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IEIAA Chairman's Message

Dear Alumni,

I am pleased to see the second newsletter with an article from a member from across the world and shows the spread of IEIAA. The Newsletter also has started giving news about the members and I would like to see more of this in near future as this is one of the purposes of the newsletter. I encourage members to send information to us about the achievements of members and to use the newsletter as an additional platform for celebration of the achievement of members.

Dr. Ranga Reddy Enti
Chairman

Message from the editor

Dear Alumni,

This is the second issue of the newsletter of IEIAA. This issue also has been a print issue and in future this will be a e-newsletter. This is both to preserve our environment and to help our members to be able to access it more easily anytime, anywhere.

Continuing education is something very dear to our members. In a developing economy, this is the path to educate a large segment of population not served by formal channels. An article by Dr Muralikrishna Reddy, an eminent Educationist and a Public Figure, addresses this issue and talks of AMIE and continuing engineering education. Dr Santhanam Kasturi, Lead Test Consultant for Test Architecture, describes the test architectures over ages and gives us a glimpse of the future of Test Architectures. This I feel would be interesting to our members.

As always, I request the members to continue to contribute articles, either new or pre-published with the permission of original publisher, intimation of achievement of an alumni in recent past, that we can celebrate and details of any alumni events happening.

S.A. Sathyamurthy
Editor

Alumni News

June 11th will be the West Zone Alumni Meet. This is the Second zonal meet and happens at Ahmedabad at IEI Local centre premises.

Chairman, IEIAA had an Open House meet with Alumni at the Goa Centre.

An Open House Alumni Meet was hosted by IEIAA at Bangalore on 27th May 2017. Such Open house Meets are planned for others centres too and you can get details in our website.

IEI Alumni Dr KM Sivakholundu is appointed as Vice Chancellor of Indian Maritime University Chennai, under the Ministry of Shipping Government of India. IEIAA joins the Alumni community in congratulating him and saluting him for his achievement.



Transformative Learning

AMIE – Near Century's Contribution to Societal Progress

Engineering has been the basis for the development and progress of humankind. Engineers have contributed to societal development through the initiation of new ideas and concepts and developing pathways to realize new products, solutions, and services through the implementation and execution of these novel ideas. Engineers have built credibility for the profession by creating complex technical systems that have made contemporary life possible. Over the years, engineers have played a leading role in developing technologies and systems to promote global commerce, enhancing the quality of life, minimizing the impact of human civilization on ecology and the environment, providing adequate housing, mobility, water, sanitation, electricity and telecommunication facilities to the growing global population.

Engineering Education came to India during 1794 with the establishment of the first survey school at Madras to study Indian land revenue maps, resulting in the germination of civil engineering as a branch of knowledge and a profession in India. The need for the study of Engineering became imperative with activities undertaken by civilization including Canals and Dams for Irrigation, Road Construction, Railways for mass transportation, and Industry for economic growth. The engineering-centric national building activities and the demand for qualified and trained engineering personnel led to the establishment of engineering education institutions in India, on the models of leading engineering and technological education institutions abroad. Institutions at Roorkee, Chennai, Poona, Kolkata, Bangalore and Kanpur that were established in the pre-independent India era emerged as institutions imparting 'best of class' engineering education in the country. The formal Indian Engineering Education system was established and nurtured to impart a rigorous engineering education with transformational learning based on international experiences as available with the foreign partnering institutions.

Post the Second World War and post-Independence, rapid industrialization and the country's emphasis on the development of scientific temper combinedly augmented

the growing demand for Engineers in the country. It resulted in the Government of India establishing the IITs based on the models of education available internationally in collaboration with the USA, UK, Germany, Russia, and France. Subsequently the establishment of Central and State Government supported institutions including the NITs and privately sponsored institutions led to the expansion and growth of the Indian Engineering Education System.

Engineering profession has always been in a difficult situation of matching the industry's expectations of practicing engineers with the skill-sets and knowledge base developed through the formal engineering education curriculum. One of the critical gaps that has continued to persist has been an inadequate emphasis on engineering design and minimalistic exposure to the framework of multidisciplinary systems. Practicing engineers and industry have adopted **Continuing Education** as a solution approach to bridge the gap, and facilitate professionals to contribute in their role.

Many Indian engineers in the early 50s and 60s taken up courses in engineering in premier institutions abroad to develop competencies and skills to meet the globally accepted requirements of a formal engineering education. Many Indian Engineering luminaries have contributed to the development of infrastructure; energy and utilities; railways; and the Government policy resulting in the successful modernization of the country and establishment of India's industrial base.

India's Programmes and Development of Engineering and Technological prowess is due to not just its connect with British and US education systems, but is also based on the legacy of Engineering being India's national industry. As engineering activity spans planning, research, design, implementation, and operations, it is imperative for students to align and imbibe the operational context of contemporary industries.

Building a sustainable and progressive engineering education system in the country required the inculcation of the research culture in the students, nurturing the spirit of

inquiry by establishing contemporary research facilities and laboratories in institutions, building collaboration linkages with 'best-in-class' global academic institutions, and strengthening industry-academia-students' engagement to solve real-world industrial engineering challenges.

Currently, India stands at the top of the engineering education enrollments with 1.5 million admissions for undergraduate engineering programs through IITs, NITs, Private and Public Universities and Institutions numbering over 5,000. The demographic dividend for the youth on a primary driver for a large number of engineering enrollments, and it is expected that many of these young incoming Indian Engineers will play a significant role in the national building, and addressing the challenges of a rapidly growing society and the world economy.

Engineers have the unique responsibility of continuously developing solutions for the world's biggest challenges, both now and in future. This is possible only when the engineering fraternity keeps pace with the latest developments in technology, generates new ideas, and develops innovative solutions. Continuing Professional Competency Development is integral to a career in engineering and entails keeping up to date by continuous learning and developing skills to remain productive and contribute in a meaningful manner. Lifelong learning has become the norm of contemporary Higher Education policy in most of the nations. In the context of the rapid advances in science and technology and the need to constantly innovate, it is extremely important for individuals to have their skills and expertise updated on a continuous real-time basis.

The recent rapid technological advancements in manufacturing and productivity and the integration of the country into the global economic order have brought in their wake several challenges including technology upgradation and compliance with stringent global quality standards. The future engineers will need to be on par with world educational standards; and will need to possess deep, constructive and meaningful knowledge.

These challenges can be best addressed through

Continuing Education models, and successful engineering practitioners will adopt both the formal system and Continuing Education to achieve 'Continuous Lifelong Learning' for systematic knowledge-building and acquiring higher qualifications acceptable to Industry. This is a real transformative learning process that would make the engineering workforce 'Industry Ready.'

Advancement in Information and Communication Technologies and the democratization of the Internet have led to the development and proliferation of a new learning paradigm, commonly known as Massive Open Online Courses (MOOCs). MOOCs has emerged as a viable model to develop a broad range of skills and knowledge that may come in handy on an assignment. Platforms like Coursera, Udacity, edX, eKlavya and NPTEL have emerged as 'platforms of choice' by the discerning engineers to build their knowledge and expertise in emerging and contemporary fields. MOOCs have become increasingly popular as they have now scaled-up to offer university-level courses.

In the digital era, information and data will be the key essentials which the workforce will have to process in their day-to-day profession. People would be required to do less of manual work and more tasks of control and monitoring of operations. With the adoption of automation and artificial intelligence, tasks involving technical skills like troubleshooting, quality control, and resource management skills will be eliminated. It is in this context that employees will need to pay significant attention to developing Cognitive abilities as a core skill.

The global economy is familiar with the buzzword 'Industry 4.0', a paradigm where the 'real' and the 'virtual' world are getting seamlessly connected giving rise to cyber-physical production systems. Because of this integration of the 'real' and the 'virtual' world, traditional manufacturing processes are undergoing a massive transformation that will change the way companies approach production. The adoption of Industry 4.0 by developed nations presents a significant threat to the developing countries as it will result in job migration from the developing countries to the developed countries.

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AMIE- The Pathfinder

The Institution of Engineers India [IEI] is the largest professional body of engineers with membership strength close to one Million, encompassing 15 engineering disciplines and provides engineers a global platform to share their professional interest. It has the distinction of making the maximum number of engineers in the core engineering disciplines, thus augmenting the nation building efforts both pre and post-independence. The Institution was established in 1920 and is the only Engineering professional body in the country bestowed with the Royal Charter in 1935.

In consonance with authority vested with the Institution under the Charter, the Institution has been conducting Sections A & B Examinations (popularly known as AMIE Examination) in different engineering disciplines since the 1920s. This non-formal engineering education programme has developed close to 3.5 Lakh talented, skilled and qualified engineers to address the country's needs; emerging as perhaps the largest number of alumni of Engineers in the world created by any single institution. They have successfully executed major projects and handled administrative responsibilities in the State Governments and the Central Government, apart from various public and private sector organizations.

It is the flagship programme through which IEI delivers significant value to the engineering profession. The uniqueness of this programme is that AMIEs are immediately employable in the Indian industry as the contextualized curriculum integrates concepts, application, and practice of engineering. It blends theory with practice as students are already employed while they are pursuing the programme. The flawlessly designed AMIE educational model supports students pursuing the engineering profession to acquire further qualifications, and promotes lifelong learning activities with the objective of sculpting the individual's career advancement path through a personalized learning programme. This 'Transformative Learning Process' is the basis of the educational and professional biography of every individual going through this model.

This is a time-tested programme with a lakh of students availing this opportunity every year to excel in the engineering profession in India and abroad. The curriculum has been periodically reviewed to ensure quality and relevance to the changing paradigm, complete with a blended learning programme that integrates theory, contextual relevance, associated laboratory training, and project work under the guidance of a Chartered/Professional Engineer. AMIE has emerged as 'Superior Class Engineering Education for Masses' and has helped in the democratization and opening up of engineering education for the common man. It promotes absorption of scientifically sound expert knowledge in a particular professional field, and helps develop professional expertise and other key skills that would facilitate seamless application of the newly acquired knowledge and expertise to career assignments.

The AMIE programme centered on the 'practicing engineer' has the unique characteristic of strengthening the cognitive abilities and developing system skills and sophisticated problem-solving skills that are essential to help individuals synthesize data and real-time information to make meaningful and 'business-astute' decisions.

Continuing to Learn' as a philosophy is now universally accepted, and is considered a 'best practice' by professionals irrespective of their field of choice. Majority of the 3.5 Lakh professionals who have benefited through the 'High-Impact and Highly Subsidized' AMIE programme are practicing engineers with a strong foundation in engineering, and have developed applied engineering skills through the AMIE programme while acquiring the engineering qualification as per the regulatory systems mandated by the nation and countries abroad.

AMIE is a game-changer for nation building. In the first 25 years, professionals qualified through this unique non-formal learning scheme have contributed to the countries infrastructure development including water; irrigation; roads and bridges; and railways in addition to military needs. In the post-independence era, AMIEs have successfully built the industry, developed a cogent Science

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and Technology policy and laid the foundation for self-reliance in defence and space research. In the last couple of decades, AMIEs have built success stories in the auto ancillary, engineering and information technology sectors leading to global recognition.

It is with pride that today, AMIE can claim presence and contribution to the growth of engineering in new and emerging fields with significant inputs to a robust and well ensconced Industrial Development; and Education and Research sectors.

IEI is working with the industry to assess the future skill demand, and develop a set of recommendations centered everywhere the changes required in training, curricula, and methodology for meeting industry's ability need at various stages of adoption of Industry 4.0. Industry's involvement is also being strengthened to promote apprenticeships so that AMIEs are exposed to experiential learning and not limited to theoretical knowledge.

The Century-old AMIE program has progressed in tandem with nation building. Delivering results in the context of skills-gap highlights the efficacy and robustness of the AMIE Education programme. This programme has on a continuous basis transformed engineers to overcome critical skill gaps and perform to the best of one's capabilities. This transformative learning opportunity has resulted in bringing in profound changes in one's thought process, and belief to perform better in the workplace. The radical shift in consciousness has permanently altered the individual's alignment with the working environment.

In the years to come, this perfected education model will help millions of working professionals to acquire knowledge and additional qualifications while maintaining the enhanced stringent standards. This will need conscious efforts by all stakeholders to strengthen the AMIE system and articulate a new engineering education system centered on the AMIE model.

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Test Architecture in a New Landscape

Introduction:

At a time when the value of the traditional architect role is being questioned and is being re-shaped, organizations seem to have added a little spice to the mix by introducing the role of a Test Architect. The architecture practice, especially the enterprise architecture, of the past two decades is being abandoned as it turned out to be a glorified designer role. Architecting the enterprise through governance from an enterprise or in some cases the business architect's perspective while colliding with agile transformations has diminished the value of architects. And so, the architect role has come under the spotlight to deliver value rather than do fancy big-picture drawings in Visio! Today's architect is expected to deliver transformational changes. Then what about Test Architects?

Test Architecture:

Test Architects began to roll along much the same way as the old-fashioned enterprise architect – writing a grandiose test strategy and documenting more processes! The fate of the enterprise architect has challenged the test architects to rethink also, and there is a new dimension to the role. Test Architecture is not just about writing strategies and talk processes. Instead focus is on un-wrapping the application like peeling an onion, one shell after another, to tear apart an application and TEST.

Core principle: *Look away from being a traditionalist and be ready to roll up your sleeves, hands on deck!*

- Optimize test flows – objective evaluation of test flows – knock out redundant flows. Use a scientific algorithm to compare pair-wise test flows to pick the best alternative.
 - Design to ensure more code coverage – when you do pair-wise comparisons make sure you pick the best one with the potential for maximum code coverage.
 - Design to ensure faster delivery – speed is of essence, shift-left will remain on paper if you don't design a test to meet the velocity of delivery.
- Embed Quality Engineering – picking the application apart gives you a view of what's under the hood. That is how you know the strengths and weakness of the application.
 - Virtualize what is not available - decouple dependencies, external, internal, environmental. Test with what you have and then test again with incremental pieces.
 - Putting it all together finally – integrate the final test design, stack the onion peels back, one after the other!

Design: *The four fundamentals – you cannot ignore the onion shells and test the onion from the outside!*

1. **Analyze the changes and their impact** to the project under works, to other projects in all lines of business in the release calendar; map out dependencies, and paint a picture that shows all the impact points.
2. **What to test?** Scope in based on (#1) above. Look at all layers of application architecture and technical architecture – UI, Services, Database and Infrastructure, multi-browser / W3C compliance, digital channels that include Mobile, Accessibility, Interactive Voice Recorder (IVR) spaces, any non-functional specifications including Performance and Security testing, and finally – the good old mainframe and legacy system testing. Have we covered every bit of the application?
3. **How to test?** Now that you know (#1) and (#2), is there potential for automating most of the testing, if not all of it. Remember, speed is of essence! If automating, ensure you do it differently than a manual tester. While the manual tester is more bought-in on the end-user representative test, automation should have no such constraints. Automate to test under-the-hood, more specifically conduct white-box testing. Test for transient states along the application journey through the depths of the application and technical architecture. Remember the simple rule

Santanam Kasturi

Lead Test Consultant – Test Architecture, MetLife, USA

of determining what provides maximum ROI – what should be automated, what should not be automated, and what is hard to automate. Also remember the simple rule that automation cannot eliminate the human genius – where you would need a trained eye, do not ignore the expert!

4. **Why to test?** Finally, if you don't know (#1), you will not have a clue of “why to test”. The question one should be asking looking at a test flow is “why are we testing this flow?”. “Are we hitting the impact points with this flow?” Without that questioning, we will do a test for the sake of testing.

Multi-layer testing:

A typical multilayer testing distribution would look like the pie-chart in Fig 1. As we move more in a Continuous Integration-Continuous Delivery mode in the Dev/Ops world of transformation, we should adopt a Continuous Testing cycle to match as an equal transformation from a test perspective. In that sense, when speed becomes obvious, there could be a blurring on quality. To ensure quality ensure a balanced mix of test layers across the entire application architecture from front to deep down.

Are we done testing? No, you are not, not until you have shaken hands with the architects, developers, and business leaders!

The final nail in the coffin is ready to come down if we test in isolation. The days of “throw the code over the wall” is gone. We test and guide the developer to adapt to testable needs and this aspect is facilitated by the Test Architect, who is the one that drives the conversation of quality improvements across the enterprise, pushing the agenda through the engineering team, across all disciplines seeking feedback for improvements.

Final comments:

Architecture is not a model or a view that displays a document, or even a strategic plan. One cannot hope for the document to speak for itself and provide value. An architect is someone who can help you solve a problem that you could not hope to solve on your own in the time in which you should solve it. Developers code, testers test, and these are standard definitions and both communities are needed. Business drives out the change needed based on market expectations. None of them can effect a transformational change and provide a lasting solution and that is not their role. That is the role of the architects – to provide solutions. Architecture should reveal that aspect, and if it does not, well, look around for another shakedown.

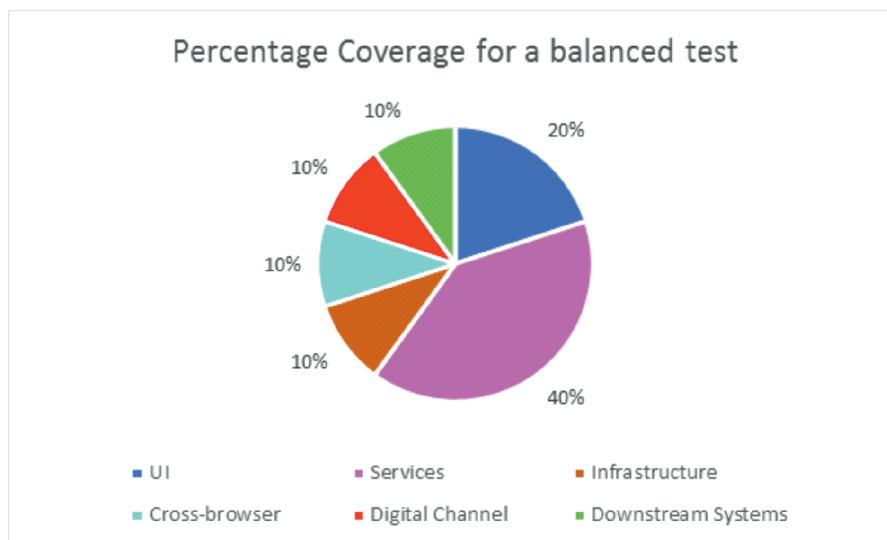


Fig. 1

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Welcome to IE(I) Alumni Association



Bangalore Open House Meet

Bangalore Open House Meet



Goa Open House Meet

Chennai Open House Meet



Dr KM Sivakholundu
Vice Chancellor of Indian Maritime University
Chennai

If undelivered please return to:

IEI Alumni Association

The Institution of Engineers (India)

Karnataka State Centre

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