvt. Ltd., managing the company's operations in Asia, the Middle East, and Africa. He is also a Director for Syaton Global Services Inc., a software company with offices in India and the U.S. (www.siyaton.com). He has held positions as Head for Green Products Division and Defence Electronics at HBL Power Systems Ltd. in Hyderabad, India (www.hbl.in) and President for Sensorgrid, Inc., heading up Indian Operations.

His major accomplishments include: Headed the team for one of the major projects on integration of traffic and transportation in India, in collaboration with a US Billion Dollar Company ACS Inc while in SensorGrid Technologies; Headed a Software Company BlueLotus Inc that Lunched and marketed a full-fledged Office suit product in competition to MS Office in India and SE Asia; Speaker in Many national and International forums Like Confederation of Indian Industries(CII) - Green Building Congress, Dubai Smart Sky Scraper Summit 2016, IACC (Indo American Chamber of Commerce) National Conclave , The Tech Fest, Honduras Technology Congress etc., and IEEE International Conference in Innovations in Power and Advanced Computing, VIT.

Elon Musk-backed startup's AI beats humans at Dota 2 game

Google Maps now zooms out to a globe instead of flat Earth

China's supercomputer runs quintillion calculations a second

Apple started from garage in 1976, now (in 2018) a trillion-dollar giant

Rainwater Harvesting – The Success Story of Chennai

Dr. Sekhar Raghavan

(Ashoka Fellow)

Director, Rain Centre

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Email: sekar1479@yahoo.co.in

ABSTRACT

The story of Chennai, a coastal city in South India is a very interesting one. This city has depended largely on its groundwater source, whose exploitable quantity and quality used to be very good till a few years back. Urbanization had not only deprived this city of open space for any natural recharge to occur but also its groundwater due to overexploitation. Chennai was never a rain starved city but was water starved one from 1998 to 2003. There was a complete lack of awareness among both the society and the state about the need to sustain the groundwater source through rainwater harvesting and artificial recharge.

The role played by individuals, non-governmental organizations (NGOs) and the state to promote and popularize RWH not only in Chennai but in the entire state of Tamil Nadu is discussed in detail in this paper. Finally, the successes obtained thereafter and the need to replicate the Chennai success to other major towns within India and outside is also highlighted in this paper.

I. INTRODUCTION

Water is perhaps the most precious asset on earth. Indians have traditionally considered it as one of the five basic elements of nature, the others being air, soil, fire and space. Fresh water is essential for human survival and rainfall is its single largest source. The part of rainfall that is trapped in surface and groundwater sources is all that is available for human consumption. This is what has come to be known as Rainwater Harvesting (RWH).

RWH can be broadly divided into a) RWH relevant in rural areas and b) RWH relevant in urban areas. The two important aspects of RWH are collection of rainwater for immediate use and the other being recharge into the soil, either naturally or artificially for sustaining and improving the groundwater source. Due to availability of large amounts of open space in rural areas RWH is essentially collection of rainwater in surface water bodies such as ponds, lakes etc. and simultaneous natural recharge also takes place. On the contrary, due to shrinking of open spaces in urban areas, RWH is predominantly artificial recharge to sustain the over exploited groundwater source in cities.

Most of the RWH found in rural areas is traditional and practiced only at the macro level.

The plan of the paper is as follows. We go on to a discussion of RWH in urban areas in section II. Section III is devoted to a discussion of the different methods of RWH in individual premises. The activities carried out by both the society and the state during the last thirteen years to promote and popularize RWH and the successes achieved as a result of RWH is explained in section IV. Concluding remarks are made in the last section (V).

II. RAINWATER HARVESTING IN URBAN AREAS

Urban areas, which consist of large and medium sized cities, almost all of them face the twin problems of floods during monsoon and shortage of fresh water during non-monsoon months. Both these problems are of a more recent origin and are caused primarily due to lack of harvesting the rainwater that falls in such areas. The solution to both these problems lies in understanding the scenario and making sincere attempts to harvest every drop of rainwater either as collection for immediate use or aquifer recharge or both.

If one analyses the reasons for these, one would realize that flooding is caused essentially because of shrinking of open spaces and very minimal area remaining unpaved. On the other hand, water scarcity is due to over exploitation of fresh water sources, apathetic attitude of people living in cities leading to water being taken for granted and a lack of awareness among them about the need to sustain the sources through RWH (Sekhar Raghavan, 2004).

In urban areas, unlike rural areas both the aspects of RWH have to be carried out at the macro and micro levels. While it is the responsibility of the state to carry it out at the macro level, the responsibility of implementing it at the micro level lies

with the society, namely the residents. Collection for immediate use at the macro level involves reviving the lakes and ponds and temple tanks still present within cities and towns, from encroachments and renovating/repairing them in order to impound the urban runoff water in them. These renovated water bodies could then serve as decentralized fresh water sources for the immediate neighborhood and also facilitate natural recharge. For example, Chennai still meets 40% of its fresh water needs from 4 such water bodies located in its suburbs.

The other activity namely, artificial recharge at the macro level to be carried out by the state involves, besides such impoundment, diverting the urban runoff into properly designed recharge structures. This runoff is presently being removed by the network of storm water drains constructed almost all over the city and dumped into the sea.

At the micro level, both these aspects will have to be done by the residents in their respective premises. Collection of rooftop water, after proper filtration in plastic/masonry tanks constructed above and below the ground respectively will be relevant only in such places which do not get enough municipal water even during and immediately after the monsoon months.

Artificial recharge at the micro level will have to be implemented by injecting the rooftop water (after using it for collection wherever it is relevant) and driveway runoff water into properly designed recharge structures as explained in detail in the next section (Sekhar Raghavan 2006). This will be relevant in places where groundwater is reasonably good, pre-monsoon water table low and soil porous and permeable.

III. METHODS OF RAINWATER HARVESTING

In every premise, whether it be a house, multistoried residential and/or commercial complex, office, factory etc., rainwater falls only on two places: 1) rooftop 2) all around the built-up area, which could be a driveway, garden etc.

ROOFTOP HARVESTING

Rooftop rainwater is of a good quality as it falls on clean terraces (except in factories) and is brought down by the drainpipes called rooftop pipes.

I) Direct at least one or more of these pipes located close to the existing below- ground- level masonry tank into it either through a first-flush arrangement or a sand filter (Fig.1).

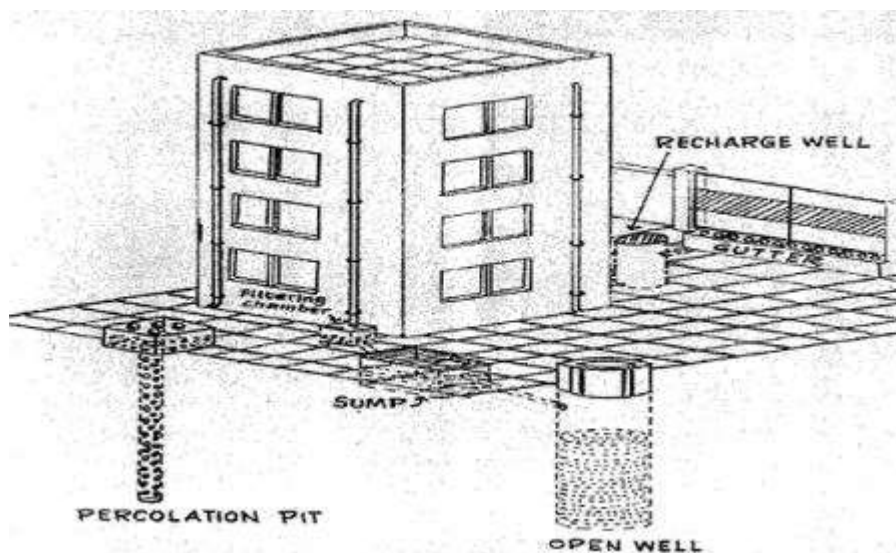
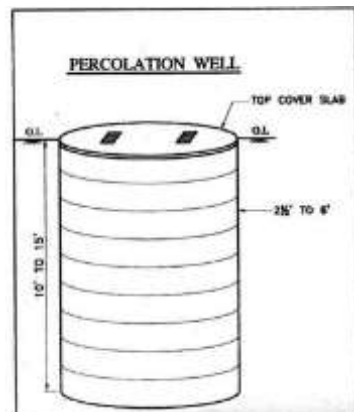


Fig.1

II) Any overflow from the sump can be led into an open/dug well, if any, within the premises for recharge purposes. Pipes not directed to the sump can also be led into the well (fig.1)

III) In the absence of an open well, a percolation/recharge (RC) well could be dug within the premises (fig.2) to inject rooftop water into it.



These are constructed using cement rings readily available in the market. The diameter of these rings range from 2.5 ft. to 6 ft. The depth to which these wells are dug depends on the nature of the soil and the diameter on the volume of water that is likely to be ingested in each one of them. They are left unfilled and are covered with RCC slabs of suitable thickness to facilitate vehicular movement on them.

Fig. 2 Percolation / recharge well

DRIVEWAY RUNOFF HARVESTING

In a large number of houses/flat complexes and office complexes, the driveway area (all around the built up area) will be as much or even more than the rooftop area. Rainwater falling on this area will be quite large and in addition a sizeable quantity of rooftop water will also contribute to this, which eventually runs off to the street through the gate(s). Hence harvesting driveway runoff in such places becomes very important. This should be harvested by intercepting it with the help of a shallow gutter (covered with a reasonably thick perforated reinforced cement concrete slab) or a bump (which is a cheaper alternative to the gutter) near the gate(s) and directed to a recharge well(s) (fig.1 and 2). Such driveway runoff should not be led into a source well since the runoff will contain large amounts of silt. These and other drawings are also available in a booklet titled “RWH in Urban Areas”, which can be downloaded from our website www.raincentre.net.

IV. ACTIVITIES CARRIED OUT IN CHENNAI TO PROMOTE RWH

Promoting rainwater harvesting in urban areas warrants a three-fold thrust: 1. Creating awareness among various sections of the society regarding the importance of rainwater harvesting, to not only augment the existing sources but also to raise ground water levels and sustain the water table 2. Helping the citizens to implement rainwater harvesting in their respective premises in an efficient and cost-effective manner 3. Carrying out studies on i) the nature of the sub-soil in different parts of the city and their capacity to absorb large quantities of water ingested into it, ii) the effectiveness and adequacy of various structures put up for rainwater harvesting and iii) the post-monsoon impact on the quality and exploitable quantity of ground water in places where rainwater harvesting has been implemented.

IV.1. BY INDIVIDUALS AND NGOS (SOCIETY)

In order to carry out these three objectives and to bring succor to the water-starved citizens of Chennai, the author decided to involve himself in a door to door campaign in 1995 in a few coastal suburbs of Chennai city called Besant Nagar and Valmiki Nagar. By virtue of its close proximity to the sea, the quality and the exploitable quantity of ground water in these localities were good till about ten years back. But, as construction in these localities proliferated, the quantity of ground water tapped increased steadily even as the soil available for direct absorption of rainwater shrank substantially. As a result, the ground water table in these areas steadily went down.

During the campaign it was made clear to the residents that implementing rainwater harvesting in these areas, where the soil is sandy, is very simple and cost-effective and failure to do so would lead to saline intrusion, resulting in a permanent damage to the aquifer.



In order to accelerate the activities, a few like-minded people formed the Akash Ganga Trust in January 2001. Our trust derives its name from Akash meaning the sky and Ganga denoting the perennial river Ganges of North India, believed to have descended from the sky - together the name stands for the water received from the sky, viz., rainwater. Our trust launched the Rain Centre in Chennai, which was inaugurated by our Hon'ble (late) Chief Minister of the state of Tamil Nadu on August 21, 2002.

This centre is a one-stop information and assistance centre for rainwater harvesting and is the first in the country. The initial seed money for starting this centre came from a few non-resident Indians living in the U.S. The state government is also one of the co-sponsors of the rain centre.

Rain Centre, has been involved since 2002 in not only creating the much needed awareness among the urban residents, but has also helped them to put up well designed artificial recharge structures in their respective homes. The centre was also instrumental in legislating RWH in 2002, according to which RWH was made mandatory in every house/flat complex in the entire state of Tamil Nadu, the first state in India to do so.

IV.2 BY THE GOVERNMENT (STATE)

The AIADMK government, which came to power in June 2001 and ruled the state of Tamil Nadu till May 2006 showed keen interest in promoting and popularizing RWH at the micro level in the entire state. This was to enable the residents to augment the little or no piped water supply as well as to sustain the groundwater source in their respective premises. For this purpose, a high-level advisory committee was formed with senior government officials as members. Our organization was the only NGO to serve in the committee.

On the advice of the committee several awareness raising activities were carried out for almost a year and a half in the entire state. This included preparation of resource material like brochures, booklets, posters and video films on the importance of RWH in both English and vernacular language and setting up several rain centres in the state. A propaganda van was designed and made to be taken to various localities of Chennai. The government organized workshops on the correct RWH methodology to plumbers and masons besides residents, almost every week for one full year. Finally, the government enacted a law in October 2002 and followed it up with an ordinance in June 2003, making RWH compulsory in all existing buildings in the entire state of Tamil Nadu and to be completed within one year viz. on or before October 11, 2003. Tamil Nadu is the first state in the entire country to enact such a law for both old and new buildings.

V. SUCCESSES

A survey conducted by the Rain centre, revealed that the groundwater levels in the entire city had risen by 6 meters in some areas and by 8 meters in some others, thanks to the law, which made RWH mandatory and the good monsoon rains that the city received during 2005 and 2006. The open dug wells in a few apartment complexes, which had gone dry a few years back came back alive and were filled up to two thirds its volume during the 2005 monsoon itself. The groundwater in the bore wells, which had gone brackish improved considerably in quality and are being used even now for drinking and cooking. The improvement in groundwater levels was also noticeable in a few temple tanks (every big Hindu temple will have a huge tank nearby with steps, which can be thought of as an open well at the macro level) within Chennai. The tanks, which had remained waterless for almost thirteen years, got filled up to three feet from the bottom, thus indicating the rise in water table.



Chennai city is no longer water starved and it was never rain starved. The Municipal piped water supply has improved considerably in the entire city and as a result groundwater exploitation has been reduced to a bare minimum leaving the groundwater reserves quite rich. There are more than one reason for all the successes achieved by Chennai city. Some of them are i) The state and the society worked together to promote an environmental cause, which is really necessary ii) There were committed individuals in both the state and the society to work for the cause wholeheartedly iii) Considerable amount of awareness activities were carried out by both the state and society before RWH was made mandatory, which is very important to promote a cause like rainwater harvesting.

VI. CONCLUSIONS

Most of the other metro cities in India are rain rich but water starved. We should not forget the fact that water harvested is water produced and make sincere attempts to harvest every drop of water that falls within every premises, locality, city and country before thinking in terms of mega projects like interlinking of rivers, desalination of sea water etc. Pollution of rivers and other water bodies such as lakes and ponds by dumping of solid waste and industrial and domestic effluents into them and encroachment of them must be stopped and the water bodies will have to be revived for capturing rainwater.

Though rainwater harvesting is important in every major town and city not only in India but the world over, it is much more important in coastal cities, since what is not harvested runs off into the sea before we realize and gets wasted. This is not so in inland towns and cities, where, what is not harvested has a good chance of getting into the nearby river and prove to be useful to people living downstream or get into water bodies within the towns. Since India has a long coastline, implementation of RWH in coastal cities with sandy beaches, which have a good groundwater potential, will have to be taken up on a war footing. Any delay will result in seawater intrusion into its fresh water aquifers and create a permanent and irreversible damage. Our slogan for the future should be HARVEST RAINWATER LEST WE PERISH.

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About the Author: Dr. Sekhar Raghavan is a doctorate in Physics from Madras University. He is currently the Director of RAIN CENTRE (www.raincentre.net) a one-stop information centre for helping the general public to know about Rainwater Harvesting and to implement the same in their respective houses, flats, offices etc. This is the first of its kind and was inaugurated by the TN Chief Minister in August 2002. Working displays of rooftop harvesting, driveway runoff harvesting near the gate have been set up in this centre. The other activities of the centre include conducting, periodically, awareness programmes on rainwater harvesting for school and college students with video presentations and workshops for builders and plumbers. The entire service is provided free of cost.

Since 1995, Dr. Sekhar has been involved in a door to door campaign in Chennai city trying to create awareness, among the residents, regarding the importance of rainwater harvesting to augment their existing sources as well as to sustain the precious ground water resource. He has also helped many residents of Chennai to implement RWH in their respective premises with the help of trained plumbers and masons.

In June 2001, he was included in the high-level committee formed by the Department of Municipal Administration and Water Supply, Government of Tamil Nadu to promote, propagate and popularize Rainwater Harvesting in the entire state. The government on the recommendation of this committee made RWH compulsory in all existing buildings and this law came into effect in October 2002.

In January 2003, he was selected as an Ashoka Fellow by a U.S. based non-profit organization called Ashoka Innovators for the public, appreciating his efforts to promote rainwater harvesting in Chennai city. He was also selected for the Harmony Silver Award 2010, by The Harmony for Silvers Foundation, a non-government organisation founded in 2004 by Tina Anil Ambani. The Government of NCT of Delhi engaged his services as an invitee to offer service and advice on Rainwater Harvesting.

Cybercriminals use fake Income Tax refund SMS for fraud

A ransomware attack at Alaska's Matanuska-Susitna town has forced the employees to forego computers and work on typewriters and hand receipts.

OnePlus beats Apple, Samsung to become top premium smartphone brand in India in 2018 Q2

The Art of Data Science

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Data science is a 21st century term although some of the techniques it encompasses, like machine learning, have been around for decades. and some, like statistics, for centuries. The growth of computational power and storage capacity and the vast array of new personal computational devices and associated online services and social networks, monitoring devices, embedded processing in automobiles or manufacture, these have all contributed to an explosion of data crying out to be interpreted. Many stories remain untold and pose a teasing challenge to a generation of emerging data scientists. This article provides an overview of the data science landscape and subsequent articles will expand on interesting aspects.

What is Data Science?

So what constitutes data science? A blend of requirements gathering, product design, programming, data gathering, data cleansing, modeling through statistics or machine learning, visualization, and presentation of the analysis. The telling of a story based in data or the generation of complex reports for the analytically minded decision maker, understanding systems with incomplete information, the building of data product. This could happen on a laptop or take large clusters with many big data sources. It is a science. One looks at empirical data and builds models to explain the data and generate new probable scenarios: predictions or forecasts. It is potentially a new way of doing science - build a black box model that lives or dies based on its performance on a well-constructed test rather than a sound theoretical foundation. And thus, if one drops the theoretical demands, the barrier for entry into the field is significantly lowered and it is possible to make useful contributions by tinkering. Take a model, play with it and get an improved model (one that performs better on the test data). The proliferation of such tinkering within modeling frameworks has led data scientists to be likened to toddlers playing with Lego blocks. And perhaps with some justification as there are a number of results which get reported with a very scant understanding of the underlying scientific context. The democratization of learning (not unlike the democratization of journalism) comes with its share of problems.

Not surprisingly, most of the available data is observational data: data that was generated as a by-product of other activity rather than that generated by a well-designed experiment. Experiments can be expensive. When starting on a new project, it is often not apparent which lines of inquiry a given data set supports. The data may contain signal for some kinds of analysis and be utterly uncooperative on other fronts. So a data scientist must begin with an exploration of the available data. Which fields are complete and which have missing values, which have strong correlations or associations, which are potential target variables one would like to predict, which can be controlled to alter the processes, which are well understood by the business, which are likely to have significant errors ... Sometimes data scientists, like marketers, are pushed to squeeze water out of dry stone. The key to keeping it sciency is to document honestly the hunch or anecdotal bridges that were needed to complete the analysis so a future researcher may advance the state of the science. It usually pays to craft an interesting story from the data.

Trying too many things with the same data set can lead to what has been termed p-hacking in the hypothesis testing context. [The fivethirtyeight blog](#) provides a demonstration of what could happen if one goes fishing in the dataset instead of setting up a hypothesis first. But again some thought shows that the problem is not with trying too many things, but with the fuzziness of the metrics and mis-statement of the robustness of the result. If you find a hypothesis supported by fishing in the data set, you could still take random test/train splits of the data to verify its robustness. Your error estimates may end up optimistic because of leakage during the training process (unless you save off a test set from the start). So don't let the concern for p-hacking discourage you from exploring the data set but ensure that you report only robust results.

[This article](#) on wired.com provides a wonderful example of a data science project. A food recommender that uses collaborative filtering. that is, it gauges the visitor's preferences and recommends items that will align with their preferences at a particular restaurant by looking at what similar visitors prefer in that situation. A diverse set of attributes, unstructured data, ingredients and other similarities between foods defined by a chef and fed to the recommender system. One can hold out a test set of users and their food choices and see if the user's choices fall within the top 5 predictions made by the algorithm for that user. But then often the joy of a recommender system is whether it generate interesting recommendations: does it tell good stories of why something was recommended? An excellent place to learn all about recommender systems is this [Coursera course](#).

The Data Science Process

Data science projects can start at very different points. Sometimes organizations have gathered data for years and want to answer specific questions about their customers or their suppliers. They are looking to optimize business processes. The data is already clean and stashed in relational stores so one can start with an exploration to understand it and talk to the data owners about the kind of analysis they want and get to modeling pretty quickly.

But more often than not, the data is not yet gathered or not clean or spread over different data stores which may not quite align and require flexible logic to connect them. And thus begins a larger exploration of ill-defined scope. One can start by exploring the needs, potential data sources, discuss the range of analysis different data sets might support and the associated costs. And then again, sometimes a data journalist or blogger goes hunting for a story that is hidden in the data and one starts by exploring potential angles.

Model Building

Machine learning models come in many flavors. Supervised learning methods include classification where we have a labeled data set and the aim is to assign labels reliably to new cases, and regressions where the labels are continuous variables. There are many types of classifiers and many ways of improving regression models. And then there are unsupervised models used for clustering or dimensionality reduction where the purpose is to discover structure in the data. Often one uses unsupervised methods to bring out important features in the data.

It is a well-known fact of the modeling process that complex models tend to have many adjustable parameters and therefore require more data to fit. They are also harder to explain. So the rule is to go for the simplest model that does a reasonable job as a basis for the solution. Sometimes one tinkers around that with more complex models which may be used to get better predictions without a good understanding of why they work. Also remember that a complex model can fit the training data set too well and then it does not generalize well to new data. Thus it is necessary to include some defense against overfitting such as regularization.

It is important to separate the test data set and ensure that training and tuning of the model happen within the training set. The test set is to be used solely for estimating model performance.

There is a lot that remains to be said about models and the process of data science, about bias in models, data governance, privacy but it is best to first get a sense of what modeling is about by building or exploring a few models. [R2d3](#) provides a visual explanation of a decision tree classifier. You can build a model using the drag and drop interface provided by [Azure](#), or if you like to code, try the [datacamp scikit-learn tutorial](#).

Quotes:

“In God we trust; all others bring data.” — [W. Edwards Deming](#)

“All models are wrong but some are useful.” --- [George Box](#)

“If you torture the data long enough, it will confess.” --- [Ronald Coase](#)

“Statistician -- The Sexiest Job in the 21st Century.” --- [Hal Varian](#)

“Data Scientist -- The Sexiest Job in the 21st Century.” --- [Harvard Business Review](#)

“Why Data Scientist is being called the Sexiest Job in the 21st Century” --- [import.io](#)

“The sexiest (and last?) job in the 21st century” -- [techcrunch](#)



About the author: Krishna Balasubramanian is a member of [Claro Data Science](#), a company which provides data science solutions for small businesses. He has twenty years of experience working in start-ups in the online and television advertising space, and has been building machine learning applications for ad delivery, audience segmentation, targeting and optimization. He taught a data science bootcamp and a Deep Learning course while at Metis/Kaplan. At Claro he has been working on projects in data privacy and NLP.

Unmanned Aerial Vehicle - A Sky Boon

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Unmanned Aerial Vehicle (UAV) or Remotely Piloted Aircraft System (RPAS), is one of the top emerging technologies today which opens up new opportunities in solving delivery issues. In recent years, many drone makers have developed technologically superior drones in various sizes for a variety of applications such as aerial photography, aerial surveillance, aerial promo movies, aerial panorama and so on. These drones are put to use in various industries which include construction, mining, roads and highways, solar, surveying, railways, oil and gas-pipelines, power lines, telecommunications, agriculture and wind. Most of these applications are commercial but the question which always remained in our hearts was, what about the application of drones for use of mankind. This article surveys the paramount impacts of UAV both nationally as well as globally.



Figure.1 Drone accessories

Features of Drones: Fig.1 shows the advanced hardware present in most of the commercial drones out of which few of them are retrofitted. These includes Vertical Take-off and Landing (VTOL), Radar Positioning and Return to Home, Gyro stabilization, Inertial measurement unit, Flight controller, On screen real time flight parameters, No fly zone technology, GPS ready to fly mode technology, Internal compass and fail safe function, First Person View (FPV) live video transmission technology, Firmware and flight assistant port, LED flight indicators, Range extender UAV technology, Smart phone app featuring ground station function, High performance zoom cameras, Gimbals and Tilt control, Multispectral, Lidar, Photogrammetry, low light night vision and Thermal vision sensors, Obstacle detection and Collision avoidance technology, Anti-drop kit and Parachutes.

A drone flew chilled human blood for 160 miles over the hot Arizona desert — smashing records for transport of biological samples on a remotely operated vehicle. The blood was still in good condition after the three-hour flight, which means that the growing role of drones in rural medical care really could have the potential to save lives. For people who live in remote areas, going to the doctor or getting lab tests can be challenging. That's why using drones to drop off medical supplies or pick up blood samples for testing could be a game-changer. Some companies, like California-based Zipline, have been in the game for a few years, delivering blood for transfusions by drone in Rwanda, and soon in Tanzania.

Facebook's solar-powered, internet-providing drone successfully completed its second test flight over the Arizona desert during the month of May, 2017. The aircraft, called Aquila, aims to provide internet access to remote corners of the

world by transmitting a signal that can be received on the ground within a 60-mile radius. Meanwhile 'Alphabet', the parent company of Google, has shut down the firm's project to create solar-powered drones that could provide internet connections to rural areas.

The forest fire is one of the major threats to humanity and climate. Countries like U.S spend lump sum of dollars for damage control measures. Recent wildfire at California raised many questions about disaster management techniques and the needed improvements to prevent. In the era of Artificial Intelligence, the integrated mission using cooperative technologies could make it possible. The combination of Wireless Sensor Network (WSN) and Drones may be a wild guess. The pored sensor nodes over a wild region form a WSN and starts monitoring the abnormal wind pressure and blaze. This information can be sent to the miniones (mini drones) deployed randomly in the forest. Upon detecting abnormally, these drones could form a swarm possibly providing a visual communication like a smoke signal used at olden days and fly to a nearest base station. This may caution about the situation well in advance and help the mission SWAOT (Stop Wildfire Aerially On Time). Issues related to the deployment of sensor nodes, their life time, spot selection for miniones could be argued but while comparing with the devastation, it makes us to find the possibilities.

The aerial video footage and images captured while a fire is burning can be crucial in after-action assessments, in which firefighters critique their own efforts so that they can improve their approach and identify future training needs. These materials can also be used to train new firefighters, providing real life examples of how a fire might unfold, and where decisions on the ground were made well or could have been made better.



Figure .2 Drones on Habitat Monitoring

Nowadays drones are used for habitat monitoring. One such recent example has been captured in fig.2 where VolAero Drones has demonstrated that drones equipped with state-of-the-art thermal imaging equipment can effectively spot and track pythons at night – their prime hunting time. Over 100,000 Burmese pythons infesting the Florida Everglades have decimated 90 percent of small wildlife while surviving all attempts at eradication. This drone and thermal technology is light-years ahead of shining a flashlight into the darkness and hoping for the best. The thermal imagery picked up not just the monster pythons, but also native snakes as small as 18 inches. This suggests that we'll be able to spot and eliminate clusters of python hatchlings, which will help curb their reproductive cycle.



Figure .3 High Altitude UAV's

The European Space Agency (ESA) has announced that it is considering extending its activities to a new region of the sky via a novel type of unmanned aerial vehicle (UAV), a 'missing link' between drones and satellites. As shown in fig.3, High Altitude Pseudo-Satellites, or HAPS, are platforms that float or fly at high altitude like conventional aircraft but operate more like satellites – except that rather than working from space they can remain in position inside the atmosphere for weeks or even months, offering continuous coverage of the territory below.

ESA regards the vehicles as a valuable way of establishing applications that complement its satellites while also accelerating space technologies through early, high-altitude flight testing.

Indian Government Initiatives

After years of prohibiting the public from flying drones, India's aviation regulator, the Directorate General of Civil Aviation (DGCA), on Oct. 30, 2017 unveiled draft norms for the usage of aerial vehicles. Until now, owing to safety concerns, it has been illegal to fly drones in India without a nod from the authorities. The new rules aim to tap the myriad opportunities in the commercial and recreational space, while ensuring the safety of other vehicles in the airspace and people on the ground. The government has designed the rules according to the size of the drone being flown.

The rules will come as a relief for Indian e-commerce companies who can potentially skip the country's crowded roads and traffic jams to make timely deliveries. Commercial use of drones has so far been limited mostly to video and photography, but according to experts these can be utilised for many other applications as well, from delivering packages to emergency services, environment monitoring and providing wireless Internet in remote areas. American ecommerce giant Amazon has already designed a system, Prime Air, using drones to deliver packages to customers within 30 minutes of placing an order.

The Indian government wants to extend the 'Make in India' initiative to planes and drones and not just import the entire requirement in the coming years. India is recording a healthy growth in passenger traffic as compared to China, which is the largest aviation market in the world. The government has launched **Udaan scheme**, which is a regional connectivity scheme under which the government plans to provide connectivity to remote areas and enhance access in under-served regions. Indian Institute of Technology (IIT)-Kanpur, has signed a Memorandum of Understanding (MoU) with 'VTOL AVIATION INDIA PVT LTD' to help in developing Vertical Take-Off and Landing (VTOL) aircrafts for Civil Defence and Civil Aviation. These aircraft will be used as air taxi for civilians. Vertical Take-Off and Landing (VTOL) aircrafts are becoming popular in both civil and military aviation sectors. It could be a milestone under the 'Make in India' initiative.

Agricultural drones are UAVs used for precision agriculture, which is a modern method of farming that uses big data, aerial imagery and other means to optimise efficiency. The drone collects the farm's image and makes a colour-coded map based on its health, which is then assessed by the UAV Company. Agriculture Insurance Company of India along with Skymet, a weather forecasting company, has conducted a few pilots in parts of Gujarat and Rajasthan to see how drones can be used to survey crops and help map crop diseases along with helping insurance companies settle claims.

The Maharashtra government turns to technology to ensure timely intervention and compensations for farmers in an area notorious for farmer suicides. Private weather forecaster Skymet is using drones, or unmanned aerial vehicles (UAVs), to map 51 villages of Marathwada under a pilot project. The state government has decided to carry out pilot projects for assessing crop yields using different technologies from four different companies. Reinsurance giant Swiss Re and Climate Change for Agriculture, a not-for-profit organisation based in Delhi, are also participating in the project to assess 186 villages in the state, using drones and satellite imagery. Madhya Pradesh and Uttar Pradesh governments, too, are expected to soon start using low cost drones to assess crop losses.

The experimental move of Tamil Nadu Government:

Tamil Nadu Government as a part of its regular developmental activities taken an initiative of drone project where the drones help Greater Chennai Municipal corporation (GCMC) to prevent land encroachment and property tax evasion. GCMC became the first municipal body in the country to commission drone mapping of properties and utilities. They Initiated 6 drones which were capable of collecting photos from 79 wards of Chennai, the drones are capable of covering 7 Square kilometres a day with an accuracy of 5 cm resolution, the drones in the air can clearly see the potholes signboards and small encroachments of footpaths and also the officials could count the number of trees without reaching the actual place.

Apart from government institutions, Chennai based few private engineering colleges such as Agni College of Technology and Panimalar Institute of Technology (PIT) also rendering their notable contributions on UAV technology. The Aerial Robotics Team of PIT was born on small casual talk in a small lab by a few students from ECE with an illustrious Professor which later on moved on to be **TeamDronix**. <https://www.teamdronix.com>



Figure .4 Drone developed by Dronix in action



Figure 5 Team Dronix with a group of engineers from Aeronautical Research Centre of Sudan trained by them.

Conclusion Note

The eyes in the air have their own challenges like safety issue of the state and the country, key areas like the defence, military, airports and research centres are not covered by the drones for the security reasons. The drone operations are not always at the moment but we have a systematic approach on how to make maximum use of the technology keeping the security factors in mind.



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Deep Learning in Artificial Intelligence

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I. INTRODUCTION

Artificial Intelligence is the field of computer technology and which is used to apply various theories, models, methods, techniques and algorithms to simulate and develop intelligent systems. AI enables to solve real time problems by using computer and make intelligent decision. An algorithm is the main part for developing or solving real time problems and it is the step by step procedure at each stage. AI algorithms are set of procedure and used to perform intelligent behaviour and make successful decision using involvement of learning and perception. The main purpose of AI is to apply technology to real time situation and reduce the human efforts. The high level goal is to the user to exhibit perception behaviour to intelligent machine. Learning is the most important part for applying AI based solutions or automated environment. Learning can be done by perception of input behaviours at different environment. Deep learning is the most responsible part to recognize or percept following capabilities of intelligent system like problem solving, decision making, planning and reasoning, interaction and knowledge representation. Deep learning process is used to build, represent and analysis input behaviours and involves symbolic and neural forms to achieve knowledge representation. Knowledge representation is the important part in AI and which leads the role to make intelligent machine with decision making capabilities.

Machine learning and Natural Language processing is need to apply deep learning process. Machine learning techniques are used to analyse the behaviours be set of input characteristics. A successful intelligent AI system gives the ability to read, write, process and generate human and native user inputs. Nowadays Internet are playing important role in day-to-day life and includes information processing and analysing various inputs such as text, audio, video, etc. Handling internet request AI researchers are developed highly effective algorithms as well as computer vision techniques.

This paper mainly focuses on general techniques of AI with deep learning characteristics and gives historical view of current state of intelligent systems. Based on various survey we focused the AI can verifies different paradigms such as machine learning, agent interaction systems, natural language processing, etc. The core application of AI the above is need and most significant contribution in AI technology and deep learning.

II. THE FIRST ERA OF AI

The expert systems are started in engineering domain in 1970s and it devised computer programs based on pseudo code transition. Teach Pendent type of AI system involved in Expert application processing in telecommunication and commercial environments. In this case the capability of learning and converting new situation is difficult process. So the decision making process was not up to the level and solve the complex problem is tedious process. The expert systems developed in 1980s with the if-else statement t make decision with inference rule forms. Due to this stage the first AI system cannot handle real time data processing, language processing and chat based applications.

The researchers can decide machine learning based expert systems with the involvement of contributors and optimization produce to good software deliverables. According to the survey of Colorado University and Li Deng et al, the speech processing agent systems are in the field of 1990s to perform automated caller based response system. The author can contribute to transmitting from inference rule based mechanism to speech recognition system with the capable of data domain, knowledge and statistical approach.

III. THE SECOND ERA OF AI

The speech processing agents are used in real time application and which gives clear picture of learning and perception. Computer vision was played vital role for handling perception and knowledge request. According to defence based knowledge systems and NASA report the speech based agents are having autonomous behaviour and automated learning capabilities. In this case, the machine learning inputs and natural language processing are combined with deep learning representations. In such cases, AI system more focuses on trained input data and predefined algorithms. The real time input capturing agents are designed in 2000s with the key components such as decision trees, Bayesian networks, support vector machine, neural networks, etc. Generally the AI system performs various real time applications like face recognition, Bio-metrics process, speech processing, machine learning vision applications, etc.

According to the survey the Hidden Markov model and Limber Ziv Code are used to converting of language processing and speech processing agents. In that situation the involvement of Kalman filter and statistical measurement techniques involved to human speech inputs capturing agents.

IV. THE CURRENT AI

The current AI based application more useful to real time and day-to-day life environments and automated applications. The deep learning process is one the driving force in current application which includes learning different kind of input data and trained various decision making procedures. In traditional machine learning techniques are designed only doing specified task with less decision making capabilities. But current deep learning models have to handle end-to-end learning process and large scale automated applications.

In 2010, the automated data processing system developed with deep learning capabilities and handle data analytics behaviours. Microsoft started the speech processing applications for content delivery networks with lower recognition features. The start-of-the-art nature of machine learning systems and speech processing are the backbone of deep learning process. Large scale real time applications are which handle deep learning process and following are the major natural language process systems like Amazon Alexa, Google Now, Amazon Chime, etc. The deep learning includes large number of real time applications including of Robotics, Machine Vision Systems, Drone assisted networks, Energy Consumption, Medical Image Processing, Web Search engines, Gaming, CRM, Internet advertisement, etc.

The huge empirical analyse of AI System in real time environments, the deep learning process used to predict the learning and extract the knowledge and produce decision as correct manner. The various software is developed to implement automated process and handle variety of data set. Deep learning process is proven techniques in AI based smart applications and to achieve ultimate feature of future prediction capabilities. The current deep learning models have accessing human perception and competent real market. Deep learning process is break through the all the unstable in learning process, allow and explain the action, decision, decide and act their own way. The inference rule and knowledge representation techniques involved to predict integrated, worldwide and social media applications.

The following are the steps used in implementing deep learning process and it is breakdown all the statistical problem.

- i. Percept the any form of input request like natural language and making the decision
- ii. Analyze the input behaviours based on algorithms and inference rule of knowledge
- iii. The knowledge representation techniques applied various Q-Learning algorithms
- iv. Finally decision agent with capable to handle all type of request and analyze, synthesis in adversary networks

A close and typical research of deep learning in AI have low cost supervision and stated natural language processing systems, machine learning process and Image recognition system. The deep learning AI models are allows different knowledge representation techniques and statistical approach for making decision. This approach is aimed to improve engineering systems and measure the semantic values to design AI systems.

V. APPLICATIONS IN AI

Artificial Intelligence includes various commercial application which offered deep learning behaviours. They are selected to elaborate and monitor the operations. The following services offered in selected and knowledge discovery process like financial services, transportation services, customer services automated applications, etc. AI techniques can process millions of applications and trigger the process. The following are the popular recommendation engines used in connecting various real time services providers such as Amazon Alexa, Amazon Chime, Google Assistance, etc. For example, banking systems are used AI applications to offers various file handling mechanisms, managing properties and reasoning capabilities. AI system can alert and trigger investigation process. Bots based automated techniques used to promise searching and firewall operations to control, e-commerce and social networks.

In summary, this paper constructs and analyse the techniques that enabling deep learning process in AI. The wide ranges of applications are used in data processing, social applications and other commercial applications. The AI technology development provided and improved perceptive based on research experience. This paper summarises the property of deep learning process in complex and real time applications. In future various optimization based deep learning methods are used to improve the efficiency of Artificial Intelligence applications in IT and ITeS.

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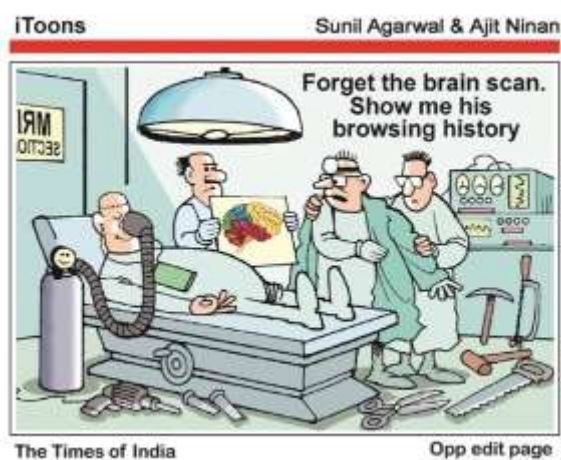
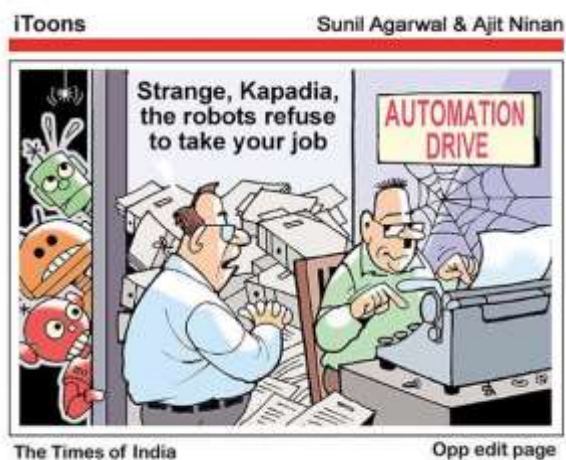
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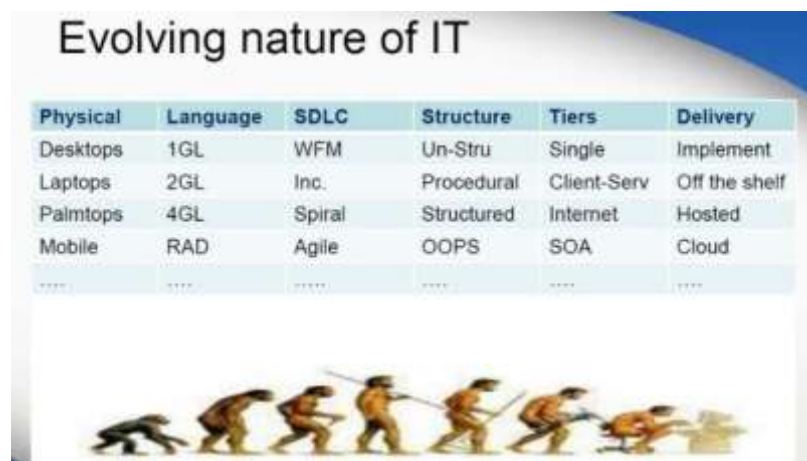


Agile, Cloud, Mobility, DevOps in Software Testing Career

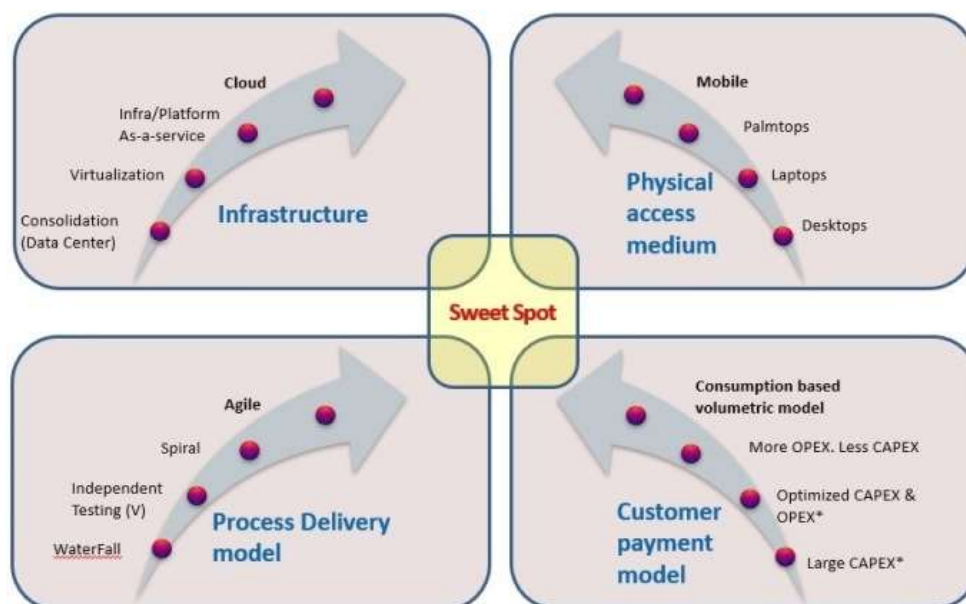
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IT industry is flooded with latest technologies and models. We have been learning and adopting the latest technologies and models such as DevOps, Agile, mobile and cloud in product development and testing. These technologies mostly adopted in isolation but not in totality. However, these models and technologies are inter-related, and it is important to understand their co-relation while thinking about the future of testing. Extending these lines and foot print of these technologies may tell us how testing will be after 5 to 10 years which can kind of give inputs to both academia and industry on what exactly to expect in testing career in the coming years. This article tries to map the evolution of these technologies and leads you with the imagination, which is worthwhile in shaping our career for the future. The idea of this article is not to elaborate on these technologies (as there are many resources in web for this) but to explain/perceive what in store for us in future.

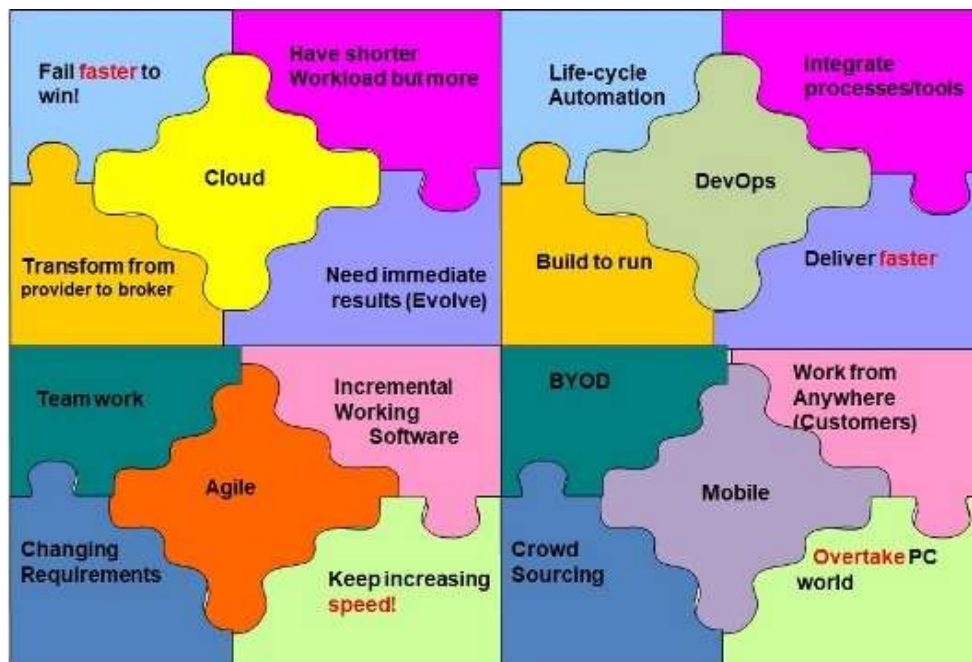


As you can see from above evolution above it is not just hardware (physical media), language/structure, development life cycle, architecture or delivery mechanism that evolved alone but they also had influence and impact on others. To give you an example, mobile devices do depend heavily on cloud to get latest apps (app store), storage/emails (cloud storage), updates (Cloud OS) ...etc, for it's mere existence. Having understood this, now it is time to add the dimensions of infrastructure and customer payment behavior to this evolution to get a complete picture on where it is leading us.



As you can see from above picture the sweet spot is in the intersection of Infrastructure, process, payment models, and access medium. It is important to understand that the customers and their expectations are changed along with these evolutions, where they have moved away from investing large amount of money (Capital expenditure) to “pay per use” or “pay per volume” or “pay as you go”, where consumption units drive the price (only operational expenditure). This is not just for services alone but for the whole infrastructure, product, services and solutions that are involved as one bundle. This behavior makes the companies to bundle infrastructure, products, integrations and physical media into one and provide them, to customers on “pay per use” models where the price spent by customers is constant month on month and leads to predictable budget. This makes the existence of the companies very difficult that focus on just one of these evolutions in isolation and not in totality. This makes the big fish companies eat small fish, as investments needed initially for bundled solutions is huge and to get the ROI, one must really be cheap and utilize returns only on big volume consumptions on long-term usage by the customers. Customer retention is also the key here. Small and medium companies can still exist in this scenario, providing technology pieces to provider companies which intern sell bundled solutions to customers, and keep looking at technology innovations, but not in the space of selling bundled solutions to customers at volumetric pay per use models.

Now let us look at common parameters of Cloud, DevOps, Agile and mobile with a different look (Below picture). Agile as a word is coined from Agility which means speed. DevOps as a concept is all about how a product in development can be moved to Ops (production) in less speed using automation and continuous integration. The concept of mobile is miniaturization of large sized PC and summarization of other equipment’s that people use, in to the hands of customers so that they can quickly do their business fast enough. The picture below (with speed marked in **Red**) illustrated this nice little intersection in those technologies which ultimately percolates down to time-to-market and time-to-profits of companies.



Now let us come to the topic of testing and career of test engineers, extending the line of these evolutions and imagine what can happen:

- Test engineers are expected to be masters in testing the complete solution that involves skills in hardware medium, Language, Process models, delivery, Complete Infrastructure, payment models so they can test the bundles for industry and customer expectation changes.
- Days are not far where test engineers will be only paid for productivity/volumetric pricing (per test case, per defect, per release (on-time), per unit of customer satisfaction/quality index) and permanent jobs may slowly vanish or reshape
- Outcome based payment model is going to hit the life of test engineers where only successful products in the customer space will provide them bonus (based on satisfaction index of products tested) and not the longevity or time-period
- Automation and DevOps will happen automatically as this is the only way productivity (throughput) of test engineers and developers can be improved and paid for their time. Automation/DevOps then becomes essential

commodity of all resources in IT companies and manual testing will be the thing of the past over time. Companies may consider using robots for manual/mundane testing

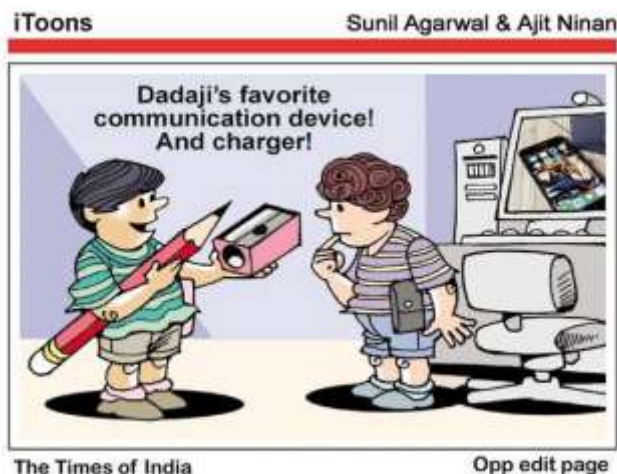
- With technologies being implemented fast, quick time to market gives first mover advantage to companies and that will drive the retention of test engineers. Some one who adopts a lean process, finds & fixes defects quickly with high throughput, has a knowledge on all pieces of the bundle to reproduce and simulate problems fast enough to help fixing will go long way forward compared to others
- Testing on the go – With the advent of mobile & cloud, everything is available everywhere and good amount of testing can happen while people are on the move and multiplexing it with other activities of the day. Test engineers may also venture into development and support to improve their earnings as now they have knowledge of all evolving dimensions.
- Crowd sourcing of voluminous students to test mobile/cloud applications (stress/load testing) will bring enough competition to industry testers through cheap labor and differentiation of industry testers may only be based on outcome/quality of testing delivered
- Marathon testers Vs Sprinters: Speed becomes essential commodity in every test engineer and they are expected to think and deliver the quality product in quick time mostly overnight (eg. follow the sun model with different engineers in different time zone as a team developing and delivering 24x7). Quality doesn't come by "repeated testing and iterations" but with the focus on defect prevention with only one qualification round called acceptance testing. The word "Test Cycle" will mean to multiple product releases and not just one.

Summary: Schools main job may become guiding the students with right resources on the web rather than teaching, organizations may become virtual with the advent of internet & cloud, employees may then will have a choice of working for any organization in the world that do not have local offices. Like-wise the role of testers may also change, and they will do testing on the go while on mobile with a mobile in hand, and parameters like throughput, speed, outcomes, quality may determine the mere existence of testing engineers, while robots and students test community (through crowd-testing), may give tough challenge to freelance testers and industry testers. Adoption of technology in totality and differentiation is going to be the key.



About the author: Mr. Srinivasan is a hands-on software engineering professional in the area of product development, testing and production support. He works as Managing Director at Rolling Rock Software and has been in the Product development field since 1988 (three decades). He has authored the one of the best-selling book "Software Testing: Principles & Practices". He has served as Honorary Advisor in the Boards of many testing companies based in India. He has to his credit two patents -- one filed and another published. He has developed courseware part of pedagogy initiative of HRD ministry of Govt of India and received "Thought Leadership" Award from Test2009.in for his contribution to academia and Industry on software testing. He is a founder member of STeP-In Forum that conducts international conferences on testing and is currently serving

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Change Management

Two Questions to Ask When Responding to Change

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In recent years, there were public protests against several big ticket industrial and research projects in various parts of Tamil Nadu, on environmental grounds. The protests led to the cancellation of either pre-commencement or expansion or closer of quite a few projects.

Finding the merits and demerits of the protests is beyond the scope of this article. But such protests - and what they could achieve - point to a profound social change. It is this: the public - especially, the local community - today have a greater say in the way organizations (and the governments) are run. They are not silent spectators any more. They have become an active group of stakeholders.

Therefore, merely obtaining licence from the government, and clearances from regulators - not to mention, lining up those in power and higher offices, are not going to work anymore, if the local community is not taken along.

Change Management is about preparing organizations to see such external changes, well in advance and help organizations change themselves, in response. Changes that happen outside an organization can be Political, Economical, Social, Technological, Environmental, and Legal (in short, PESTEL) in nature. PESTEL changes happen all the time - though the pace or the potential impact of changes may differ.

However, responding to changes, begins with the organization asking two questions:

1. What business function is most important now?
2. What constitutes the best practice today?

Let us go back to the case of protests and how these two questions can be applied. A typical Change Management intervention in an organization, caught in the storm of public agitation, would have meant first getting the top management to understand the growing influence of the external stakeholders - in other words, getting them recognize the change in the 'environment'.

And next concerns with business functions. A business organization is composed of many different functions. Examples include: branding, product development, customer relations, and conservation. It is possible that an organization is excellent at one or two business functions. But responding to change usually means not continuing to do 'what-we-are-good-at-doing'. It is about shifting the attention to 'what-is-the-important-thing-to-do'.

This change in priority is the hardest to come about in any people organizations - because we like routines, and we are biased towards what we are good at doing. In contrast, change of leadership happens so effortlessly in nature. One should only observe how birds change their positions relative to others when they fly in V formation. At the right time the lead bird gives way to the next in line in the interest of the longevity of the flight (or you could say, out of tiredness!).

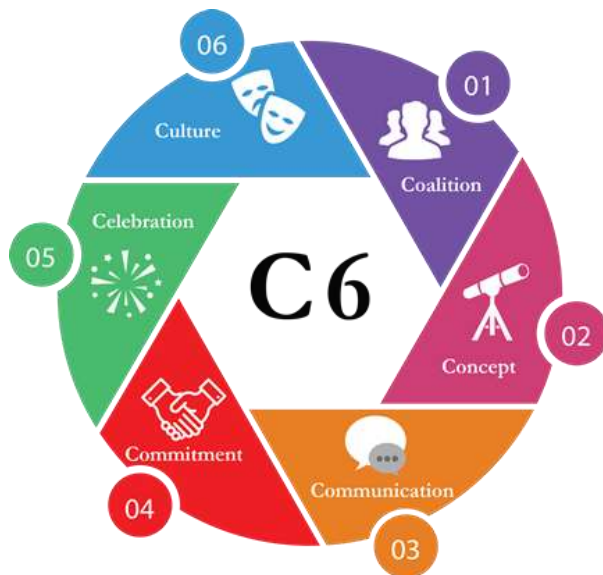
Hence, after getting the management to recognize the change, the next logical step is to get the management to accord a high priority to the business function(s) whose role has just become crucial. In our case, the function that should have taken the driver's seat could have been Public Relations - assuming that the organization in question is already doing enough and more toward discharging its corporate social responsibility / sustainability duties.

Once it is done, the organization should be asking 'what are the best practices' in public relations, today? As they say in the age of social media, Public Relations is not just about storytelling but storydoing, where action precedes stories.

Broadcasting the brand's side of the story in mass media is fine. But what about making news on incidents or potential risks open and keeping the public informed of the remedial measures? How about holding citizen consultative programs or town hall and grievance meetings for the local community?

Once an organization has thus found the convincing answers for these two questions, and has come so far, the rest is just management. That is, communicating the changes expected from members of the organization and rewarding for compliance - and yes, punishing non-compliance.

C6 Change Management Framework



There are several factors that influence the success or otherwise of a Change Management programme. Out of which there are the following six important aspects, what the C6 Change Management framework stands for:

The crucial steps of an effective change management program that C6 stands for are:

1. Forming a Coalition
2. Creating a Concept of the Future
3. Communicating the Vision
4. Seeking Commitment
5. Celebrating small wins, and
6. Making Change Management a Culture

Coalition

When an organization introduces a change, not everyone will react in a same way. There will be detractors, promoters, and neutral people. Forming a coalition of champions - from across the ranks - therefore is important. The primary task of the coalition of Change Management champions is to try to minimize the number of detractors, and convert them and the neutral people into promoters.

A case in point is the Change Management program of Titan Industries, a joint venture between TATA group and Tamil Nadu Industrial Development Corporation. Titan was formed in 1985 to design, manufacture, brand and retail watches. It went on to become a dominant watch retailer in India. Its current market share is about 60%. In 1995, Titan diversified into precious jewellery manufacturing and retailing. However, the company could not penetrate the domestic jewellery market which was then dominated by family jewellers.

The jewellery division was making losses year on year from 1995 to 2003. In 2002, an international consultant engaged by Titan, studied the market situation and recommended the closure of the jewellery manufacturing plant. However, the company launched a change initiative - one, based on innovation, and made a turnaround in a couple of years. Today, jewellery accounts for around 75% of Titan.

Writing for Management Innovation Exchange (1), a portal on management ideas, Mr Lalgudi Ramanathan Natarajan, a senior executive of Tanishq, shared how the turnaround story began with people and teams. "We engaged with union office bearers and opinion makers in formal discussions in the factory and informal discussions outside the factory premises, in creating awareness on the current situation, and the expected outcomes in terms of productivity for us to break even (200%

improvement in productivity). We shared with them the turn-around stories of many corporate with employee involvement. We sensitized them to the urgency and leading them with conversation to think that, we need to innovate, and they can innovate

After taking the department heads, office bearers of the union and opinion makers in to confidence, we conducted many open houses to genuinely communicate with employees on the need for break through improvements, and sharing many inspiring innovation stories.” A lot of preparation with people preceded the launch of the innovation drive.

Concept

Creating a unique concept of future that is shared by all is crucial to aligning people around Change Management initiatives. Writing for Harvard Business Review (2), management gurus: Gary Hamel, and C.K. Prahalad share that “When we talk to senior managers about competing for the future, we ask them three questions. First, what percentage of your time is spent on external rather than internal issues—on understanding, for example, the implications of a particular new technology instead of debating corporate overhead allocations? Second, of this time spent looking outward, how much do you spend considering how the world may change in five or ten years rather than worrying about winning the next big contract or responding to a competitor’s pricing move? Third, of the time devoted to looking outward and forward, how much do you spend working with colleagues to build a deeply shared, well-tested perspective on the future as opposed to a personal and idiosyncratic view?”

The future competitiveness of an organization can depend a lot on the uniqueness of its collective view of future - for it would decide to which function(s) the organization will commit its resources to.

Communication

Bringing in change calls for constant communication. Take the case of Samsung. From a run of the mill electronics company in South Korea, Samsung became the world’s largest electronics company in 2000. It all started with a three day meeting that the former chairman of the company, Mr Lee Kun Hee, conducted in 1993 (3).

Lee Kun Hee wanted Samsung to be like G.E. — an internationally recognized industrial powerhouse. And he wanted it to happen within 2000. In June of 1993, while on his global tour, he landed in Germany, where he called Samsung's hundreds of executives for a meeting. He gave a three day speech laying out his vision for the future of Samsung and what the company had to do to become successful. The speech became known inside Samsung as the "Frankfurt Declaration of 1993."

Outside of Samsung, no one knew much about Lee Kun Hee. But inside, he was omnipresent. Lee went around the globe, evangelizing his gospel to all corners of the Samsung empire. He conducted a lot of lectures. It comes to 350 hours. When they were transcribed, it took 8,500 pages.

And communication can take different forms. Once in 1995, the CEO - disgusted by the low quality mobile phones coming out of his factories - ordered it all destroyed. He and his lieutenants, carrying out his order, cracked the screens and cases with heavy hammers, in front of 2,000-odd workers who were weeping. Then they lit a bonfire and threw everything in. In all, something like \$50 million worth of hardware was burned that day. From those ashes emerged a global electronics conglomerate very soon.

The entire organization should know that they mean business - and they mean change.

Commitment

The next step is securing the commitment of the team to make change happen in their work. One example is the ‘Whiteboard’ revolution of Titan’s Jewellery Division. In 2004, the division started ‘What is New?’ program. Each department was given a white board, where members of the department should capture, three new things that they were pursuing, every month. Titan had 14 departments. Each department gave 3 ideas per month, and in 12 months, that gave the company amazing results.

Celebration

People do not do what is expected of them - sometimes, not even what is inspected. They do what is celebrated. And for the celebration to be frequent and to be the way of life or part of the culture, we must have small targets. Keeping small targets, and celebrating small wins is the hallmark of successful Change Management stories. This is also called the Kaizen way:

aiming for incremental improvements - probably, in quick successions - and recognizing the team for taking the idea to the next level.

Toyota's success in becoming a leader in hybrid cars with its Prius model can show how small wins can lead to historical achievements. When Toyota launched Prius in 1998, it achieved 28 kilometers per liter - double the fuel efficiency of a conventional car. The company kept increasing the target in incremental ways. And the fourth generation of Prius released in 2015 boasted fuel efficiency of more than 40 kilometers per liter. Every year, the team worked on small wins - bringing in incremental improvements to fuel efficiency - one can assume there were celebrations the Toyota Way, whenever there were small wins.

Culture

Making change a habit is about institutionalizing practices as long as they are appropriate for the external environment. Institutionalization happens when the new practice finds itself embedded in the standard operating procedure - formally and informally.

Charles Duhigg, author, *The Power of Habit*, wrote about how Alcoa (4), a large aluminium company in the US, kept making records in workplace safety. When Paul O'Neill, took over as the chairman of Alcoa in 1987, he intended "to make Alcoa the safest company in America. I intend to go for zero injuries." Every year, numerous Alcoa workers were getting injured so badly that they miss a day of work. Alcoa had 175 plants. O'Neill asked the executives of these plants to report as soon as there is an incident, and come up with a remedial plan within 24 hours. Those who followed the routine were rewarded, and those who covered up the incidents were sent home.

O'Neill's 24-hour policy caused a chain reaction that improved Alcoa's operation in countless ways. Alcoa soon became a world-class safety organization. Over O'Neill's tenure, Alcoa dropped from 1.86 lost work days to injury per 100 workers to 0.2. O'Neill left in 2000 but the momentum continues. By 2012, the rate had fallen to 0.125.

The fact that the organization continues to improve its workplace safety, even when O'Neill is no more at the helm, proves that certain Change Management practices have already become part of Alcoa's culture.

The C6 Framework thus captures the key stages of Change Management - from the formation of a team to institutionalizing change. But as we saw in the beginning it all starts with the top management willing to spend time and see - if not, imagine - the change in the external environment, and asking those two questions: one, 'What business function is most important now?', and two, 'What constitutes the best practice today?'

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Sankar currently offers editorial services for brand building and thought leadership. He provides training and consulting services based on his ideation frameworks. Some of his acclaimed ideation frameworks include: Total Value Matrix, a business growth framework, P6, a digital / social business framework, C6, a change management framework, and 5 Growth Dimensions, a framework on leadership.

Sankar's books include: *The Co-creation Roadmap: Six Steps to Tap the Wisdom of Crowds*, which deals with strategy formation on co-creation; *Facebook, Twitter, and a Pair of Shoes*, which presents insights into social business strategies using news, stories, and humour. His forthcoming book is on work-life balance – it is titled: *Tales of Two Lists*, which presents ideas on creating a balanced to-do list and a practical to-be list.

Emerging Education Patterns

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1. Introduction - Education Need

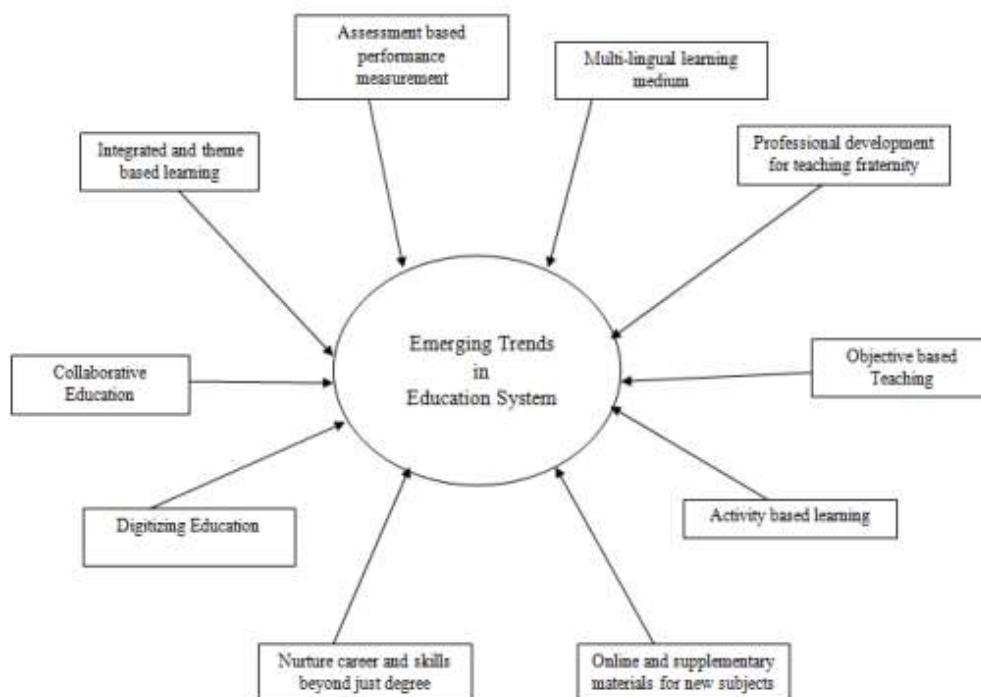
Education is one of the fundamental factors of development. Education plays a major role in enriching people's understanding of themselves and of the world. It raises people's productivity and creativity and promotes entrepreneurship and technological advances. Also, education plays a very crucial role in securing economic and social progress and improving income distribution. It also acts as an integrative force in society, imparting values that foster social position and national identity. The broad **aims of education**, according to National Curriculum Framework guidelines, 2005 [1] are:

- Independence of thought and action.
- Sensitivity to others' well being and feelings.
- Learning to respond to new situations in flexible and creative manner.
- Predisposition towards participation in democratic processes.
- Ability to work towards and contribute to economic processes and social change.

2. Education trends and changes

Gone are the days where only classroom teaching was the only medium to provide education to student fraternity. The world has changed so drastically that the changes have completed a full circle.

The student can be anywhere at his desired location and technology provides all the information needed in various formats to enrich knowledge over a particular topic. The educational systems for their share have also embraced technology and have leveraged its services in the best way possible to enhance the way the educational systems serve the student fraternity.



Traditional courses not the preference any more among student fraternity. Students seek new courses and options like radio jockeying, news anchoring, event management, content writing, and other courses which are the most sought after courses. Innovative mode of learning and coaching preferred like e-learning, distance learning, interactive CD ROM, and other modes of learning. Widening of courses and the changing trends in education sector provides broader choice for students to decide their career as per their core interest and aptitude. The figure shows the emerging educational trends

Each of these trends has a significant impact on the educational system and promotes a positive environment to enrich knowledge by leveraging the technology that is available in abundance.

Integrated and theme based learning

Integrated learning solutions seamlessly combine print and digital modes. The Solutions are teacher-friendly, assessment-enabled, and theme or activity-based as well. They enable contextual learning through multiple disciplines which clears the concepts of learners to a great extent.

The essential aspects of integrated learning are shown in fig 1

- Integrated learning solutions that seamlessly combine print and digital modes.
- Solutions to be teacher-friendly, assessment-enabled, and theme or activity-based as well.
- Enable contextual learning through multiple disciplines which clears the concepts of learners to a great extent.



Fig. 1. Essential aspects of integrated learning

Integrated learning is more focused towards promoting interdisciplinary learning which aims to provide multi-dimensional learning and develop multi-skilled individuals. This way of integrated learning should again be based on a theme which is motivated at diversifying the skill set of student by providing them opportunities to explore multiple domains. This in turn sparks the students to be skilled as cross domain professionals who understand the inter-domain relationship aspects and thus enriching the skills of students across multiple domains. At the same time it is highly significant that the theme behind the integrated programmes is clearly defined after understanding the intra domain and inter-domain relationships clearly.

Assessment based performance measurement

Assessments are a potential tool to evaluate learner's performance as well as the effectiveness of teaching strategies. Huge focus is on measuring student outcomes and performance both online and offline. Most of the time the assessments are misinterpreted to the exams, tests and assignments that are given to the students to evaluate their understanding of the subjects, But in reality, the real assessment stretches beyond the above artifacts. These exams and tests which are conducted on a periodic basis are just a part of overall assessment. The overall assessment covers various other aspects like how a student utilizes the resources such as text books, digital libraries, online materials, online videos NPTEL etc available to him, what are the contents that the student has learnt beyond his syllabus, how the student is able to apply what he has studied to real time environment etc. The assessments should cover all these facets such that it just does not evaluate the student based on the marks secured, it also carries **weightings for evaluating the usage of various resources available** and also evaluating how much knowledge has been gained as content beyond syllabus.

Similarly, the assessments should also be carried across to evaluate the present level of the teaching faculty and provide suitable suggestions such that the gap is narrowed by suggesting suitable online courses that the faculty fraternity can take up to enrich their knowledge in that course or subject.

Multi lingual learning medium

It is a known fact that the medium of teaching has a significant bearing on the understanding of the subject being taught. Also, it is proven that use of mother tongue language as a medium of instruction enables faster and better understanding of concepts. With the diversified educational system that is prevailing these days, students travel across far distance to get quality education. The same content is made available across multiple languages for the ease of understanding of the diversified student fraternity. The Fig.2.shows the medium of instruction may be English, but the translation to national language Hindi and regional language Tamil will also be made available. This is one significant attempt that has been tried out not for just enriching the knowledge of student, but also enhances the reputation of the educational institution at a national or global level.



Fig. 2. Multilingual learning modes

Professional development for teaching fraternity

There is a strong belief that a student is as good as his teacher as “the influence of a good teacher can never be erased”. . With ever growing technology, it has become mandatory that even the teaching fraternity along with the students has to keep pace with the evolving technology and update their skills and knowledge level. The educational institutions should periodically review the curriculum and syllabus which matches with the current industrial demands. Also, the current skill set, teaching methodologies and knowledge level of the teaching faculty should be evaluated and the gap analysis should be performed periodically and various faculty development programs conducted to enrich the skill set of their faculty.

Game/Activity based learning

Gone are the days when teaching using black board was a primary mode of making students understand the concepts pertaining to a subject. Even projector based presentations have started to diminish gradually. Modern way of teaching and learning is centered around making the student learn the subject or content based on various activities that can be performed inside the class room. The activities can be game based, scientific puzzles, quiz, group discussions, enacting a scenario and the list grows.

- Young learners have a keen interest in games.
- This approach is perfect for adults to garner the attention of the children towards studies.
- Apart from making the learners understand the concepts, game-based learning also helps in enhancing the learners' self-morale, confidence.

A self-learned individual is the most sought person in current industrial trend.

Collaborative Education

Collaborative education is an upcoming concept in educational systems [1]. The focus of this collaborative education is to join hands with other educational institutions in an attempt to share, enhance, enrich and expand the knowledge space by sharing the resources across the partnering institutions for the benefit of students across both the partnering institutions. The collaborative education is paving this path of bringing various specialized institutions in a link according to the need of students. It includes inter-institutional arrangements where two or more institutions agree to offer jointly a study

programme in terms of study credits and credit-transfers, so that students pursuing their studies in one institution have their credits recognized by the other, and accepted for transfer in order to continue their studies. It may also be termed as twinning programmes. The concept of collaborative education can be of different types :Institution-Institution Collaboration, Institution-School Collaboration, Institution-Community Collaboration., Institution-NGO Collaboration, Institution-State Collaboration, Institution-State-NGO Collaboration, Institution-Industry Collaboration and various other forms. The concept of collaborative education helps in bringing the institutions closer which leads for understanding each-others functions and works and reforming their ideas. Many institutions are collaborating with other universities, schools, NGOs and government agencies for adding value to their educational practices.

Online courses and supplementary materials in new subjects

With the educational institutions turning their focus towards collaborative education, there has been advent of several new courses which are multi-disciplinary and inter-disciplinary in nature. The faculties handling these courses not always make it to the class rooms but they connect to the student fraternity via online course discharge which includes online lectures, technical blogs, online repository and links for study materials. Apart from video lectures, the supplementary materials such as experiments, practical sessions, demonstrations etc, are made available online. This way the materials pertaining to these subjects are made accessible to the student anywhere with the available network connectivity.

Objective based teaching

Industrial and Information technology revolution have triggered a lot of changes in the expectations of employers. It is also to be noted that the expectations of these employers do not remain constant forever and it changes with the growing disruptive technological front. Preserving ethical and Cultural value in the fast changing technology is a challenge to maximize cultural, social and ethical values. In order to make the students employable in this demanding situation and at the same time to strengthen moral/ethical values, the educational institutions at various levels should make every possible attempt to clearly identify the objectives according to the industrial/ethical/social harmony demand and align the syllabus such that it caters to the industrial /ethical/social needs.

This object based alignment will not be sufficient if implemented only at college level who serves as an interface between the student and industry. The objectives should be clearly demarked starting from the primary school level to higher education.

Focus on nurturing career and skills beyond degree

The supply chain for an educational institution especially at college level ends when their student who are their brand ambassadors get employed in reputed organizations. With this in mind the educational institutions have turned their focus towards nurturing the skills of the students apart from imparting quality education.

- Focus on career skills, not just degrees.
- Traditional degrees like a bachelors or masters not sufficient any more for successful career.
- Focus on specific skill for a specific job profile

The degree obtained at the completion of the course is no longer the only criteria for getting employed. Various facets such as communication skills, soft skills, personality traits etc, constitute in addition to the academic scores which makes a student employable. This makes the educational institutions doubly responsible for understanding the industrial demands and identifying the skill gaps that exists among the students and organize and provide various courses and guidance programs that address this gap and make the students more employment ready thereby ensuring a successful start to their careers.

Digitizing Education

Internet and its usage through various devices have redefined learning ability. It has enabled a person to learn from anywhere and at any time. With the emergence of various modes in which information sharing and communication can happen seamlessly, it becomes highly significant that the teaching and learning mode is not only reliant on printed mode such as books, magazines, journals, notes and so on. Various other modes such as online materials, group discussions, technology forums, online videos etc, can serve as dependable and good source of information from which knowledge can be tapped.

The Digital Literacy Mission was announced as part of the Union Budget 2016 to cover 60 million rural households within

the next three years. 'Digital Highways' that are being created as part of the Digital India Mission will play an important role in "connecting India and Bharat". Also, the Government of Tamil Nadu have allocated large funds for education and skill development under the title Vision 2023 [2] as shown in fig.3. It can be clearly seen that the move to digitize education and make it available across various modes is already up and running.

Govt. of Tamil Nadu – Vision 2023

Box No. 12.1 Education and Skill Development - Vision 2023

Aims to establish robust human resources by adopting following measures:

- Providing universal access, equity, quality at primary, upper primary, secondary and higher secondary level.
- Increasing the enrolment in higher education (including vocational education) to over 50%.
- With focus on employability in manufacturing and service sector, train and skill 20 million people - people entering job market 15 million, and people already part of working population 5 million.

As part of the skill developed programme the key intervention are:

- Large scale skill development programme to impart basic training to unskilled labour primarily agriculture workforce (bottom of the pyramid).
- Employability programme for skilled level (middle layer in the pyramid) to deliver industry relevant skills key growth sectors.
- Setting up of centre of excellence in the area of automotive technology, solar and clean energy technology, biotechnology, agricultural practices, water resources management, construction management, lifestyle diseases, aerospace, basic science, nano-technology and social sciences.
- Focus on "train the trainers" programmes in different sector by setting up specialized training institutes.

Upgrading middle and high schools	Rs. 5,000 Crore
Skill Development for vocational training to 20 million people	Rs. 11,000 crore
Setting up of Centres of Excellence across 11 identified areas	Rs. 3,000 Crore
Total	Rs. 19,000 Crore

Source: Vision 2023, Government of Tamil Nadu.

Fig.3. Govt. of Tamil Nadu – Vision 2023

3. Conclusion

As quoted famously by George Bernard Shaw "Progress is impossible without change, and those who cannot change their minds cannot change anything" [3], the education system has evolved and has adjusted its sails in accordance with growing technology.

The alignment of key activities of the educational system should focus towards imparting concept clarity, innovative thinking and higher order skills via multi-lingual learning and improving learning capability and skill development by creating a democratic physical learning space to enable group based learning. Skill development programs should focus on life skill education which covers personality development, enhancing confidence and self motivation among student fraternity. Many technical development programs at various levels of education system should be organized with an effort to bridge the skill gap for job profiles across industries. The quality of education especially across science and mathematics should be very high such that the student is acquainted with the ability to think logically, formulate and handle abstractions.

At the same time the education system should ensure that the student is equipped with social, moral and ethical responsibilities by organizing relevant sessions. With all these aspects discussed, the focus of educational institutions should now be directed towards implementing these ideas successfully to ensure the students attain intelligence and have the right skill set to embark on a successful career ahead. Our education system needs to continue to provide high quality researchers, engineers and physicians to the industry to provide safety-first smarter life experience to customers irrespective of fluctuating domestic/global political/economical issues.

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Quotes

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2. To improve is to change; to be perfect is to change often. - Winston Churchill
3. Change your opinions, keep to your principles; change your leaves, keep intact your roots. - Victor Hugo
4. Education is the most powerful weapon which you can use to change the world. - Nelson Mandela
5. The only person who is educated is the one who has learned how to learn and change. - Carl Rogers
6. You are always a student, never a master. You have to keep moving forward. – Conrad Hall



About the author: Dr C Chellappan ME, Ph.D has worked as professor for more than 37 years with strong technical, academic, managerial, industrial, and research experience as well as expertise in implementation and management of IT systems for educational and organizational requirements. He has served as IT consultant in the USA for more than 2 years in CDMA Technology. He has published more than 160 research papers at national, internal level journals and conferences and visited various countries like China, Singapore, Australia, USA, Canada. He is member of MISTE, CSI, ACM.

His research interest includes cyber security, agent technology, wireless networks. He was the project coordinator for collaborative directed basic research project on 'Smart and Secure Environment' sponsored by National Technical Research Organization, Govt. of India, New Delhi. He was also the project team member of Indo-Australian Joint Research Project on 'Protecting Critical Infrastructure from Denial of Service Attacks: Tools, Technology and Policy' sponsored by Department of Science and Technology, Govt. of India.

He has also been associated at various levels with several bodies like Technical Expert member in Govt. departments, inspection committee member of AICTE, NBA, UPSC selection committee, Chairman/member of Computer Science syllabus committee (XI and XII std), Tamil Nadu State Board of Higher Secondary Education.

Dr. C. Chellappan is currently the Principal of G.K.M. College of Engineering and Technology, Chennai and he has held several administrative portfolios at Anna University viz. Dean-CEG, Director – Ramanujan Computing Centre, etc.

We, the people that were born between 1940-1980 are the blessed ones. Our life is a living proof

- While playing and riding bicycles, we never wore helmets.
- After school, we played until dusk. We never watched TV.
- We played with real friends, not internet friends.
- If we ever felt thirsty, we drank tap water not bottled water.
- We never got ill although we used to share the same glass of juice with four friends.
- We never gained weight although we used to eat a lot of rice everyday.
- Nothing happened to our feet despite roaming bare-feet.
- Our mother and father never used any supplements to keep us healthy.
- We used to create our own toys and play with them.
- Our parents were not rich. They gave us love, not worldly materials.
- We never had cell phones, DVDs, play station, XBox, video games, personal computers, internet chat - but we had real friends.
- We visited our friend's home uninvited and enjoyed food with them.
- Unlike your world we had Relatives who lived close by so family time and ties were enjoyed together.
- We may have been in black and white photos but you can find colourful memories in those photos.
- We are a unique and the most understanding generation, because *we are the last generation who listened to their parents*.

**We are a LIMITED edition! So you better, Enjoy us; Learn from us; Treasure us;
before we disappear from Earth and your lives..... Love everything and everyone**

Next Generation DNA Led Analysis - Challenges and Threats

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DNA is the source of life and has been studied since a generation, but very little is known about as yet. Several sophisticated technologies of the current era have laid their foundations on the principle of DNA based mechanisms. DNA based technologies are revolutionizing Forensic Investigation, Medical Diagnosis, Paternity Disputes, Individual Identity, Health insurance, Motor Insurance sectors.



Recent years have witnessed an explosive growth in biological data and gave birth to the pacemaker of biology called Bioinformatics. More than 350 fully sequenced genomes are publicly available, and more than 780 are in the pipeline. We can expect automation; it is already happening. There will be more integration of computerized analysis with laboratory tests. Capillary electrophoresis will require less material and produce faster results; DNA chips are in the pipeline too. We can also expect miniaturization with attendant portability. Recently into action of a hand-held chip that can analyze 8 STRs in a few minutes. We can foresee the time when forensic analysis can take place at the crime scene. If immediate results are produced, it can offer prompt clearance of erroneously identified suspects, avoiding much needless apprehension. I would emphasize, however, that what can be done in pilot

experiments will usually not be good enough for forensic use, for which a system must be thoroughly tested and validated. Primitive DNA Analysis methods required higher cell count in order to develop profiles. Current DNA Fingerprinting from swabs is particularly fast, results may be expected in hours, yielding accurate results.



While the appropriate use of DNA can be helpful in reducing and reversing wrongful convictions, inappropriate use of it and the sway of it, over other evidence on juries and judges can create a system of wrongful convictions. The expansion of publicly available information resulting from the Human Genome Project has justified the role for bioinformatics capabilities worldwide. With the regular increase in the Biological data scientists started focusing on challenges like-where to store the data?, how to analyze them? Do we have enough expertise and manpower to secure and manage the massive data coming out of different genome projects across the globe? If Computers are being hacked Biological data stored in computers and databases can also be hacked. Cells are compared to the

hardware and DNA as the Biological software. What next??? Will bad biologists start developing bad synthetic biomolecules for disturbing the human race and making them unhealthy? DNA testing which is used to free innocents and convict the criminals may start working other way round? Can Biology be hacked? If yes, what is the way forward? We are in 1980s era; if you talk of Biological hacking – a very early stage. There have been only a few Biological attacks, which were sponsored by Governments as of now (Including the white powder, Anthrax attack), but genomics is changing with jet speed and the silence of Biological hacking may last soon in absence of corrective measures and ignorance. We may need to be prepared for listening and handling DNA Spams, DNA Spoofing and bio identify theft sometimes soon. The current era of incredible innovations toward the zeal to chase the heights of development has made science and technology one of the most powerful tools to accomplish the tasks of incremental prosperity for human welfare and sustainable development. It has been rightly said that science, technology, and innovation work together for growth and development. With the multifarious aspects of science there is a need for thought-provoking ideas and cumulative efforts that can strengthen the scientific capacity to produce successful innovation systems.



About the author: Dr. Amit Kumar is passionate Forensic Scientist, Entrepreneur, Engineer, Bioinformatician and an IEEE Volunteer. In 2005 he founded first Private DNA Testing Company BioAxis DNA Research Centre (P) Ltd in Hyderabad, India with an US Collaborator. He has vast experience of training 1000+ Crime investigation officers and helped 750+ Criminal and non-criminal cases to reach justice by offering analytical services in his laboratory. His group also works extensively on Genetic Predisposition risk studies of cancers and has been helping many cancer patients from 2012 to fight and win the battle against cancer. Amit is member of IEEE Strategy Development and

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Cognitive IoT Systems – the Future of IoT

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IoT – Current Status and Future Trends

The Internet of Things (IoT) has emerged in recent years as the main technology for “Digitalization” of different Industries, be it manufacturing or energy & utilities or transportation or healthcare or smart cities. IoT connects the physical and virtual worlds by giving sensing and processing capabilities to the physical “things”. The “things” can be extended to sensing “people” and “processes” and is generally known as Internet of Everything (IoE) [1]. All such systems are typically characterized by a “Sense-Analyze-Respond” cycle [2], leading towards context-aware systems. With large scale proliferation of IoT technology in real-world deployments in the verticals of Manufacturing, Energy & Utilities and Smart Cities, the basic technologies of sensing, communication and cloud are getting matured and the focus is now shifting towards incorporating technologies for advanced security, artificial intelligence and edge computing and newer application verticals of Smart home and Healthcare [2]².

By 2020, the IoT market size is estimated to be more than 450 Billion USD growing at an annual rate of approximately 30% with Smart Cities, Manufacturing, HealthCare and Smart Homes catering for more than 75% of the market. For the first time in the history of mankind, in 2018, the number of devices are already outnumbering number of people in our planet³, giving credence to the phenomenal growth story of IoT.

In a recent book on IoT by the authors [2], we presented a detailed discussion on ‘Real IoT’ bringing out the key contributing factors of realistic implementations of IoT and outlined how a real implementation of IoT is always a trade-off between various features like hard & soft sensing, security & user experience, battery life & performance, communication range, power & bandwidth etc. It appears that that next wave of IoT will be driven by two key technologies – “Resilient IoT Systems” and “Cognitive IoT Systems”. While the Resilient IoT systems will naturally emerge through engineering advancements of IoT technology, it is the Cognitive IoT Systems which will potentially disrupt the market through unique marriage of IoT Sensing with Artificial Intelligence.

What is Cognitive IoT and Why it is Needed

We define “Cognitive IoT” as an IoT system that integrates aspects of human cognitive processes in the system design to achieve various levels of autonomy in perception, analysis and actuation supporting self-x capabilities including learning, re-configuration, resilience, optimization and management with adequate human-machine context awareness.

The underlying cognitive process can have many abstractions of a cognitive cycle such as ‘Sense’, ‘Understand’, ‘Decide’ and ‘Act’. The ‘Sense’ process takes care of sensing and collecting data about the self the world around. ‘Understanding’ involves extraction of information through analysis of sensor data, interpreting and representing them in a structured manner. This is followed by a decision making process to arrive at responses and actions to be taken based on the information gathered. Finally the decisions taken are applied to the system through suitable actuation logic as part of the ‘Act’ process. At each of these stages the system can learn from experiences which can be used subsequently to adapt. Such intelligent control loops can provide a system with autonomic capabilities or self-x properties such as self-healing, self-configuring, self-optimization and self-management.

What it means to be a cognitive IoT (C-IoT) system? A C-IoT system should be able to detect any failures of its system components and re-configure itself to provide a graceful degradation through self-healing. If there is a sensor failure, the system should explore if it can be compensated using a soft-sensor or inference from remaining sensor data. When communication bandwidth is affected by an unforeseen interference source, it should explore if the flow can be re-routed or the data can be compressed or encoded with suitable error control codes as an adaptation measure. On the detection of a security attack on a part of the network, suitable counter measures needs to be kicked-in including change of security keys, isolation of the affected network branch or alerting human operator making the system resilient to any attacks. Depletion of battery power of a device can be detected and the system may re-distribute its tasks so that the burning rate can be

² <https://www.globalsign.com/en/blog/top-iot-trends-of-2018/>

³ <http://www.edgica.com/internet-of-things-in-2018/>

reduced to extend its life. Extending such adaptations and self-optimization in various dimensions can enhance the overall system robustness.

The intelligence of C-IoT should also reflect in its ways for interacting with human. Five senses of human could be exploited as a means to communicate with human. It may vary with the objectives of the interactions. A C-IoT system may receive commands and configuration inputs from human through voice, haptics or other input devices. Information about system states, events etc. could be conveyed to human through audio, vision, haptics and other output devices. Augmented Reality (AR) and Virtual Reality (VR) are emerging technologies that integrates many of these modes that are being explored for many of the human-IoT system interactions. In all these cases the C-IoT system should understand the human context and choose appropriate modality that provide optimum user experience and efficiency.

Knowledge management is an important aspect for C-IoT to help in its autonomous functionalities. This would include knowledge about the application, system architecture, resources, system state, behavior etc. It has static as well as dynamic parts and suitable learning algorithms should be deployed to support the dynamic knowledge. Recent advancements in the machine learning including deep learning can help a lot to build required learning capability in the system.

Some Motivating Use Cases

Let's look at a few interesting examples of C-IoT. Our first example is an industrial safety application. Monitoring the body vitals of the workers working in a hazardous environment and quickly responding to any abnormal events can be critical and potentially life-saving for worker safety. It can be achieved by the worker wearing a smart watch that can monitor the movement and heart beats round-the-clock and send the information to a back-end⁴. A cognitive analytics engine running in the back-end can do a knowledge-driven analytics on the collected information and raise appropriate alarms when required. The cognitive engine can look for detecting events like sudden fall, immobility and sudden fluctuations in heartbeats to generate the requisite alarms. Multitudes of sensors on the wearable have to be scheduled and configured through self-optimization so that the battery life can be extended without affecting the performance expectations. In case the wearable lose the wireless network (Low Power Wide Area Network - LPWAN) connectivity in an emergency situation, it would like to search for an alternate gateway – may be a Wi-Fi access point or users smartphone over Bluetooth to pass the critical message.

The second example is of an IoT-driven resilient process control system for a factory. In the era of Industry 4.0, a lot of factory equipment are fitted with sensors which send data to backend over an IoT-driven infrastructure for analytics and actionable insights. In a C-IoT implementation of such a system, the system can automatically switch to other sensor data or generate soft sensor outputs combining other sensor data and information in case of sensor failure. Such system can also create alternate networking routes and/or process most of the data at the network edge in order to minimize network throughput / relax latency requirements in case of disturbances in the factory wireless network. In both cases, the cognitive engine can help in improving the resilience and reliability of the IoT system.

Our third example is of a drone examining a critical outdoor infrastructure. This is a real problem for utility companies having large electricity and water distribution systems. Let's take an electricity company which wants to inspect the structural integrity of its powerline distribution towers, either as a part of routine maintenance or as a health-check up after a disaster like storm. Sending people to do this job is extremely time consuming and hazardous. Instead, we can have a drone which can autonomously navigate itself by following the powerlines by processing the images taken from its downward looking camera (such sensor driven autonomous navigation makes it a C-IoT system) and reach the distribution tower. It can inspect the tower from a distance using camera vision and try to find out high level irregularities. If it finds some problem (say an insulator cap of a high tension line seems to be damaged), it can automatically go closer to that part of the tower, zoom in, assess the damage and send real-time reports to the back office for sending a technician to repair. The drone can also self-monitor its resources (like battery life) or on-board faults to make sure it can maximize its mission objectives. In not so distant future, even the repair would be possible by the drone with a technician siting remotely in his office remotely guiding a robotic arm on the drone to perform the repair / replacement (similar to remotely operated robotic surgery). In this case, use of C-IoT not only saves money and time, but also avoids sending people to do hazardous jobs like going near high-tension electrical lines, thereby improving the overall safety.

⁴ <https://economictimes.indiatimes.com/tech/hardware/tatas-develop-safety-watch-for-workers-to-focus-on-wearables/articleshow/52111684.cms>

Some Thoughts on Implementation Aspects

How to go about implementing a C-IoT system? We would like to share some high level thoughts here. As mentioned earlier, at the heart of a cognitive system, there is a cognitive architecture implementing a cognitive cycle. ‘Sense-Understand-Decide-Act’ is a generic abstract cognitive cycle that can guide the architecture of autonomic functions planned to be incorporated in the system. Learning is an integral part of the cycle that helps managing the knowledge about ‘self’ and ‘world’. So first question on the implementation aspect is on the knowledge model and repository for the system. ‘Self’ model should capture the knowledge about the IoT system – sensors, network structure, states and configuration, protocols, data & control flows, security configuration etc. The world knowledge should incorporate the models of all external entities that would contribute or impact the operation of the system. It will include the target system – the system for which IoT is built for, environment factors, ambience, user state and goals. Of-course the detailing of such knowledge systems will be based on the level and scope of automation to be incorporated in the system. The knowledge model has both static and dynamic parts. The static part include ontologies, graphs, rules etc. and they have to be either specified upfront or at least part of it discovered from the system. The dynamic part is acquired from the system with suitable data analysis and inferences. From our experience, the most difficult part of a C-IoT is in building and maintaining the knowledge base that is required to the level of self-x functions we would like to incorporate.

Looking at the cognitive cycle, the ‘Sense’ capability is already a basic component of any IoT system. From the sensed data building up and updating the knowledge structures through analysis and inferences is the ‘Understanding’ capability. As a next step in the ‘Decide’ stage the facts and knowledge about the ‘self’ and ‘world’ is used to make various decisions and actionable insights towards achieving the stated system goals. Most cases this will include a high level planning stage as well to generate a coarse action plan. In the ‘Act’ stage the decisions are mapped to corresponding low level action sequences and applied on the IoT system in a timely manner. Specific algorithm candidates for implementing the above capabilities are well covered in the state of the art literature on autonomous systems and a discussion on them is out of scope of this article.

Another implementation related question is on where to embed this ‘cognitive engine’ encapsulating the cognitive cycle? Should it be centralized at the cloud or distributed at edges or both? For a standard IoT system also this question comes up [2]. Is the cognitive C-IoT system is any different than a standard IoT system from this perspective? What we need to remember for a cognitive system is that it incorporates a cognitive cycle which is a control loop. The system should satisfy the control theoretic expectations on response time, actuations etc. so that the overall system is stable. The architecture should be chosen accordingly.

Today C-IoT has started gathering research interests but yet to reach real Industrial deployments in its true sense of self-x systems. More and more research and implementation challenges are expected to emerge as we progress towards pilot studies and field implementations.

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About the authors



Arpan Pal received both his B.Tech and M.Tech from Indian Institute of Technology, Kharagpur, India in Electronics and Telecommunications and PhD. from Aalborg University Denmark. He has more than 26 years of experience in the area of Signal Processing, Communication, Embedded Systems and Robotics. Currently he is with Tata Consultancy Services (TCS), where, as Principal Scientist, he is heading the Embedded Systems and Robotics Research in TCS. He has more than 125 publications and book chapters till date in reputed Journals and Conferences. He has also co-authored a complete book on IoT. He has filed for more than 95 patents and has 38 patents granted to him. He is on the editorial board for reputed journals like ACM Transactions on Embedded Computing Systems, IEEE Transactions on Emerging Topics in Computing and IT Professional Magazine from IEEE Computer Society. He is a Senior Member of IEEE and is also engaged in the innovation space in different industry bodies like Confederation of Indian Industries (CII), Bengal Chamber of Commerce and Industries (BCC&I) and National Association of Software and Services Companies (NASSCOM). He is on the board of studies and review committees of different engineering institutes and also engaged as technology mentor for some of the start-up accelerators.



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Life Lesson from Xi Jing Peng, President of China

President Xi Jing Peng of China said:

When I was a small child, I was very selfish; I would always grab the best for myself. Slowly, everyone left me and I had no friends. I didn't think it was my fault so I criticized others.

My father gave me 3 sentences to help me in life.

One day, my father cooked 2 bowls of noodles put the 2 bowls on the table. One bowl had one egg on top and the other bowl did not have any egg on top. He said "My child. You choose. Which bowl do you want". Eggs were hard to come by those days! We only got to eat eggs during festivals or New Year. Of course I chose the bowl with the egg! As we started eating. I was congratulating myself on my wise choice/decision and eat up the egg. Then to my surprise, as my father ate his noodles, there were TWO eggs at the bottom of his bowl beneath the noodles! I regretted my choice so much and scolded myself for being too hasty in my decision. My father smiled and said to me, "My child. You must remember, what your eyes see may not be true. If you are intent on taking advantage of people, you will end up losing!"

The next day, my father again cooked 2 bowls of noodles: one bowl with an egg on top and the other bowl with no egg on top. Again, he put the two bowls on the table and said to me, "My child, you choose. Which bowl do you want?" This time I thought I was smarter. I chose the bowl without any egg on top. To my surprise, as I separated the noodles on top, there was not even a single egg at the bottom of the bowl! Again my father smiled and said to me, "My child, you must not always rely on experiences because sometimes, life can cheat you or play tricks on you. But you must not get annoyed or be sad. Just treat this as learning a lesson. You cannot learn this from textbooks.

The third day, my father again cooked 2 bowls of noodles, again one bowl with an egg on top and the other bowl with no egg on top. He put the 2 bowls on the table and again said to me, "My child. You choose. Which bowl do you want?". This time, I told my father, "Dad, you choose first. You are the head of the family and contributed the most to the family." My father did not decline and chose the bowl with one egg on top. As I ate my bowl of noodles, I was sure in my heart that there was no egg inside the bowl. To my surprise! There were TWO eggs at the bottom of the bowl.

My father smiled at me with love in his eyes, "My child, you must remember that when you think for the good of others, good things will always naturally happen to u!"

I always remember these 3 sentences of my father and lived and do my business accordingly. True enough, my business was a roaring success.

-- Xi Jing Peng

Xiaomi has launched a smart dustbin which opens automatically using sensors to detect human hand or other objects within a distance of 0-35 cm. It also has the ability to seal the garbage bag once it is full and can automatically replace it with a fresh bag. Priced at ₹2000, the dustbin is expected to begin shipping from September.

A 26-year-old homeless web developer in California, David Casarez received over 200 job offers after he stood at a busy street and distributed his CVs. His story went viral on the Net after a passerby took his picture and posted it online urging others to support him. David claimed Google, Bitcoin.com and a bunch of startups offered him a job.

Atal Innovation Mission

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India, over the centuries has never had a dearth of great thinkers, scientists, engineers, doctors, innovators, philosophers, artists. Indian intellectual capabilities are second to none with some of the greatest scientists, mathematicians and engineers in the world like President Abdul Kalam, Shri Ramanujan, Sir CV Raman, Shri Jagdish Chandra Bose and Dr Vikram Sarabhai. Our philosophy, culture , fine arts, temples and sculptures over thousands of years also bear testimony of the same.

What India however lacks today is a holistic innovation ecosystem that enables the thinking capabilities of more of our people to be expressed as great scientists and innovators. Whenever Indians go abroad they excel. Many like Sundar Pichai, Satya Nadella and other Indians are leading innovations in some of the largest and most innovative companies of the world like Google, Microsoft , etc.

Access to an innovative ecosystem in these developed countries has allowed them to realize their aspirations, convert their dreams into realities, and helped them flower and blossom to their true potential.

With over 1.3 billion+ people, over 1.4 million+ schools, over 10500 engineering institutions and similar number of business schools, with over 150 million youth of India entering the work force and we need to ensure that these students and youth can also realize their true potential.

The Atal Innovation Mission single focus is to create such a world class innovation and entrepreneurial ecosystem in India - to promote world class innovation and entrepreneurship throughout the length and breadth of our country. To provide an innovative ecosystem that will also transform our job seekers to job creators of the future.

The AIM Framework - a Holistic Framework

The Atal Innovation Mission has adopted a holistic framework to achieve its objectives, as we need interventions which can create immediate impact, and others which are necessary from a long term.

There are a growing number of startups in India thanks to the several startup initiatives in the country both from the private sector as well as the government - but there is a greater growing need for new green field Incubators across the various fine academic and other institutions of the country to provide the necessary support system in many ways to start ups to enable their success - from access to technology labs, mentoring networks, to access to venture capital, financial, hiring networks, etc.. There is also need to support scaling of existing proven Incubators. With 100 smart cities have been identified in the country, we need to ensure thriving vibrant incubators in all these smart cities

At the schools level is a tremendous need for creation of an innovative , problem solving mindset in the students of the high schools. These students are going to be the future of our country and we need to ensure that thousands of entrepreneurs and innovators are launched through the innovation initiatives of our country.

Finally at the grass roots level a cultural shift in attitudes towards entrepreneurship through education and awareness of the importance and opportunities of entrepreneurial ventures, availability of venture capital to seed them, through the incentivization of relevant product innovations with commercial and social impact through challenges. This will trigger and incentivize entrepreneurial thinking and minimize the fear of risk taking and risk Management in such ventures.

About Atal Tinkering Labs

The word Tinkering is often associated with a garage where you use the hundreds of tools in a garage to repair or fix a vehicle or even experiment with new possibilities. The very environment and atmosphere in a garage makes you apply your theoretical knowledge to practical applications and innovations.

Theoretical class room based knowledge in the various fields of science, physics, chemistry, math triggers the spark of curiosity in a child to acquire more of such knowledge and our children and students are very good at that

Practical knowledge, access and tinkering with these latest tools and technologies that ignites the imagination of children to apply these abstract concepts learnt in the classroom to real world solutions is very important for the children and youth of our country

The world is changing at a dizzying pace. Revolutionary technological advancements are transforming the world and giving rise to new technology and business innovations at an exponential rate. Electronics miniaturization has enabled a computer the size of a room to fit the size of our pockets with convergence of computing, storage and communications at incredibly lower costs . Robotics and artificial intelligence are driving next generation productivity and automation. 3D printers are making real time conceptualization, design, prototyping and manufacturing a reality. IOT or the Internet of things are connecting sensor Technologies to mobile and satellite Technologies in every Industry - from enabling precision agriculture, water cleansing and conservation, climate change controls, disaster prediction and management, driverless cars and space shuttles. Big Data and analytics and Artificial Intelligence are enabling ecommerce and complex decision making through advanced easy to use tools

All these tools and Technologies are available today and affordable too from a learning perspective . Unless our children in our schools have access to these Technologies and get familiar with them , tinker with them, experiment with them, design solutions with them, prototype them, test them, and allow unbridled expression to their imagination and creativity, they and we all will be left far behind.

If you can create prototypes and solutions in the school level you create also a mindset and confidence in being able to become a job creators of the future

AIM has already launched the implementation of 5000+ Atal Tinkering Labs across 650+ of the 715 districts of the country in both government and private schools across the country all of which will be operational in FY1819. The results of these interventions are amazing to watch. A 10th grade girl student from a remote government school has been able to develop an IOT device for irrigation management and water conservation using soil sensors winning a national student innovation contest. Another student from one of these Tinkering labs was a winner in a World Robotics Olympiad by designing a Robotic waste segregation and management system.

Atal Incubators

The Atal Incubators intervention is to enable the creation of world class incubators to support the burgeoning number of startups in the country.

AIM has already launched 101 incubators to date all of which would be operational by end 2019. These incubators will provide the necessary ecosystem of access to technology labs, hiring, training, mentoring, finance, venture capital networks and corporate networks.

The long term vision is to have world class incubators in the Top 10 academic and engineering institutions of every state and at least a couple of incubators in every city identified as a smart city for development

Atal Challenges

India is the world's largest democracy with over a billion people, 33 states, 8 Union Territories, multiple languages with each state having different issues and problems to solve both from an economic growth point of view as well as societal needs point of view. It is important to expose the magnitude and impact of these problems to the future innovators of the country to also enable them understand the enormous positive impact that solving these problems would have

There is therefore an urgent need to incentivize relevant problem solving and innovations at local, regional and national levels across the length and breadth of the country – at schools, universities, industry and even global levels.

The Atal Tinkering Challenges at school levels, the Atal New India Challenges at Start ups and University levels, the Atal Grand challenges at a national level will incentivize Relevant problem solving and innovations and entrepreneurship, which can have ready markets for them besides enabling creating new markets. 24 Atal New India Challenges stimulating product innovations in five sectors have been launched in areas such as Drinking water and Sanitation, Urban Housing and development, climate smart Agriculture, Rail safety and Transportation which can have great benefit for the country as well as be commercial successes. In the recently held Atal Tinkering Marathon over **35000+** students participated creating 6000+ innovations in five challenges launched nationwide. The Top 100 innovations from these school students are being considered for possible conversion from prototypes into market ready products.

Collaboration is the key

AIM is convinced that that none of these initiatives are going to succeed without proactive collaboration with corporate and individual mentors, specialists and professionals who want to give back to society in some way and be a part of the India in the making, Corporates and SMEs can adopt ATLs and coach the students into problem solving, ideation, prototyping and triggering small innovations. Regional, state and international governments who actively support the cause, global academic partnerships can enable sharing of best practices and could extend their facilities virtually. NGOs and multinational companies who have a stake in one of the largest democracies of the world can collaborate on almost all these initiatives. None of these initiatives will succeed without a certain degree of selfless commitment and passion to the cause of innovation and to the cause of betterment of the world we live in. In a connected world remote or distance mentoring can be a reality.

Collaboration will be key to the success of these initiatives. AIM has therefore launched a **Mentors of Change – Mentor India Network** across the country and hopefully extend it world wide . Over 5000 mentors have registered for mentoring and many corporates have adopted Atal Tinkering Labs for mentoring them.

Future long term goals of AIM

AIM's future initiatives include establishment and promotion of Small Business Innovation Research and Development on a national scale (AIM SBIR) for accelerating innovation on a large scale in small businesses/startups/MSME in different sectors. AIM would also collaborate in Science and Technology Entrepreneurial Ecosystem Rejuvenation (AIM STEER) of innovations in major research institutions of the country like Council of Scientific Industrial Research (CSIR), Indian Council for Agricultural Research (ICAR) and Medical Research (ICMR) aligned to national socio-economic needs.

In closing

India did get left behind in the industrial revolution that swept the world in the last century. But India does have a fantastic chance to contribute to the world in the knowledge based revolution that is sweeping the world today. That is why Atal Innovation Mission initiatives are so important and needs to be embraced by all. The children and youth of the future deserve it. We all need to collectively make it happen.



About the author: Mr. R Ramanan is the Mission Director of the Atal Innovation Mission Additional Secy NITI Aayog - the Atal Innovation mission is a strategic national Innovation initiative NITI spanning schools, universities, NGOs and the industry

R Ramanan was previously Managing Director & Chief Executive Officer and member of the Board of Directors of CMC Ltd., a subsidiary of the globally acclaimed Tata Consultancy Services (TCS).

Ramanan's illustrious career in the IT industry spans more than three decades when he joined TCS in 1981 after graduating from IIT Mumbai in Electrical Engineering. Ramanan played an instrumental role in the growth of TCS with a variety of responsibilities ranging from software product development, technical marketing, global business development, and general management of large delivery centers of TCS.

Ramanan led CMC's rapid transformation from a domestic government organization to a global IT systems engineering and integration organization. Under his leadership CMC share price grew over 2100% between October 2001 to 2014, its operating profits over 1338%, with over 72% of its business coming from the overseas markets and leading to its successful amalgamation into TCS in 2015

Ramanan graduated from IIT Mumbai in electrical Engineering in 1981. He is also a Harvard Business School Advanced Management Program Alumni and accredited by Cambridge University in Sustainability Leadership. He was also elected Lifetime Chair of HBS AMP187 Alumni by HBS.

Ramanan received the CEO of the Year award in 2015 from CMO Asia, India's top 3 most "Value" able CEO recognition by Business World in 2011 and 2013, Indira Gandhi Sadbhavana and Rajiv Gandhi Shiromani awards in 2005-2006 and many other recognitions for outstanding contributions in Innovation and Business Leadership. He has recently been recently honored with Mint SAP Digitalist Award-19th April 2018 in Mumbai.

Leading Science and Technology: Vision for the Future



Excerpts from the chapter 10 of the book

Leading Science and Technology: India Next?

by

Varun Aggarwal, Co-founder, Aspiring Minds

2018 / 312 pages / Paperback: Rs 595 (9789352805082) / SAGE India

[T]o make a great future of India, the whole secret lies in organization, accumulation of power, co-ordination of wills.... This is the secret, accumulation of will power, co-ordination, bringing them all, as it were, into one focus.

--- Swami Vivekananda

Let us work toward making India a scientific superpower. We can be inventors and discoverers again. We have the experience and the potential. In the present state of technological and economic change, now is the most opportune time to embark on this national journey. We have considered a number of issues with our current research ecosystem in previous chapters. Now we look at how we can improve our situation.

I begin this chapter by discussing certain general guiding principles for forwarding the research agenda. These principles, if followed, would help create an ideal research ecosystem. We can distill these principles into particular objectives for India organized by impact area. These principles are also a guide to build policies and a yardstick—the dos and don'ts—what actually helps, what impedes research, and what actually makes no difference!

The steps to achieve our objectives are many and diverse. Some we can realize in the short term while others will require patience. Some will be evolutionary while others may seem revolutionary. And they will require the participation of multiple stakeholders. All of you could be worthy contributors of ideas—good ideas come from everywhere—this is very much the spirit of research. In fact, this is the very spirit of research!

Sixteen Principles for Building a Highly Effective Research Ecosystem

Will and Ownership

We need a strong belief in the virtues of science and a tenacious will to promote scientific research as a national goal. To embark on such a mission requires a buy in from everyone—starting with the media—the opinion creators, the politicians, the bureaucrats, the institutional leaders, and educators. Each person at every level should be dedicated wholeheartedly to pursuing the research agenda. Ideally, such individuals should have been deeply involved in research at some point in their career. They need to be believers, progressive thinkers, and charismatic go-getters. We need a laser focus on research and people dedicated to the task, at all levels.

Plan for the Future

When considering national policy, economic development, and scientific research, we need to build institutions and plans with a 10–20 year focus. It does not suffice merely to be reactive to just our immediate problems nor is it productive to attempt to harness immediate opportunities only. The world is changing too fast. We are witnessing the advent of new technologies and new kinds of businesses that present us with new problems and opportunities. We need to consider the big picture: predict, plan, and revise continuously. Second, we need to save ourselves from our habit of applying only “Band-Aid” solutions that are neither robust nor sustainable.

Last, we need to take into account the time it takes to implement anything systematically, specifically when being executed by the government. We should invest in sustainable long-term measures, otherwise they end up being too little too late.

Understand the Centrality of “People”

The quality of research cannot exceed the quality of the researcher. If one wishes to reap the economic and social rewards of great research, one must attract the best minds to scientific careers. Talented, capable people simply need the right incentives and a professional environment. As caretakers and practitioners of high knowledge, they must feel respected in the society and their institutions in the same way that knowledge itself is respected. Without the right people, no amount of money, infrastructure, or policy can produce transformational results.

Let Merit Be the Key Principle

As a moral principle, resources for human development should be equitably distributed. But in pursuit of this moral principle, allocation of our resources for research should be merit-based and competitive. We must allocate resources to those individuals who demonstrate that they have the best research ideas, who write the best proposals, and produce the most promising results. We must be open to many different ideas and thought processes, but nothing mediocre. We should put power behind our star performers with the money, facilities, equipment, student support, and decision-making power that they need to further their success. And we need to celebrate their success and that of their institutions so that they may inspire others to excel.

Promote Autonomy and Accountability

Researchers and research institutions work best when they are independent. No one should “tell” them what to do. They should be driven only by their own mission and curiosity. They should have the power to implement their plans independently. Bureaucratic rules, regulations, and micromanaging hinders creativity and progress. At the same time, they should be held accountable for their results¹ and ethical practices. Resources should be allocated accordingly.

Create Differentiators

To compete globally, we need to reinforce our current strengths while simultaneously building new strengths. Our current strengths include our proximity to certain problems, our ability to run certain experiments that might be more difficult elsewhere, and the availability of higher performers in certain areas and cost/skill advantages. We can build new strengths by developing new innovative institutional structures, identifying promising but neglected areas, and developing new research processes and policy. By copying others, we can play catchup. In order to lead, we need to prepare for ingenuity.

Create Areas of Excellence

We cannot excel in everything. A careful consideration of our national priorities, research velocity, and particular strengths will help us identify the best areas in which to focus our initial efforts. Having identified the right areas, we need to accumulate efforts in these areas—having the best researchers, the right infrastructure, and seeking to solve the toughest problems. Disruptive research happens by accumulation and multiplication of success of several researchers in a healthy ecosystem. Mission-based programs and institutions is one good way of doing this.

Raise the Bar

Top papers and citations are great, but they cannot be goals in themselves. We must raise the bar and aspire to solving our biggest puzzles and toughest problems. We cannot be mediocre in our choice of problems. We can expect to solve some problems, make progress with others, and sometimes stall. For these, we should not bring down the dream. Real breakthroughs come about by dreaming—it is a culture and a way of working with perseverance and grit. At the end, we need to benchmark ourselves on the big ideas and solutions that come out of India.

Respect Ideas, Respect Failures

We need to respect ideas: not just small, safe ones, but big and crazy ones! Science cannot afford to be complacent and arrogant. Science keeps surprising itself over the ages.² We need to be open to the potential of new, strange ideas and provide resources to test them. When we support radical ideas, there will be failures. We must accept that this is so and remember that failures also impart knowledge. The few successes that we achieve will outweigh a slew of failures, and our mistakes will help us learn.

Create Awareness

No one can be forced to do research. Good research never results from compulsion. The way to enable research is to create awareness about it among all—the government, our institutions, the industry, and the industry and the society, at large. Awareness of research will celebrate its virtues and provide role models. It also is about the larger virtue of scientific thinking itself. By such awareness, the intellectually curious will steer themselves toward research automatically. These self-selected individuals will become the best researchers.

Create Competition

Top performers can be spurred to even better performance through competition. Competition is a key factor in motivation, pushing people and institutions to excel, take risks, and explore the out of the ordinary. There are many examples of competition inspiring people to move out of their comfort zones, try something disruptive, and thereby achieve success. We should create challenges for researchers to compete. We should distribute research resources and funds competitively. The process needs to be world class, transparent, and fast.

Remember, Money Is Not a Bad Word

Money holds people accountable, provides incentives, and helps align interests. We can use money to encourage all of these things. With money as a reward, people have a higher potential for performing and a higher chance of delivering. The availability of money leads people to collaborate in pursuit of it. Money has the potential to create knowledge. It is a resource, not an end. It should be used for its very important role.

Create Incentives

The enigmatic curiosity and virtue of the researcher is not enough to support research. Individuals and institutions perform better under the right incentives, which must be professional as well as monetary. A researcher cares most for an environment that helps multiply their success and makes big impact. Such things are at least as important to success as a large paycheck. As a nation and our institutions needs to make these possible—these are the greatest incentive for researchers.

Look for Alternatives While Working on Foundations

There are new ways to research, raise money, and disseminate research results. Crowdsourcing, hackathons, *jugaad*, 3-D printing, and social media are some examples. We should delve into these and use them to advance knowledge in the best way. However, nothing replaces well-functioning universities, PhD programs, transparent and merit-driven funding agencies, and communication and collaboration in the form of conferences and journals. These are all essential components of the research ecosystem. New innovations will never diminish their necessity. They shouldn't be an excuse to neglect these.

Make the Market

Research is a public good. Around the world, governments are the largest funders of research. The beneficiaries of this funding are private players and individuals, who convert their research into products and services that improve our lives and provide economic gains. The government's role as sponsor entails making a market for private actors to participate in all parts of the research ecosystem. Government measures could include tax breaks for conducting research and for research philanthropy, colocating research institutions and academia, IP help, and public funding of innovative companies deemed too risky by private lenders. This is useful for scaling research, but also essential for deriving tangible outcomes.

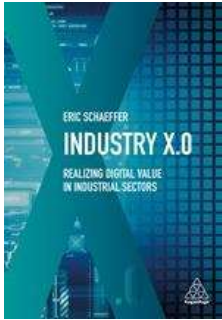
Be Dispassionate and Transparent

Good science is beyond social, political, or religious considerations. Research must be approached dispassionately. The researcher must be prepared to accept the results, regardless of the degree to which they conflict with prior assumptions and hypotheses. A researcher also must have the courage to reveal the results without fear of political and social implications. Political actors should not seek to silence or censor public intellectuals, regardless of whether they are public employees. Scientific voices must be independent. Noam Chomsky, Richard Stallman, Thomas Piketty, and Thomas Nagel, all professors at top universities, have held controversial views on political, scientific, and ethical issues. They continue to enjoy the support of their universities. Donor agencies and universities should vigorously support the autonomy of researchers and the research process and never seek to bend the proposal to serve an ulterior goal.

The second part of the chapter 10, "What India Needs to Do? will be published in the next issue.

A panel headed by retired SC judge BN Srikrishna submitted its report to the government on suggestions for a data protection law that will also cover Aadhaar. The panel recommended certain measures for protecting personal information, defining obligations of data processors and the rights of individuals. It also suggested various penalties for violation of data privacy.

Industry X.0: Realizing Digital Value in Industrial Sectors



Chapter Takeaways at a Glance

Excerpts from the book

Industry X.0: Realizing Digital Value in Industrial Sectors by Schaeffer Eric.

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Takeaways Chapter 1 – Industry’s Ongoing and Accelerating Digital Transformation

1. The industrial sphere is undergoing a profound, even dramatic change. Its drivers are many, among them the pervasiveness of connected technology, platforms and data optimization, hyperpersonalization, and as-a-service business models. And we are just at the beginning of the change.
2. Tightly connected industrial manufacturing processes are going to go mainstream soon. The Industrial Internet of Things (IIoT), will digitally orchestrate factory floors, physical products, workers and more, unleashing enormous value.
3. Critical to success in this new digital industrial world will be the deployment of the right technology, preparation of the digital workforce, intelligent orchestration of both, and embedding of enterprises in the right ecosystems of business partners.

Takeaways Chapter 2 – How the IIoT Leads to the Outcome Economy

1. The Industrial Internet of Things (IIoT) will drastically change the way companies work internally, work with each other, and sell to customers.
2. This will lead to “the end of the product” and the rise of a new kind of economy, the Outcome Economy (or “usage economy”). In this new world, tried-and-tested industrial hardware products are not only eclipsed by their much more profitable service qualities, the user experience and the ecosystems they operate in: They are also commercialized on a per outcome basis. It is the combination of living products and as-a-service business model that make the outcome economy.
3. This will be the era in which industrial companies move away from rigid business silos to more agile ecosystems and alliances with surprising partners. If they don’t, they won’t survive in the long run.

Takeaways Chapter 3 – Digital Super Value – A Guiding Light for Digital Strategy

1. Business as usual is over. Manufacturing companies can reap huge immediate and future financial rewards from digitizing their whole value chain. Society as a whole will also massively benefit via enterprises’ external value spread.
2. Understanding value is critical for an industrial business in devising a digitization strategy. Different values accrue from digitizing at different speeds. Different functions in different industrial sectors contain digital value pools of widely varying depth.
3. Although new digital business models have yet to deliver on their promise, only those companies investing ahead of existing and emerging competitors will capture the potential and establish leadership.

Takeaways Chapter 4 – Six “No-Regret” Capabilities – the Journey Towards Digital, Mapped out Simply

1. Digitally transforming your company is a challenging task that may look like a scary upheaval of all functions.

2. No perfect or predefined roadmap exists, but that doesn't mean to do nothing. Figuring out the perfect and detailed roadmap for your company is near to impossible and of little value. Set the high-level directions for your company and dive in.
3. Start-up style rapid experimentation is the way to go. The rule of "deploy if successful, move on to the next idea if not" is standard in these firms. There should ideally be multiple rapid-experimentation sites across your enterprise to get the digital ball rolling.
4. There are six core "no-regret" capabilities to be targeted for the first steps towards a full-blown IIoT-powered enterprise: synchronizing the lifecycle clocks, embedding software intelligence and connectivity, using data analytics, rendering manufacturing facilities agile, understanding business as a service, creating and running smart ecosystems.
5. Try out each of these six "no-regret" capabilities and then combine. The benefits will only increase as you do so. This will contribute to quick wins and long-term success.

Takeaways Chapter 5 – Zoom in: How to Make Data Analytics Work Your Way

1. Data and the operational and commercial insights extracted from it are going to be the lifeblood of the industrial sector in the 21st century.
2. All companies have a wealth of unleveraged legacy data. Enriching this data will drive significant value in five main areas: (a) customer experience, (b) product performance, (c) workforce efficiency, (d) operational efficiency, and (e) portfolio optimization of new products and services.
3. Start progressively exploiting operational data hidden in your existing IT systems. Once the first pilots have delivered value, integrate external data. As your products become smarter and more connected, make the direct link.
4. Launch small, safe analytics pilots focused on specific use cases. Do so in as many areas of your company as possible and scale your data platform as soon as success clicks in.
5. Set up a cross-enterprise analytics capability to support all these initiatives within your company. Leverage data analytics service providers to accelerate the process and run pilots targeting both top-line and bottom-line opportunities

Takeaways Chapter 6 – Zoom in: How to Handle Digital Product Development

1. The entire process chain around developing and designing industrially manufactured items is redefined by the emergence of the smart and connected product.
2. Strengthen your software capabilities – There will be more and more software embedded in your products. Software-enabled services and user experience will be critical, you need to build at pace your software capabilities.
3. A robust Digital Product Lifecycle Management (DPLM) must be the starting point for product development in the emerging era of data-driven Living Products. Set up the right DPLM capabilities: agility, scalability, software intelligence, and unified data connectedness.
4. Synchronize, but do not lock together, the two clocks – and ensure that marketing optimizes the resulting propositions and improvements with regard to the customer.
5. End-to-end. Let your DPLM run through your whole business and become its DNA.

Takeaways Chapter 7 – Zoom in: How to Create a Connected Industrial Workforce

1. The industrial worker of the future will be a data-based decision-maker and supervisory presence on the factory floor, in the engineering centers or on the field servicing products.
2. All business roles and functions will be affected as cobots and artificial intelligence will permeate the enterprise resulting in a blended workforce from the shop floor to the boardroom.
3. Don't wait – proactively manage this revolutionary change in your company.

4. Craft new training and recruitment strategies now – start-up skilling your workforce and recruiting the talent now as the right skills will be in short supply. Explore new digital workforce models such as crowdsourcing.
5. Focus on your line managers, they will be critical in seeding and steering the change of your entire workforce while undergoing significant changes themselves.

Takeaways Chapter 8 – Zoom in: How to Master Innovation in the New

1. Experience beats product. Improved customer experience is where companies in the industrial sector have seen the greatest success from innovation in recent years.
2. New approaches to innovation can drive significant financial returns especially in sectors such as industrial equipment, consumer goods and consumer electronics.
3. Most industrial companies have very similar innovation investment profiles. The difference comes from the “how” rather than the “what.”
4. Open up to the outside. A new view of competitors and the ability to work in more open and fluid ecosystems are key.
5. Brilliant Innovators are solution-centered, powered by insights, drive pivotal leadership and operate at multiple speeds.

Takeaways Chapter 9 – Zoom in: How to Make the Most of Platforms and Ecosystems

1. Data-driven smart services will shape the New of the industrial world. They will allow for new hyperpersonalized and context- specific user experiences created through the connection of smart products with platform-based services using the power of broad ecosystems.
2. Ecosystems and platforms are becoming innovation and growth engines for most manufacturing enterprises. This change will be fast, disruptive and redefine the rules of competitiveness.
3. Hold on to your data. In a data-driven economy, it becomes a product in itself – one with immense value.
4. Ecosystem yourself. Competition between products and companies will be replaced by competition between fluid digital platform-driven ecosystems. Start connecting your enterprise and products to the outside.
5. Anticipate and lead from the front in the move towards an ecosystem. Setting up partner ecosystems and embedding your organization in them takes time, cuts through the organization and implies a profound change in mindset. It will not happen by itself.



Announcements

WIE ILS 2018 - IEEE Women In Engineering International Leadership Summit 2018 during 7-8 Sep 2018 at Kochi.

A global high profile summit with the theme of the Summit is “emPOWERing TOgetHER”, showcasing women talents who have accomplished phenomenal success in their respective fields be it business, technology, arts or humanitarian cause. To be held in Kerala for the first time ever, this international summit seeks to celebrate womanhood by generating innovative ideas from technologists, entrepreneurs, artists, architects and humanitarians who are women and to develop strategies which aims for the wholesome development of women, especially in their life as a professional or in their pursuits of passion. On 7th and 8th of September, the golden shores of Kochi would be a host for the prolific women who have outshined and who would put their heads together to share their experiences and life journeys which would prove to be a trendsetter for the future WIE ILS Summits. You can anticipate a lifetime empowering experience for women of all genres! The goal of WIE being to facilitate the recruitment and retention of women in technical disciplines globally, the program in Kochi is outlined to inspire live action and fuel up creative fires and experiences that span over five tracks: Leadership & Empowerment, Innovation & Entrepreneurship, Science & Technology, Change Makers and Off-Beaten; Offering you the community and connection, the information and inspiration, the motivation and momentum to help you discover what you are; in order to explore those hidden potentials within you which would unleash your true self in years to come! Please visit <https://wieilskochi2018.ieeekerala.org> to find out the prolific women speakers, and our sponsors. So if you want to learn the mantras to be chanted for achieving that edge in life for enlightening the world, ensure a seat by registering at <https://wieilskochi2018.ieeekerala.org/registration> / before the deadline for early bird registration.

Web seminar and panel discussion on IEEE's Blended Learning Program (IEEE-BLP)

IEEE's Blended Learning Program (IEEE-BLP) is an initiative in the direction of technical education from IEEE in conjunction with industry thought leaders. The IEEE-BLP is a set of skill-based training in the field of VLSI, IOT, IPR, POSH and alike. The first web seminar and panel discussion will be held on 24th Aug 2018 at 3 p.m. (IST). The Event number is 630 516 938 & the Event password is 123abc. To participate in this event, pl. register at: <https://ieee.webex.com/ieee/onstage/g.php?MTID=e197fe6388278dc435883abfc9aa39f23>

IEEE-SA 2018 World Standards Day Video Contest

IEEE-SA is seeking short (15-60 seconds) videos that explore how standards support the emerging technologies that are beginning to impact our lives today and into the future. As part of its 2018 celebration of WSD and its theme of “International Standards and the 4th Industrial Revolution,” IEEE-SA is looking for creative, original, quality videos that are relevant to this year’s WSD theme and that demonstrate how IEEE standards address the blending of our physical, digital, and biological worlds. For example, artificial intelligence and robots are starting to drive the decision processes of our lives, autonomous cars are being tested on our highways, and smart systems are linking our lives in surprising ways. Based on the video submissions, IEEE-SA will select up to three videos to receive a USD \$500 prize. Entries are due by 14 Sep 2018. You can find more information and how to enter here: <https://beyondstandards.ieee.org/general-news/2018-world-standards-day-ieee-video-contest/>

INDICON-2018: At Amrita University, Coimbatore in Dec 2018. Look forward to the details soon

AISYWC 2018: 28-30 Sep 2018 at Mysore. Website at: <http://aisywc.in/> Email: aisywc2018@gmail.com

TENCON-2018: 28-31 Oct 2018 at Jeju, Island, Korea. Website: <http://tencon2018.org/>

IEEE-Sponsored Insurance Services:

http://www.ieee.org/membership_services/membership/discounts/group_insurance.html

IEEE Student Activities: http://www.ieee.org/membership_services/membership/students/index.html

Education & Careers: http://www.ieee.org/education_careers/index.html

IEEE Xplore Digital Library: <http://ieeexplore.ieee.org/Xplore/home.jsp>

IEEE Websites / Sitemap: <http://www.ieee.org/sitemap.html>

Acknowledgements: ICNL wishes to acknowledge various internet sources for the information presented in this issue of the newsletter. Our exclusive thanks to inshorts (<https://www.inshorts.com>) – a content discovery and distribution application, which aggregates the news across the world and presents them in a concise manner. We also thank Mr. Sunil Agarwal and Mr Ajit Ninan for the permission to use their thought provoking cartoons appeared in Times of India. .

Guidelines for submitting reports and articles to get published in the IEEE INDIA INFO, the India Council Newsletter (ICNL)

- Please submit the event reports within TWO months of its happening. Older events reported may be ignored.
- The matter may be in doc / rtf / txt format. Please avoid other formats such as pdf, jpg as they will not be considered.
- Please use SINGLE column format (while the report is prepared).
- Please avoid embedding the photos in the document relating to event reports. However, images referred in articles alone may be embedded at appropriate places in the article document in addition to sending them separately.
- Please send the event photos (typically one/two best) separately (even in they are included in the report).
- Preferred format for photos is “jpg”. Please avoid sending the photos in “bmp”, “png” formats.
- Photographs in digital form should not to exceed 1024 pixels in width. You may use any photo editing software (MS Office Picture Manager is quite useful) to re-size the image. This will reduce the file size of the images considerably. Pl. avoid sending large size photos (Sometimes we get files even up to 6 MB size). We generally recommend file sizes less than 500K.
- Provide your name, full affiliation, membership no. and email id at the end of the document.
- Send the matter by email with the subject: From <Section / College Name in short form> -- Report on <Event Name (short name is OK) & Date> eg: “From Madras Section / SSNCE -- Report on Conf on Wireless Networking dt. 10-11, Feb 2017”
- Please send the matter by email to ieee.icnl@gmail.com
- Please note that the matter sent to other email ids may get ignored and may not be considered.
- Please submit the matter for publication latest by 8th of the publication month (currently Mar, Jun, Sep, Dec as ICNL is a quarterly) to facilitate inclusion in that quarter’s issue of IC Newsletter.
- Please note that while all efforts will be made for publishing, due to certain practical constraints, the actual publishing may be delayed.
- We will be constrained to ignore the submitted materials, if they do not follow the above guidelines.
- Please co-operate with us by adhering to the guidelines specified.

IEEE India Council Website

The website of the IEEE India Council (IC) has been redesigned using the Wordpress content management system and is hosted on the IEEE webserver at <http://sites.ieee.org/indiacouncil/> with the efforts of the web master Dr. Suryanarayana Doolla of IIT Bombay. The readers may find the following links of the IC useful.

Home: <http://sites.ieee.org/indiacouncil/>

Executive Committee: <http://sites.ieee.org/indiacouncil/about-ieee/executive-committee/>

Sections: <http://sites.ieee.org/indiacouncil/about-ieee/sections/>

Chapters: <http://sites.ieee.org/indiacouncil/about-ieee/chapters/>

Announcements: <http://sites.ieee.org/indiacouncil/category/announcements/>

Events: <http://sites.ieee.org/indiacouncil/events/>

Newsletter Archives: <http://sites.ieee.org/indiacouncil/newsletter/newsletter-archives/>

Conference Norms: <http://sites.ieee.org/indiacouncil/conference-norms/>

INDICON: <http://sites.ieee.org/indiacouncil/indicon/>

Student Activities – Awards: <http://sites.ieee.org/indiacouncil/student-activities/awards/>

M V Chauhan Student Paper Contest: <http://sites.ieee.org/indiacouncil/student-activities/mvc/>

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