Prelude: As the first and the largest IT professional society of India, the CSI has a crucial role to play at the national and international level. The founders of CSI had a holistic vision for the society and its members to eventually become a springboard for innovation and creativity in IT usage and development.

In the last 49 years, the CSI has made a tremendous business, industry, government, academia, research and consultancy. The effective functioning and growth oriented organization of the CSI has made it possible to reach out to different geographical regions of India. On the other hand, the technical divisions along with the constituent special interest groups have been providing the technological leadership to the members of the society. Since its inception, the CSI has been playing the leading roles in the international collaboration among the professional societies.

Aim and Objectives: To consolidate the above achievements and take forward the technology development agenda of CSI, we request our members to volunteer their services in the following ways:

1. Form new Special Interest Groups (SIGs) in emerging technological domains with a focus on solving the issues and concerns about globalization and inclusive growth.
2. Contribute in the CSI Special Interest Groups as member, event organizer, technical reviewer, knowledge capturing and making available to all members and industry etc.
3. Contribute in the activities of IFIP Technical Committees and highlight the India-specific technological needs through participation and contribution in the IFIP programmes and activities in India and abroad.
4. Contribute in the collaborative programmes of CSI and is partner societies e.g. IEEE, BCS etc. Also, participate and contribute in the continuing education programmes offered jointly by CSI and its partner societies.

Submission of Proposals: This call is being issued for inviting fresh proposals as well as strengthening the existing entities. Outline about SIGs and a list of new expected topics can be found under DIVISION & SIGs listed on CSI KM portal www.csi-india.org.

More details about IFIP, IEEE and BCS can be seen at the respective websites of these organizations.

The conveners of existing CSI SIGs and CSI representatives in IFIP Technical committees are especially requested to submit the activities reports and current status of the respective entities covering following points:

CSI SIG Conveners:
• Activities Report for the last two years
• Action plan for the 2014-16
• A brief note on the SIG’s outcomes e.g. helping Research and promoting knowledge in this domain
• A brief note on ny significant contributions/ achievement of the SIG e.g. helping CSI in enhancing its brand image and adding more value to members
• A brief note on the National/International conferences planned and corpus generated for Chapters and HQ.

CSI Representatives in IFIP Technical Committees:
• What did you set out to achieve as an IFIP TC Representative and as a global ambassador representing Indian technical community?
• What were the activities of your IFIP TC during the last year, and how you were able to contribute / participate?
• What is action plan for 2014-2016, and any constraints that you faced/face?
• How can your involvement benefit Indian academicians, researchers and professionals? E.g. May be we could have more of our members to participate in IFIP Working Groups or other events, and/or bring more of these activities to India.

The interested members may please forward their profiles, past achievements, carrying out similar or equivalent volunteering activities and statements of intent to (a) hq.sig@csi-india.org for volunteering in CSI SIGs, (b) hq.IFIP@csi-india.org for volunteering in IFIP TCs and (c) hq.IEEE@csi-india.org for volunteering in IEEE, IEEECS and BCS joint programs and promotions.

Submission Deadline: The last date for all the submissions as above is 21st August, 2014.

Bipin V Mehta
Vice-President, CSI
Sanjay Mohapatra
Honorary Secretary, CSI
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### Region - II
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### Division-III : Applications (2013-15)
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- Dr. Anirban Basu
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- **Executive Committee**: http://www.csi-india.org/web/guest/executive-committee
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## Contact us

For queries, correspondence regarding Membership, contact helpdesk@csi-india.org
Dear Members

I am happy to share that CSI Chennai chapter organised the Golden Jubilee Celebrations meeting on 13th Jul 2014 in which the past president Mr. Mahalingam and fellows Mr. G. Ramachandran, Mr. Ram Mohan participated along with six chapter patrons including the first patron Mr. Bhasker Shah who had the distinction of having four CSI members in his family - a rarity and possibly the only one in the CSI history. It was a grand event of sharing experiences and thoughts and concerns on the future of CSI. Mr. Maha and Mr. Jayaramakrishnan briefed the gathering on the status of the CSI ED HQ land and are of confident for a positive outcome. Mr. S. Venkatakrishnan, who was instrumental in setting up the CSI Education Directorate at Chennai, recalled the initiatives of ED such as NSTPC Exams and the ODETACC scheme which had a major impact in the lives of a large no. of our members. After a brief address the President Mr. Mohan, the Chapter Chairman Mr. Pramod Mooriath outlined the special events being planned during the year at CSI Chennai. CSI Pune, CSI Gaziabad & CSI Hyderabad have indicated their plans to hold the @CSI50 events in the immediate near future. In this context, I wish to inform the chapter chairs that CSI HQ will financially support these events to the extent of 50% subject to certain limits based on the chapter category. Regional Vice Presidents may please interact with the chapters and organise similar events at their regions.

In the CSI-2014 review meeting recently held at Hyderabad, the OC Chair Mr. J.A. Choudary, PC Chair Dr. A Govardhan, CSI Hyderabad Chairman & FC Chair Mr. Gautam Mahapatra along with their committee members briefed the CSI Apex Committee consisted of the four Office Bearers of CSI on the various arrangements being made for the successful conduct of CSI-2014. It is the first time in the recent past, the CSI Convention is being held in an academic environment (at JNTU Hyderabad) which is now surrounded by a cluster of IT & ITES establishments. The convention venue, programme details along with the various CSI official events to be held during the convention were discussed at length. The members of all the committees including the CSI Hyderabad management committee are very enthusiastic and working towards a memorable convention during the CSI Golden Jubilee period. The Apex Committee also visited Guru Nanak Institutions Technical Campus at the outskirts of Hyderabad, the venue for the two days exclusive student convention during CSI-2104 and met the Chairman Mr. T.S. Kohli and the Managing Director Dr. Gopala Krishna, Dr. Kumar Mishra, Chair Div IV delivered the keynote addresses while Dr. A.K. Naik, Chair Div III chaired a paper presentation session. Our thanks to Dr. P. Suresh Kumar, Prof. D.L. Manilal & Ms. Sony of CEC and Mr. Soman, RVP-VII & Ms. Mini, NSC for their leadership.

We had the 2nd Execom meeting of CSI at Kochi recently which facilitated the execom members to participate in the First International Conference on Information Science organized by the College of Engineering and Technology, Vazhakulam, Kerala; Workshop on Cross Short Term Training Programme on Network Security at Viswajyothi College of Engineering and Technology, Vazhakulam, Kerala; Workshop on IPv6 Security at Bangalore & Mumbai; and a CSI Div IV and SIG-IS supported International Conference on Information Systems Security by Institute for Development & Research in Banking Technology (IDRBT) at Hyderabad. Chairman of Div IV has also proposed a no. of events in Cyber Security related areas. ISACA with whom CSI has an MOU has recently launched Cyber Security Nexus (CSX), a new security knowledge platform and professional program, has shown interest in organising joint events with CSI. It may not be out of context to mention that one of senior life member Dr. Srinam Raghavan who has been working towards providing information relating to cyberspace and cybersecurity benefitting all professionals and students in CSE has managed to consolidate and present valuable information ranging from concepts to terminologies which are extracted from sources such as US-CERT, NIST, ITU, CERT-IN at http://www.securecyberspace.org/. Further, CSI has been invited to participate in the meeting of the Cyber Regulation Advisory Committee set up as per Section 88 of Information Technology Act 2000 under the Chairmanship of Shri Ravi Shankar Prasad, Minister (Communications & Information Technology). We can represent the user and academic community and take things forward.

I am happy to share the information that in the prelims of national contest organized by the CSI ED on 27th Jul 2014, as a part of the SEARCC International School Software Competition (ISSCC), for the first time, over 200 schools participated in 21 centers across the country. The winners of the national finals will participate in the ISSCC-2014 during Oct 2014 which will be hosted by the Rajalakshmi Engineering College, Chennai. Our association with the schools is on the go beyond the annual contest. We can grow in terms of have them as our institution members and guide the school students in their studies & career planning, nurture their talents & creativity and ultimately enroll them as our members. I request the Chapter Chairpersons and RVPs to work closely with the CSI ED in this regard.

While a no. of initiatives to benefit our members are in the pipeline through CSI ED, which will be highlighted in this column next month, I wish to add that our Hony. Secretary Mr. Sanjay Mohapatra is working on various initiatives relating to membership development and administrative reforms at CSI whose results will be beneficial to members at large.

A committee headed by the Vice President Mr. Bipin Mehta is working on the creation of a Documentary on CSI. I request all our members, to kindly provide information and share their inputs for this documentary which can also be useful in the CSI History Project for which we are looking for inputs from all for quite some time.

Before I close, I am happy to inform that a 15% discount is being extended on Individual Life Membership Fee for a limited period from 1st Aug to 31st Dec 2014 to facilitate more professionals and academic faculty to become Life Members of CSI. I request all our members to inform their colleagues and contacts and make them as members of CSI.

More in the next month message.

With best regards

H R Mohan
President
Computer Society of India
Dear Fellow CSI Members,

The theme for this issue is Software Engineering. According to Association for Computing Machinery (ACM), Software Engineering (SE) deals with development and maintenance of software systems that behave reliably and efficiently, also are affordable to develop as well as maintain, and satisfy all the customer requirements. (Ref: http://computingcareers.acm.org/?page_id=12).

We present our cover story with a comprehensible and informative article titled Real Software Engineering authored by Dr. Ivar Jacobson and Ed Seidewitz of Ivar Jacobson International. They argue that traditional software engineering has not succeeded in bringing the benefits of engineering to the craft of software development, lacking a true foundation for the methods used by practitioners. The focus is on Essence, a common kernel for software engineering practices and methods in the emergence of SEMAT (Software Engineering Method and Theory) as the paradigm shift to real software engineering. This eye opener article is followed by an Exclusive Interview by Dr. Ivar Jacobson and Ed Seidewitz of Ivar Jacobson International. They argue that traditional software engineering

Software Engineering (SE) deals with development and maintenance of software systems that behave reliably and efficiently, also are affordable to develop as well as maintain, and satisfy all the customer requirements.

Technical Trends section of this month has three articles. The first one is by Mr. Bipin Patwardhan of IGATE Global Solutions on An Overview of DevOps, an agile software development and operations management methodology. The second one is by Ms. Srererkha Bakaraju on The Role of the Release Plan in Software Development Lifecycle, emphasizing the need of realistic release plan. The third one is by Madhurima, Saru Dhir, Madhulika, Anchal Garg and Ms. Madhurima and Ms. Anchal Garg of Amity University, Noida on Software Testing: An Insight of Latest Tools and Techniques with a test script execution model through point to point communication and collective communication. Third one is by Mr. Anshu Parashar and Prof. Jitender Kumar Chhabra of National Institute of Technology (NIT), Kurukshetra titled Measuring Changeability of Object Oriented Classes and Packages by Mining Change History. It attempts to analyze earlier change behavior through data mining techniques. The authors claim that changeability metrics can be helpful in predicting future change behavior, categorizing in terms of high or low changeability, and most likely set of changeable classes that should be changed together, thus enabling efficient management of changes in software.

In our regular Programming.Tips() section under Practitioner Workbench column, Ms. Madhulika, Prof. Abhay Bansal, Ms. Madhurima and Ms. Anchal Garg of Amity University, Noida explain Visualizing EEG Data using EEG Lab Tool Box in Matlab Conceptions and Perceptions. Umesh P and Silpa Bhaskaran continue their write-ups on R and this time they write about K-means clustering in R under Programming.Learn("R").

The focus is on Essence, a common kernel for software engineering practices and methods in the emergence of SEMAT (Software Engineering Method and Theory) as the paradigm shift to real software engineering.

In the case study section Dr. Vishnu Kanhere of CSI-SIG on Humane Computing presents an interesting anecdote and discusses on A Case Study of Quick Fix Engineering under Security Corner. Dr. Kanhere has presented an interesting anecdote and emphasized the fact that every software engineer must ensure safety, health and welfare of the user as well as every stakeholder while designing software especially when meant for public use. Ethical judgment call with personal traits and values of a software engineer towards due diligence of honesty, fairness and trust is utmost important.

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With warm regards,
Rajendra M Sonar, Achuthsankar S Nair, Debasish Jana and Jayshree Dhere
Editors

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Real Software Engineering

Introduction

It has become fashionable these days to refer to disruptive changes in a discipline as “paradigm shifts”. The key feature of a true paradigm shift is the difficulty (even impossibility) of translating the language of one paradigm to another[1]. And the software development community has actually seen such shifts before, in which the “old guard” has trouble even understanding the new approaches at all. The move to object orientation was one such shift and, arguably, the current transition to agile methods is another.

But the rise of software engineering has not been such a shift, at least not so far.

The term software engineering was introduced in the title of the first NATO Software Engineering Conference in 1968. This conference proposed applying engineering methods to software development in order to address the so-called “crisis” of so many software projects being over budget and over schedule, while still creating poor quality software. Given that many feel that this “crisis” still exists today, the software engineering practices instituted in the intervening years do not seem to have fundamentally resolved the issues that inspired them in the first place.

The report from the 1968 conference notes that “the phrase ‘software engineering’ was deliberately chosen as being provocative, in implying the need for software manufacture to be based on the types of theoretical foundations and practical disciplines, that are traditional in the established branches of engineering.”[2] We claim that, unfortunately, software engineering, as it has developed, has not met this goal.

In particular, it has not managed to provide strong, common foundations for truly supporting software practitioners. Instead, it has emphasized the adoption of management and process control practices more applicable to engineering for physical product manufacturing than the development of software.

An ironic example of this is the well-known “waterfall” lifecycle (whose origins are really in the manufacturing and construction industries). Winston Royce is credited with first presenting this model for software development (though he did not actually use the term “waterfall”). But he presented this model as being flawed and unrealistic, and spent the rest of his paper radically revising it[3].

And yet, today, traditional software engineering is still associated in the minds of many with the waterfall lifecycle, leaving it to the agile community to make the true, disruptive shift away from this model—and toward the kind of practices that were, in many ways, already proposed by Royce in his original paper, but largely ignored in the software engineering community.

Instead of a true engineering discipline for software, what we see today is a tendency to adopt new ideas based on popular fashion rather than appropriateness; a lack of a sound, widely accepted theoretical basis; a huge number of methods, whose differences are little understood; a lack of credible experimental evaluation and validation; and a split between industry practice and academic research. Is it, then, time to abandon software engineering as a failed idea? Some would say so. But we can, instead, see this as a call for action to refound software engineering based on solid theory, proven principles and best practices, so that it can finally achieve its original goals[4].

The Software Engineering Method and Theory (SEMAT) initiative has taken up this call for action. But where to begin? Well, if one wishes to refound software engineering, it would seem to make sense to start with the foundation: what is the basic set of concepts and principles that should be at the core of software engineering, its very essence? This is the question those working on SEMAT have asked themselves.

And, through the work of a number of dedicated individuals, an answer has begun to emerge.

The Essence of Software Engineering

The first tangible result of the SEMAT initiative is what is known as the kernel for software engineering. This kernel can be thought of as the minimal set of things that are universal to all software development endeavors. The kernel comprises three parts:

1. Means for measuring the progress and health of an endeavor.
2. A categorization of the activities necessary to advance the progress of an endeavor.
3. A set of competencies necessary to carry out such activities.

Given that many feel that this “crisis” still exists today, the software engineering practices instituted in the intervening years do not seem to have fundamentally resolved the issues that inspired them in the first place.
Of particular importance is having common means for understanding how an endeavor is progressing. The SEMAT kernel defines seven dimensions for measuring this progress, known as alphas:\footnote{The term “alpha” was originally coined as an acronym for “Abstract-Level Progress Health Attribute,” but is now simply used as the word for a progress and health dimension as defined in the kernel. Many other existing terms were considered, but all had connotations that clashed with the essentially new concept being introduced for the kernel. So, in the end, a new term was adopted without any of the old baggage!}

Opportunity, Stakeholders, Requirements, Software System, Work, Team, and Way of Working. These alphas are related to each other, as shown in Fig. 1.

Each alpha has a specific set of states that codify points along the dimension of progress represented by the alpha. Each of the states has a checklist to help practitioners monitor the current state of their endeavor along a certain alpha and to understand the state they need to move toward next. The idea is to provide an intuitive tool for practitioners to reason about the progress and health of their endeavors in a common, method-independent way.

For example, each of the alpha states can be put on a card, along with the state checklist in an abbreviated form (see Fig. 2). The deck of all such cards can then easily fit into a person’s pocket. Although more detailed guidelines are available, these cards contain key reminders that can be used by development teams in their daily work, much like an engineer’s handbook in other disciplines.

References\cite{5} and\cite{6} provide a more complete discussion of the kernel and its application. The kernel itself is formally defined as part of the Essence specification that has been standardized through the Object Management Group\cite{7}.

The Practice of Software Engineering

If the kernel provides a new foundation for software engineering, then how do we build on this foundation? The answer is that we build practices. A practice is a repeatable approach to doing something with a specific purpose in mind. Practices are the things that practitioners actually do.

A practice can be expressed in terms of the kernel by:
1. Identifying the areas in which it advances the endeavor.
2. Describing the activities used to achieve this advancement and the work products produced.
3. Describing the specific competencies needed to carry out these activities.

A practice can also extend the kernel with additional states, checklists or even new alphas.

A critical point is that the kernel provides a common framework for describing all practices and allowing them to be combined into methods. A method (equivalently a “methodology” or “process”) is a description of a way of working in order to carry out some endeavor, such as developing software. A method may appear monolithic, but any method may be analyzed as composed from a number of practices.

For example, the agile method of Extreme Programming is described as having twelve practices, including pair programming, test-driven development, continuous integration, etc. Scrum, on the other hand, introduces practices such as maintaining a backlog, daily scrums and sprints. Scrum is not really a complete method, though, it is a composite practice built from a number of other practices (including the mentioned ones) designed to work together. But Scrum can be used as a process framework combined with practices from, say, Extreme Programming, to form the method used by an agile team.

And that exemplifies the power of explicitly considering how methods are made up of practices. Teams can pull together the practices that best fit the development task at hand and the skills of the team members involved. Further, when necessary, a team can evolve its method not only in small steps, but also in more radical and big steps such as replacing an old practice with a better practice (without having to change any other practices).

Building practices on the common framework of the kernel allows gaps and overlaps to be more easily identified when these practices are used together. And the gaps can then be filled with additional practices and the overlaps resolved by connecting the overlapping practices together appropriately. Using the kernel, one can understand whether a proposed method is well constructed, and, if there are gaps or overlaps in its practices, how to resolve those.

In addition to the full kernel, the Essence standard also defines a language that can be used both to represent the kernel and to describe practices and methods in terms of the kernel.
What we gain from this approach is that practitioners can take charge of their own methods, their own way of working, adapting their development process throughout a project. What we gain is agility in methods.

Importantly, this language is intended to be usable by practitioners, not just method engineers, and, for basic uses, it can be learned in just a couple of hours (the alpha state cards are actually a simple example of this). This ability to use the kernel to describe practices is exactly what we need as a foundation for true software engineering methods.

Conclusion
Methods constructed from practices built on the essential foundation of the kernel. What we gain from this approach is that practitioners can take charge of their own methods, their own way of working, adapting their development process throughout a project. What we gain is agility in methods. The lack of agility in methods is a central failure of traditional software engineering.

We achieve agility in methods by focusing on supporting the practitioner, rather than requiring the practitioner to support a fixed process. One size does not fit all. The goal is to empower teams to produce quality software through application of effective practices, rather than through process control.

This is also the viewpoint taken today by the software craftsmanship movement, focusing on the craft of software development. Other engineering disciplines have also developed out of older craft disciplines. A craft develops into engineering through recognition of the commonality between the methods of various craft masters, based on the underlying shared experience of the endeavor being carried out. This common understanding is then captured in a theory that can be used as a basis for all the different methods to be applied to the endeavor by skilled craftsmen and engineers.

Theory is not the “bad word” it is sometimes treated as in our culture (“oh, that’s just a theory”). Having a theoretical foundation is, in fact, the key that allows for disciplined engineering analysis. This is true of material science for construction engineering, electromagnetic theory for electrical engineering, aerodynamics for aeronautical engineering, and so forth.

What is needed for software, then, is an engineering discipline built on the experience of software craftsmen, capturing their understanding in a foundation that can then be used to educate and support a new generation of practitioners. This is essentially what was missing from previous incarnations of “software engineering”.

What is needed for software, then, is an engineering discipline built on the experience of software craftsmen, capturing their understanding in a foundation that can then be used to educate and support a new generation of practitioners.

What we have described in this paper is just the first step, providing a common kernel for software engineering practices and methods (the “M” in SEMAT). Work is now proceeding on evaluating and integrating existing practices using the kernel and on elaborating the supporting theory (the “T” in SEMAT).

And this, we believe, is what will bring the true paradigm shift to real software engineering.

References

About the Authors

Dr. Ivar Jacobson is the Founder and Chairman of Ivar Jacobson International (IJI). Dr. Jacobson is a father of components and component architecture, use cases, aspect-oriented software development, modern business engineering, the Unified Modeling Language, and the Rational Unified Process. His latest contribution to the software industry is a formal practice concept that promotes practices as the ‘first-class citizens’ of software development and views process simply as a composition of practices. He is the principal author of six influential and best-selling books, and is a regular keynote speaker at software industry conferences around the world.

Ed Seidewitz is the CTO Americas of Ivar Jacobson International. Ed is experienced in agile system architecture and development in both the commercial and government sectors, ranging from business process analysis, to system architecture to full implementation of enterprise-class information systems, deployed in the data center or in the cloud. He has leading expertise in the Unified Modeling Language (UML), including involvement in the continued evolution of the standard, as well as a background in state of the art information system technologies. Ed has strong skills in leadership, oral and written communication and technology transfer. He enjoys learning new things and teaching others.
Exclusive Interview with Prof. Ivar Jacobson
Father of Software Engineering

Prof. Ivar Jacobson, the Chairman of Ivar Jacobson International, is a father of components and component architecture, use cases, the Unified Modeling Language, and the Rational Unified Process. He received his Master of Electrical Engineering degree at Chalmers Institute of Technology in Gothenburg in 1962 and a Ph.D. at the Royal Institute of Technology in Stockholm in 1985 on a thesis on Language Constructs for Large Real Time Systems. He has contributed to modern business modeling and aspect-oriented software development. He is an international honorary advisor at Peking University, Beijing, and holds an honorary doctorate from San Martin de Porres University, Peru.

(above) The tutorial participants including the presenters at Indian Statistical Institute, Kolkata and (below) (From L to R): Dr. Debasish Jana, Dr. Pinakpani Pal, Dr. Mira Kajko-Mattson and Dr. Ivar Jacobson during the meeting (June 4, 2014)

“A problem to fix: We don’t understand the nature of software engineering” – Ivar Jacobson
Prelude

Software is a fashion world. There are so many methods and processes; we switch from one to another, from Rational Unified Process, for example, which talk about iterations, to Scrum, that talks about agile development, talks about Sprint, that is a regular, repeatable work cycle.

Instead of learning from experience emphasis is sometimes given on something believed to be fundamentally new. At each transition we start over, failing to learn anything; we fail to keep what is working and improve what is not.

Debasish: Why is not Essence just another method?

Ivar: There are 100,000's of methods in the world, some of which are described and some of these described are famous such as RUP, Scrum, XP, Kanban. Essence is not one of these. Essence is just what is common for all these other methods - it is a common ground. It includes things that every method has. It has some resemblance to a method, but to really become a method you need to add things on top of it.

Pinakpani: Do you mean that they have the same language in common?

Ivar: No. The way you use them have something in common. They are all about developing software. When people develop software, they always have a number of things, ingredients that are prevalent in every software endeavor.

For instance, their work always results in software. There is always a team. They always have a way of working. The way of working doesn’t need to be documented. If it’s a real team they will nevertheless have a way of working.

Pinakpani: They all have something in common, right?

Ivar: Exactly. They always do things, they always come up with what the system is going to do, we can call it requirements. They always implement the requirements for instance by writing code. They always test. There are many things they always do. If you’re really careful and identify things that are universal for all software development endeavors, you can come up with a common ground, and that’s what Essence is. Essence is the common ground, it’s something we always do, we always have, and we always work with when we develop software. Thus we can say that Essence includes elements universal to all software development methods; Essence is agnostic to any specific method.

Debasish: How Essence can act as a foundation of all practices?

Ivar: In contrast to Essence a method includes things that are specific and that distinguish it from other methods. These specific things come with practices added using Essence as a foundation. So for instance, there are many ways for users to write requirements. You could just write it as a functional specification. You could use structured analysis. Or you could do use cases or user stories. So there are many different ways of doing requirements. The specific way is captured in a practice described on top of Essence. However, independent of which practice for doing requirements (documented as a practice or not) that you use, you always agree on the requirements and achieve an understanding of the team - that is universal.

In some agile methods you first write the test cases and let them work as requirements. And then you test to ensure that you meet these test cases.

Debasish: Is there a distinction between what Essence is and what a kernel is?

Ivar: Yes. Essence is a kernel for software development endeavors. Thus, Essence is a specific kernel. There could be other kernels. Pinakpani: What might be a difference between one kernel and another?

Ivar: As I just said, Essence is a kernel to support endeavors that result in a software system. There will be an extended kernel for systems including hardware and peopleware - a kernel for systems engineering. So there could be other kernels. Now what we have
checklists are better
do they help a software professional?
value expected. What are these and how
around forever and ever and not given a
project checklist. Checklists have been
software and people ware. The changes to
systems engineering – hardware and
Essence kernel so that it also includes
Russia coming from the Russian Chapter
CSI Communications August 2014

Debasish: So could I say in the most
abstract sense, a kernel attempts to
establish a common ground for a group
endeavor, and that group endeavor could
be anything. In this case its software,
but it could be building a skyscraper or
building a bridge or building a company
or anything like that. Correct?
Ivar: Yes, in Russia people have realized
that a kernel similar to the Essence
kernel could work for almost any human
endeavor. As a first example, a team in
Russia coming from the Russian Chapter
of INCOSE is working on extending the
Essence kernel so that it also includes
system engineering – hardware and
software and people ware. The changes to
get there are rather small.

On advantages of checklists
Pinakpani: You often talk about software
project checklist. Checklists have been
around forever and ever and not given a
value expected. What are these and how
do they help a software professional?
A developer, a tester, an architect or a
project manager? Why do you think your
checklists are better?
Ivar: Historically we have used checklists to
identify progress. The problem with these
checklists has been that they have usually
been related to the fact that you have done
a particular activity or that you have written
a particular work product, a document or
something like that. Such checklists are
very easy to cheat and not really very useful.
The fact that you have written a document
doesn’t mean the document is valuable. By
having states representing real outcome, you
know you really have achieved something when you have reached a particular state.
And not in terms of written documents or
performed activities. For example, the Team
Collaborating state cannot be achieved just
by listing the names of your team members.
It requires that the team members are
communicating in an open and honest way,
and that the team members are focused on
their agreed mission. That is actually the
key to the difference. Our checklists are
measuring or identifying that you really have
achieved something and not that you have
filled in a document template or that you
have performed an activity.
Debasish: So are you saying that the
particular kinds of checklists that you’ve
got are trying to measure the quality of the
item or activity or artifact?
Ivar: Not exactly. Essence doesn’t care about
documents at all, it doesn’t care that you
have done some activity. Instead, Essence
cares that you have achieved something of
value like executable code. Executable
code is a real result. For instance, that you
have written a requirement specification
is not something that we would use to
measure progress. Instead that you have
got consensus among the stakeholders that
these are the requirements for what the
system is required to do.

Pinakpani: The different checks in the
checklists are ambiguous. What value
does such checklists give?
Ivar: That is really a very important question.
If you go through a checklist for a particular
state, it’s not necessarily instantly clear
what is meant to achieve a state. This is
actually intentional. If we tried to make it
unambiguous, we would have to express
ourselves in a formal way and then almost
nobody would understand what is meant.
On the other hand if we had no precision at
all the checklists wouldn’t give us any hint of
the meaning and that wouldn’t make them
useful. Let’s go back to the Bounded state
we discussed earlier and look at the example
checklist item in this state that says, “the
stakeholders have a shared understanding of
the extent of the proposed solution”. Some
people might think we need a complete
and consistent set of requirements that
are frozen to achieve this state but that is
not what is meant by Bounded. A “shared
understanding of the extent” means the
stakeholders agree where the boundaries
of the proposed system lie. The team needs
to agree that this checklist item is achieved
by discussing it within the context of their
own endeavor. This is one of the reasons we
refer to Essence as a “thinking framework.”
Instead we have had to strike a balance and
to some extent rely on people’s experience.
We know that within a team, people may
have different opinions about the meaning
of a particular checklist item. That results
in a discussion, which is most valuable,
and eventually the team will decide on how
they interpret the checklist item and take a
decision about whether the item has been
achieved or not as in the example referred
to previously.

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of a particular checklist item. That results in a discussion, which is most valuable,
and eventually the team will decide on how they interpret the checklist item and take a
decision about whether the item has been achieved or not as in the example referred
to previously.

Debasish: In one of your prior answers you
used the word “consensus” – for example,
is their consensus about the requirements.
The ambiguous word there is obviously
“consensus”. Does consensus mean 80%
of the people like it or my boss likes it? What
is the meaning of “consensus” is partly
environmentally determined. That makes
it a useful ambiguity. It makes it a useful
ambiguity because it brings up discussion
which inevitably must be clarifying to the
process. Would you agree?
Ivar: Yes, exactly that’s a very good
example. It brings up a discussion and the
team will eventually agree and make a
decision about whether we have achieved
what the checklist item implies and
whether we have consensus or not.
Pinakpani: The ambiguity brings up a
discussion of a likely critical aspect of the
endeavor as opposed to that being left out
of the mind of the developers. Or everybody
assuming things are okay without really
having had an explicit agreement. Would
that be a fair statement?
Ivar: Yes.

On SEMAT vs. SWEBOK
Debasish: Why isn’t SEMAT just another
SWEBOK?
Ivar: SWEBOK stands for software
engineering body of knowledge. And we
have a clear difference between these two
initiatives. SEMAT is looking for the kernel
to provide a foundation for practices; practices
defined on top of the kernel that can be
combined and composed to form your
particular way of working. SWEBOK has

The fact that you have written a document doesn’t mean the document is valuable. By
having states representing real outcome, you know you really have achieved
something when you have reached a particular state.
a different purpose and that is to identify practices and specify them. Both initiatives have the ambition to create a library of practices. So SEMAT and SWEBOK could work well together. SEMAT could take practices defined in SWEBOK and define them on top of the kernel. SEMAT is also about using practices in daily work. So usage is very important in SEMAT. SWEBOK has nothing similar. There is a good opportunity for the two initiatives to collaborate and do something that will become stronger for each one of them.

**Pinakpani:** Are you saying that SWEBOK is more about ways of working?

**Ivar:** No, both SEMAT and SWEBOK are about ways of working. However, SWEBOK has no common ground concept similar to what SEMAT has developed. SWEBOK is describing every practice from the bottom using English. There is probably a common vocabulary, but it is just a vocabulary. Furthermore SWEBOK has no support for the actual doing in everyday work.

**On Essence kernel supporting existing practices**

**Debasish:** Why doesn’t the Essence kernel include support for iterative development (or Scrum)?

**Ivar:** It depends on what you mean by support for. On the one hand Essence absolutely does provide support for iterative development, and for Scrum and for any other practice you may be interested in. For instance Essence can work with Scrum by powering it. An example of how it can be done was seen with a group of students who used both Essence and Scrum as part of a course at Carnegie-Mellon West. The students reported that Essence helped them consider issues that might be a problem, but they didn’t know they might be problems. When you conduct Sprint Retrospectives without an aid like Essence the team will only consider issues that they have learnt from Scrum or that they are aware of from their own experience. Essence helped them with foundational, method-independent reflections. This is part of the power of Essence.

It is true that we don’t include iterative ideas within the kernel because that would make Essence method specific. However, you can add practices on top of the kernel to support Scrum or any other iterative approach. There is work going on now to compare, for instance, native Scrum as defined by the fathers of Scrum with the same Scrum, but defined on top of Essence.

There are several significant advantages and values to defining Scrum using the Essence kernel.

**On betterment of existing method powered by Essence**

**Pinakpani:** Why do you say that any existing method becomes a better method if “powered by Essence”?

**Ivar:** If you have Essence as a platform for describing your method, you are sure that you won’t miss any of the essential dimensions of software development. What we have seen is that when people don’t use Essence, they forget about essential aspects of their projects. They may forget about the stakeholders, or they forget about why they are doing this endeavor in the first place. For example, what is the business case? Or what is the opportunity we are trying to exploit? Or they may forget about enhancing their way of working. Or they may forget about keeping the team healthy and growing its competency over time.

Basically with Essence, you are consciously looking at all seven dimensions, the seven Alpha’s. You won’t forget any of the dimensions, especially you don’t only focus on “getting code to run.” Even if code is what we want to get eventually, we need to have the right code. You don’t get the right code if you don’t carefully check what the stakeholders want. And you don’t get the right code if you don’t have the right competencies, and so on.

Even if code is what we want to get eventually, we need to have the right code. You don’t get the right code if you don’t carefully check what the stakeholders want. And you don’t get the right code if you don’t have the right team with the right competencies, and so on.

**Debasish:** In what way does Essence support building a general theory in software engineering?

**Ivar:** A general theory in software engineering (GTSE) should as I can see it have a definition worth the name of what software engineering is. If you look in the literature you will find many alternative definitions of the length 1-10 lines, but these definitions really don’t help as a base for a theory. From a theory perspective the Essence kernel and language work as such a useful definition. However, Essence is not just a static definition, it also includes dynamics for measuring progress and health, which should help in giving predictive properties to the theory.

**On myth and reality**

**Pinakpani:** There is a common myth among business owners and practicing project managers that agile methodology will reduce software development and delivery cycle time drastically? Is it so? In the name of agile, are we giving birth to fragile software that causes more re-work and eventual holes in the entire quality aspect?

**Ivar:** First, nowadays what is classified as agile is everything that is good about software development. The term agile has really lost its value. How could you not be agile? However, not all so called agile practices will give the values we hope for. Some we even should stay away from. However, some are really good. It is with agile as with everything else: you need to select the practices that fit your project and that give you what you are looking for.

**Debasish:** Object orientation and component based development stood on strong philosophy of separation of concerns and compartmentalization of responsibilities. But, immature learning as well as lack of fundamentals often leads to poor conceptualization of code reuse. If code is not usable in its first instance re-usability is a far cry. Do you agree?

**Ivar:** Software reuse is a complex area and much can be said about it. Together with Martin Griss, I wrote a book (Software Reuse...), which discusses the questions you raise. Briefly, I would like to say that software reuse is something you need to architect to get. It is not something you get for free.
Introduction
The field of software development is fairly new as compared to traditional industries like manufacturing, retail and the like. Even so, it has seen a lot of churn in the methods proposed to develop software and maintain enterprise applications. In the early days of software, the complexity of applications was not so much that a well-defined processes had to be followed. As application complexity started increasing and software started being used across various enterprise processes and domains, it was necessary to have a well-defined approach for development. Thus, over the years, many software development methodologies like Waterfall, Incremental and Iterative, Agile, and Scrum, to name a few, were developed.

As recent as 2009, a new development methodology called DevOps was proposed. Though it was developed at startups, with the passage of time and proven benefits, DevOps is being considered for software development across many more enterprises. In the following sections, we will elaborate on the DevOps methodology, its benefits and also share some negative views about it.

What is DevOps?
DevOps (short for Development + Operations) is a software development and operations management methodology that tries to bring Agile thinking into all aspects of the application's lifecycle in the enterprise. The concept behind DevOps is to bring software development and operations management teams together, so that they can perform each other’s tasks with ease. This idea is quite radical because software development and its maintenance have become compartmentalized to such an extent that concerned teams do not talk to each other. In most cases, talks end up becoming screaming matches that quickly turn into a blame game.

DevOps aims to re-energize the software development and maintenance activities by co-locating and mixing the teams that are important to the success of the endeavor. The aim is to create a mix of experts such that any person in the team is able to perform any role, depending on the need. Thus, developers can play the role of system administrators, while system administrators can also develop code, as needed. Thus, DevOps advocates multi-skilling the team so that ownership of the enterprise application is with the full team, rather than each team taking a siloed view. Additionally, by this exchange of responsibilities, teams would be able to appreciate the work done by the other teams involved in developing and maintaining the applications.

As per research commissioned by CA Technologies and conducted between May and July 2013 by Vanson Bourne, many organizations are achieving significant and measurable benefits from DevOps — anywhere from between 17% to 23% improvement in key business metrics such as revenue, time-to-market and new customer acquisition.

Areas That Need to be Addressed During Adoption
Simply putting the development team and the operations team is not going to give us DevOps, nor is it going to provide benefits. A change is needed in almost each and every aspect of the way the software is developed, deployed and maintained, as illustrated in Fig. 1.

To adopt DevOps, the following areas need to be addressed:
- Infrastructure — It should be possible to setup/deploy the environment using tools and pre-defined/well-defined configurations.
- Code — Should be version controlled in a repository and is updated on a commit by commit basis.
- Testing — Should be automated as much as possible with nightly/weekly build tests.
- Change Management — Should...
be automated, pushing released changes from Dev to QAS for testing and QAS to Prod to go live.
  • Tools - Common tools should be used and deployed across all the teams.

‘Full Stack’ Developer
With the popularity of DevOps, the term ‘Full Stack Developer’ is also gaining importance. Full Stack Developer essentially means someone who is familiar with each layer of the application. The person may not be an expert in each and every layer, but has sufficient exposure to be able to resolve issues. The layers that a Full Stack Developer needs to be familiar with are: Server, Network, and Hosting Environment; Data Modeling; Business Logic; API layer / Action Layer / MVC; User Interface; User Experience as well as and Understanding of the customer and the business needs.

Benefits
Some of the benefits of DevOps are
  • Increase in frequency of deployment of software/services
  • Increased collaboration between departments
  • Reduction in spend on development and operations
  • Improved quality of deployed applications
  • Reduced time-to-market for software/services
  • Availability of software/services across more platforms
  • Increase in revenue
  • Better management of software assets by using version control and automation

Negative Views
While DevOps has many proponents and benefits, it has its share of detractors. Most of the detractors believe that DevOps is a methodology that will put more pressure on each team member. This is because, each team member is new expected to know and be familiar with each component technology in the enterprise application stack. While DevOps states that teams have to be familiar with technologies, in most situations, enterprises will demand that their teams be experts in these technologies. Additionally, as development and operations are very different activities, many believe that DevOps will create a situation where developers will have very little time on their hands to develop new functionality, as they will many times be expected to support operations. Lastly, many people believe that DevOps will be a mechanism for enterprises to reduce their workforce by asking people to perform multiple roles.

Conclusion
Though DevOps is being practiced in many organizations and is being proposed as the next best thing to happen to software development, it is important to realize that simply putting teams together and dictating that they work together is not going to generate the expected results. For change to occur, commitment for the change has to come from the Executive level in the organization. This, is needed in addition to a well thought out Application Lifecycle Management (ALM) strategy.

Multi-skilling teams is a definite advantage for enterprises. It will help develop empathy and appreciation between the teams involved and go a long way in reducing the friction between them. But, it is important to note that DevOps and multi-skilling should not become a tool to reduce the number of people needed to develop and maintain an application.

Indian IT service providers that are developing software and providing operational support for the same project (and customer) can benefit a lot by adopting DevOps methodology. Adoption of DevOps will allow them to create better synergy between the teams. It will also help reduce the blame game between teams and most importantly, create a more uniform experience for customers.

References

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The Role of the Release Plan in Software Development Lifecycle

**Introduction**

These days the software market is coming up with different applications and products based on customer needs. Without on-time release of the product, product teams are not successful. Thus it has become necessary to have a realistic release plan in the software development life cycle.

The release of the product is a crucial phase in the software development cycle. The release phase begins after test and development cycles are completed, and after project teams sign-offs are done. This comes in effect after conceptualizing the requirements, design, and code. After successful product tests are completed to the satisfaction of the product team, it will be classified as a minor or major release based on the product plan, and the software code comes to the release team. Here is the essence of this article:

The release team builds the product release package from specified code libraries and a prepared software bundle, most often called zip file, gzip, gnu or tar file, depending on the software that is used to create the compressed file. Following the company’s standard procedures, the software is written to a compact disk or stored on the website for downloading purposes. Some of the standards are ISO image procedures, company logo checks, disclaimers, copyrights, limitations, licenses, usage violations, laws and permissions.

General Availability (GA) is the phase of checking all of these components before making it available to the general public. Sometimes due to the product requirements, software release bundles are created just for internal purposes and are not available for the general public. The software release team has specific identification to denote whether it is for the general public or for internal use.

Before the release of a product to the general public, the release team has a checklist for the existence of required norms. Some of the checklist items are sign-offs from development teams, test teams, quality teams, business teams, product teams, and management. Once the compact disk is prepared, it is sent to the product team for the initial test and signoffs. After all the checklist items are successfully completed, the release team signs off on the product. The product team decides whether a particular release is of service pack (minor release) or dot release (also called major release or new release). Service packs generally consist of fixes for minor, cosmetic, low critical issues or bugs. Dot release or major release would consist of component enhancements, fixes for critical bugs, change in architecture or major shift in business requirements. A change or major shift in architecture or components of the software product requires a huge effort from development, test, quality assurance, and product release teams. They have to work in conjunction to get the new release on time. The product goes to the market which is denoted as RTM (Release to Manufacturing). The release team specifies whether a particular software bundle is RTM. Software has to meet the RTM criteria before it is released to manufacturing.

Checklists differ based on the specific nature of products that are released. For example medical products can have drug usage statistics, clinical samples, and clinical studies which are taken into consideration before releasing the product. Software products or financial products would normally incorporate market studies, success stories, webcasts, standards, compliances, growth studies, and business impact analysis. All these factors are taken into consideration before project initialization. The release team generally consists of software release engineers or developers who invest their time in preparation for software releases and also research the latest development with regards to standards, compliance rules, and regulations. These release engineers certainly need to have knowledge about the product releases and configuration management procedures however their technical strengths would be more on tackling the issues that are encountered when preparing the software bundles. When they encounter such issues, they communicate and file them using test bug databases or defect management database under “release” component. Due to the criticality of the issues they face while preparing the software packages, release-related issues have to be dealt with urgently, complying with product plans. They communicate and coordinate these issues with product development, quality assurance, and test teams for their timely fixes. After successful release of the product they document their activities in the product release plan with the actual procedures of compiling methods, processes, and checklists that they have used while preparing the software compact disks or packages.

Release engineers work to prepare releases on time and do not necessarily need to understand the internal structures of the code. They compile the required libraries and code packages in proper sequences and label them correctly. They have to know and use the correct software which is required for the particular release that they are working on. Depending on the company software standards and strategy, the required libraries and software are used. Some companies use automated procedures and tools to prepare these software release bundles. They normally use batch/automated processes or shell scripts on UNIX systems to create the release software packages.
Instead of re-inventing the wheel to develop necessary components, software products nowadays include third party products in their software to which they pay royalties. In these cases release engineers have to check the support as well as sustenance of the product lines. They have knowledge about the support mechanism of the product in terms of first line of support, second line of support and so on. Release engineers need to know the required libraries, components, 3rd party software that are used and bundled with the software. They need to know the accurate versions of the software components that are to be imbedded or included within the software and their usage. If they use the latest or upgraded versions of software they have to understand their impact on the earlier releases. Generally they conduct impact analysis before using the upgraded versions of the software in releases. Using this impact analysis they find out immediately about compatibility, support, and maintainability issues.

In conclusion, having a realistic release plan makes things easier when it comes to the on time release of the product line. In this plan, the information regarding the support time lines, mechanisms, release criteria, processes, procedures, release checklists, timelines, communication to the product teams, required personnel and their roles and responsibilities, required libraries, software, licenses etc. are detailed. This plan is subsequently implemented for the successful release of the software product.

Fig. 2: Software development life cycle

Sreerekha Bakaraju has over thirteen years of experience in the Information Technology industry. She is successful in conceptualizing business requirements, computing technical specifications, and project budget. She played a pivotal role as team member, leader, and manager. She also advised in design, policies, procedures, programming, testing criteria, and helped in improvising, specializing in the testing software programs and applications.

In addition to developing Application Software in Oracle, SQL, and PL/SQL in Windows and UNIX environments, and system development methodologies such as Agile, ITIL, she has also specialized in the Testing and Quality Assurance fields. She has international experience in financial, telecommunications, banking, and technological sectors.

About the Author
Software Testing: An Insight of Latest Tools and Techniques with a test script execution in Rational Robot

Software Testing is exemplified as a process in which software or a program is checked in order to reveal any gaps or errors or missing requirements in contrary to actual desire or requirements. It gears stakeholders with information about the quality or service under test. The two terms which are backbone of software testing are validating and verifying which are closely related; but to most people it seems same but they are poles apart. Verification make certain that the software system meets all range of capabilities and take into account the checking mechanism for documentation, code etc. It is generally done by developers. Validation has static activities as it substantiates whether the software is impeccable or not. Whereas, Validation cocksure that all the functionalities meet the intended behaviour. It always takes place after verification and it inculcates the scrutiny of the overall product. This is generally done by the Testers. Validation has dynamic activities as it includes executing the software against the reclaims. Thus we can consummate executing the software against the has dynamic activities as it includes scrutiny of the overall product. This is behavior. It always takes place after all the functionalities meet the intended is appreciated and a true blue development there are two separate teams, development team and a true blue testing team.

An early start to testing impacts the cost incurred, time needed to rework and ultimately results in error free software that is supposed to be delivered to the client. As we know testing is a never ending process and so there is no definite time when one can stop testing and can say that the given software/program is 100% tested and completely fault free. 

Now as number of software packages in the market is increasing, so has the desideratum of the software testers. Until 1980’s “SOFTWARE TESTER” was the term generally used; but later after seeing the drumfire in the IT industry it was seen as a separate profession. Different roles have been established regarding different aspirations in software testing as stated below:

- Manager
- Test lead
- Test analyst
- Test designer
- Tester
- Automation developer
- Test Administrator

Web Testing is the name given to software testing that spotlights on web applications. In web testing complete testing of web based software/program/ system can help address inflict and scoop them to the developer before it is revealed to the public. Issues such as the security of web applications, the basic functionality of the site, its accessibility to fully able and handicapped users as well as its readiness for the expected traffic and number of users which is though related to load testing.

The web security testing tells us whether web based application requirements are met when they are subjected to malicious data. There are two different types of testing’s which are used to test software as described below:

Manual Testing: This type of testing includes the testing of the software manually that is performing the testing without using any tool. In this type the tester performs the role of an end user and test the software to get the hang of any un-expected behaviour or bug in the program/software. There are different junctures for manual testing like unit testing, integration testing, system testing and user acceptance testing. Testers use test plan, test cases or test scenarios to test the software and asservates the plenitude of testing. In this type of testing, the testers explore the software to spot errors in the program/software.

Automation Testing: Automation testing is also known as “TEST AUTOMATION”. In this type of testing the tester write scripts and makes use of software to test the software/program. In this type the manual process is done by the automated or the consecrated software. It is also used to re-run the test scenarios those were consummated manually earlier quite swiftly and repeatably. Automation testing improves the incisiveness, bail out time and money in juxtaposition to manual testing. Also, there are certain snags related to automated testing as it is not possible to automate everything in software, the areas where users can make transactions such as login form or the registration forms or simply the areas where the requirement is automation.
There are a lot of automated tools already on deck which can be used to write the automation scripts. Some of the tools which can be used to perform automated testing are listed below:

• HP Quick Test Professional
• IBM Rational Functional Tester
• Silk Test
• Test Complete
• Testing Anywhere
• WinRunner
• Visual Studio Test Pro
• WATIR etc.

### Advantages:
- Access of code is not required.
- Suitable and efficient for large code segments.
- Even the accomplished testers can test the application that doesn’t have much knowledge about the programming languages.
- Different user’s view from the developers view through visibly defined roles.
- It is difficult to design the test cases.

### Disadvantages:
- Restrained or blind coverage as the tester is not accessible to whole code and cannot target the specific code segment or error prone areas due to lack of knowledge.
- Testing is not effective as tester has circumscribed knowledge about the application.

Table 1: Advantages and disadvantages of black box testing

### Different methods of Manual Testing
There are a variety of methods which can be used for testing the software:

**Black Box Testing:** It is a testing technique done without having the cognition of the internal workings of the application. The testers identify the system architecture but they do not have equity to access the source code. Basically, black box tester will interact with the system’s user interface by providing inputs and examining the outputs without knowing how the inputs are worked upon. The advantages and disadvantages of black box testing are mentioned in Table 1.

**White Box testing:** It is the complete examination of internal logic and structure of the code. White box testing is also called as glass testing or open box testing. In order to execute the open box or white box testing on an application, the tester has limited apprehension of the internal workings of the application. Getting the knacks of the domain of a system always gives the tester an edge over someone with limited domain knowledge. Unlike black box testing, in the grey box testing the tester only test the user interface, the tester has access to design documents and the database. Since the ingenious testers have better knowledge; they are able to create better test data and test scenarios while making the test plan. The advantages and disadvantages of grey box testing are mentioned in Table 3.

### Potpourri of Software Testing Tools
Selection of software tools is entirely based upon the project requirements & commercial (proprietary/commercial tools) or free tools (Open source tools).

The free tools have some injunctions due to accessibility of some features. The tools are prorated into following different categories:

- Test management tools
- Functional testing tools
- Load testing tools

Some of the popular testing tools available in the market based upon their classification are given below in Table 4.

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Test Management Tools</th>
<th>Functional Testing Tools</th>
<th>Load Testing Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Source Tools</td>
<td>TET( Test Environment Toolkit)</td>
<td>Selenium</td>
<td>Jmeter</td>
</tr>
<tr>
<td></td>
<td>TET ware</td>
<td>Canoo WebTest</td>
<td>FunkLoad</td>
</tr>
<tr>
<td></td>
<td>Test Manager</td>
<td>HTTP: Recorder</td>
<td>....</td>
</tr>
<tr>
<td></td>
<td>RTH (Requirement and Testing Hub)</td>
<td>Solex</td>
<td>....</td>
</tr>
<tr>
<td>Proprietary or Commercial Tools</td>
<td>HO Quality Center/ ALM</td>
<td>Quicktest Pro</td>
<td>HP Load runner</td>
</tr>
<tr>
<td></td>
<td>QA Complete</td>
<td>Rational Robot</td>
<td>LoadStorm</td>
</tr>
<tr>
<td></td>
<td>T-Plan Professional</td>
<td>Test Complete</td>
<td>Forecast</td>
</tr>
<tr>
<td></td>
<td>Testuff</td>
<td>BadBoy</td>
<td>Load Impact</td>
</tr>
</tbody>
</table>

Table 2: Advantages and disadvantages of white box testing

**Advantages:**
- It helps in optimizing the code.
- Extra lines of code can be removed or declared as a comment which can bring in hidden defects.
- Due to tester’s knowledge about the code, maximum coverage of the code or program is attained during test scenario writing.
- Experienced tester is required to perform white box testing, hence the costs are elevated.
- Sometimes it becomes wearisome to look into every aspect and every small thing; to find out hidden errors that might create problems as many paths go untested.
- It is difficult to execute the white box testing without the help of specialized tools like code analyzers and thus there is exigency of debugging tools.

### Grey Box Testing: In grey box testing

**Advantages:**
- Black and white box testing can be amalgamated, wherever it may possible.
- Grey box testers don’t rely on the source code instead they work on interface definition and functional specification.
- Based on the specified information, grey box tester can design excellent test scenarios especially around communication protocols and data type handling.
- The test is prepared and executed from the point of view of the user and not the designer.

**Disadvantages:**
- Since the access to source code is limited, the test coverage is limited.
- The test result becomes palaverous if the test designer has already run a test case.
- Testing every possible input stream is unrealistic because it would take an unreasonable amount of path; therefore, many programs will go untested.

Table 3: Advantages and disadvantages of grey box testing

### Table 4: Popular testing tools available in the market
**Collocations of Testing**
Some of the substantial software testing techniques are discussed below in nutshell.

**Equivalence Partitioning:** This technique segregates the input of the program onto equivalence classes. Equivalence classes are set of valid as well as invalid states for input conditions. While using this technique, one can get test cases which identify the classes of errors.

**Boundary Value Analysis:** This technique is like equivalence partitioning except that for creating test cases input domains as well as output domains are also used.

**Cause Effect Graphing Techniques:**
When one uses this technique one wants to explicate a policy or procedure specified in a natural language into software’s language. In this the cause effect graph is produced and then the graph is changed into a decision table and finally the rules of the table are graph is changed into a decision table for obtaining the basis set and presentation flow in the program.

**Loop Testing:** It is a white box testing technique consummated to validate the loops by proclaiming the loops initialization contingencies. The uninitialized variables in the loop can be clinched by passing through the loop once so as to avoid loop repetition issues and unveiling performance clogging.

**Rational Robot Software Testing Tool Manifestation**
Rational Robot, IBM test automation tool is a complete set of components for automating the testing of client/server and Internet applications (like E-commerce, ERP applications etc.) specifically for regression and functional testing. Rational Robot is installed along with many other supporting tools like ClearQuest, Rational LogViewer and Comparators, SQL Anywhere, Rational Test Manager, Rational Administrator, Rational SiteCheck, Test Factory, Rational Purify, Rational Visual Quantify, and Rational Visual PureCoverage etc. depending upon which version we are using[4]. Following are the steps showing how to open and test a script using Rational Robot.

**Step 1:** Click on Start -> Rational Software -> Rational Administrator. Rational administrator window will open. First, we have to create a new project that will be created automatically in a new folder. This folder will also store all the other files such as Test DataStore and Script files. It will also prompt for providing any password for the project to provide security. As soon as the project will be created, a database holding records is configured along with.

**Step 2:** Now Click on Tools -> Rational Test -> Rational Test Manager.
Create a new test script by choosing File -> New Test Script -> GUI- (Rational Test DataStore). This is shown in Fig. 1.
Provide a name to the script file for example, script 1. When we click on OK, script will be opened as shown in Fig. 2 with coding in Visual Basic. Start the application using Insert -> Start Application. Now browse the existing script file to add in our new script file or we can create an entirely new script file. Do the necessary changes, if required.
Step 3: We can perform testing with our manual script file “script 1”. Click on Insert -> Verification Point -> Alphanumeric. There are other options also in place of Alphanumeric for example, Object, Menu, Object Properties etc. As shown in Fig. 3.

Now we are testing the object properties of existing and new script files with the help of Object finder Tool as shown in Fig. 4.

Step 4: Run both the script files by clicking on playback script icon displayed on standard toolbar. The result showing pass or fail of script is shown in Fig. 5.

Acknowledgements
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End Notes

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**Cost Estimation for Fixing the Security Risks on Architecture of an Information System**

*Abstract*—Information systems are easy target of security attacks. The augmented usage and the development of information systems over the years have triggered the quantity and frequency of threats to these very systems. The damage caused by these threats is costly to fix if not prevented at appropriate time. Little effort has been made by academicians to estimate the cost of the damage and cost involved to fix them, when a particular attack goes through. The paper, done qualitatively, confirms the cost of fixing the various effects on the architecture of the information systems when the systems are exposed to attacks. The conceptual results, presented in the paper explore the relation among cost of fixing, security risks and effected architectural components of information systems. The findings will help the developer community to estimate the cost involved in fixing the effects of security breaches to information systems.

**Introduction**

Information systems are widely used for sectors like business, banks, finance, marketing, trade, medical service, hospitality, energy, and education to carry out their day to day proceedings. Security of these systems is always at stake. Current era is no doubt an information-centric age where seemingly every aspect of our existence is inextricably dependent on the services of information systems. Information is the center of gravity for daily operations because it holds relevance and value as knowledge to decision makers in the organization. Through interpretation, data becomes information and is inherently associated with meaning. For these reasons, therefore information instead of data should be the focus when valuing cyber resources. If we accept the idea that information is an asset, we must develop standardized schemes for identifying, valuing, tracking, documenting, and reporting information assets. As illustrated by Bulguru et al. (2010) still we prefer infrastructure based policies to secure our information system. These policies lack in identifying the risks to the assets, the organization is concerned to protect. It substitutes the value of information to the organization with that of the infrastructure components. The infrastructure elements are protected equally against known vulnerabilities even though vulnerabilities are only significant if they place critical assets at risk. The thoughtless up gradation of technology is proving to be dangerous. Although infrastructural elements are used to store, retrieve, process, and transport data, the timely, secure and accurate delivery of data to end users as information depends upon lots of interrelated factor like design, architecture, security models and security policies. The term information security was highlighted in 1970s for the very first time. Large number of cases related to intrusion, spam email and identity theft happened. Subsequently in 1980s, many reputed banks reported incidents of cracking and hacking. The 90s saw a huge increase in volume of attacks. The DOD computers were attacked roughly millions of times. Then highly acclaimed and secure websites of the U.S. Department of Justice, CIA, Air Force and Microsoft became victim of Denial of Service attacks. In later years these reports were so frequent throughout the world that a large pool of risk management policies was framed for information systems (Joseph, 2008). The usage of ISs has expanded to metros and subsequently to the global environment, therefore exposing these systems to vastly more security risks. These risks when exploited, causes huge damage to organizations. Estimation of the cost of fixing these security risks needs to be done so as to have knowledge of economical way out needed to fix threats and potential damage that they could cause. The security property of every component in the system varies with the environment.

Adding or removing a subsystem will affect the security properties of the whole systems. Security risks are closely associated with system vulnerabilities, which refer to any weaknesses in an IS architecture. Good cost estimation will be one having details about above mentioned points and satisfying following objective criteria:

**Objectiveness:** The measurement must yield quantifiable information.

**Repeatability:** when repeated in the same context, with exactly the same conditions, the measure must return the same result.

**Clarity:** The measure should be easy to interpret with a clearly defined semantics.

**Easiness:** The measurement of an attribute should be easy to perform. The measure should create or add knowledge about the entity itself, sometimes with the purpose of improving the usefulness of the entity.

When vulnerabilities are exploited, information systems get hacked. So therefore cost of each above mentioned entity needs to be counted while determining a valid estimate of cost of fixing the threats. The existence of IS vulnerabilities continues to be one

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**Fig 1:** Risks, attacks and cost incurred to manage risks in sensitive Information System Architecture
of the most important determinants of malicious IT attacks against weak IS architectures. Malicious attacks come from outside and remote sources through networks. If an attack is successful, damage control is required. It was observed by Campbell et al. (2009) that vast efforts in terms of cost and time are required to fix damage. The different studies on IS security and cost analysis can be summarized by linear relation between cost and number of risks as cost is proportional to number of risks and further risk are dependent on asset, threats and vulnerabilities in a direct relation too.

**Literature Survey**

Analysis of destructive potential of security risks is a key point in estimation of cost incurred while managing the after affects of security attacks on these very systems (Richardson, 2003). Cyber attackers and cyber terrorist groups are ever watchful of the latest innovations and skills in information security. They are always looking for their chances to breach into the systems and cause the damage. The goals of researchers are to make the stakeholders aware of the need of risk management and information security policies, so as these risks can be prevented at very initial stage of development. Information is particularly important for organizations and its destruction can have serious consequences on a business. If not given proper attention these risks then becomes a challenge to the developers. Microsoft in year 2002 ceased development of new system software for more than thirty days, and sent the company’s 7,000 systems programmers to a special security training program. Risks when exploited cause huge revenue loss to organizations in addition to fixation cost of the damage. Various IS risk analysis methodologies have been developed within academia and industry. These include expected value analysis, CBAM, stochastic dominance approach, Livermore Risk Analysis Methodology, scenario analysis, questionnaire, and fuzzy metrics, and tool kits like Information Risk Analysis and Management Method, National Institutes of Standards and Technology Special Publication 800-64. Also techniques like COCOMO, COCOMO II and SLIM methods exist for estimation of cost for software development. But cost estimation concerned with security risks is omitted in all above studies.

**Information Attribute within an Information System and their Importance**

Raman (2006) has pointed bad design of information system as most vital factors in increasing the security breaches. Information systems are essential components of critical infrastructure of any Nation. Breaches can jeopardize intellectual property, consumer trust, and business operations and services. A broad spectrum of critical applications and infrastructure, from process control systems to commercial application products, depend on secure, reliable software. Majority of reported security incidents result from exploits against defects in the design or code of software. The software integrity is decisive in protecting the infrastructure from threats and vulnerabilities, and reducing overall risk to network based attacks. In order to ensure system reliability, integrity, and safety, it is critical to include provisions for built-in security of the enabling software. The tremendous advances of computer hardware have increased the pressure on software developers as the security of a computing system rely heavily on its software. There is still a significant variation in state of the arts of software technology in comparison to hardware counterpart in terms of reliability and security. Building software which can defend intentional and unintentional malicious attack is need of the hour (Julia and McGraw, 2008). The software security should exhibit ability to defend itself and the system from the attacker's exploitation and misuse of security loop holes. Developers must have ability to identify the deficiencies of the software development process and to identify critical threats that can make software vulnerable. Software with build-in security should reflect features like predictable execution, trustworthiness and conformance. Along with these properties, the secure information system should be attack resistant, attack tolerant and attack resilient.

**Cost Issues for Information System Security Attributes**

- **Authenticity** - It means truthfulness of origins, attributions, commitments, sincerity, devotion, and intentions.
- **Confidentiality** - It means information is accessible only to those who are authorized to have access.
- **Possession/Authority** - Means the ownership or control of information.
- **Integrity** - It refers to the validity, trustworthiness and dependability of information.
- **Utility** - It is related with the usefulness of information.
- **Non-repudiation** - It refers to the undeniable ability of entities to perform actions on sensitive information.
- **Availability** - Means to have timely access to information. These attributes can be tabulated as per their damaging effects on information systems as per table 1. The

<table>
<thead>
<tr>
<th>Security Attribute</th>
<th>Potential Damage</th>
<th>Cost of Fixing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidentiality</td>
<td>unauthorized access to IS, user can manipulate the system</td>
<td>costly to fix</td>
</tr>
<tr>
<td>Availability</td>
<td>Disruption of key business processes and potential damage of important data</td>
<td>very costly to fix</td>
</tr>
<tr>
<td>Integrity</td>
<td>Financial reports may be incorrect, decision making Process questionable</td>
<td>less costly if implemented at design level</td>
</tr>
<tr>
<td>Authenticity</td>
<td>Illegal Access</td>
<td>costly to fix</td>
</tr>
<tr>
<td>Possession</td>
<td>Access to storage</td>
<td>Medium cost</td>
</tr>
</tbody>
</table>

**Table 1. Cost of fixing the Information system Security attributes based upon user perception.**
attributes are assigned the corresponding rankings based upon the user perceptions.

**Damage and Cost Estimate for Security Attributes and IS Architecture**

The following table 2 sums up our findings in the form of relationship of security attributes and their effects on Information system architecture when these vulnerabilities of information systems are exploited.

<table>
<thead>
<tr>
<th>Security Attribute</th>
<th>Potential Damage</th>
<th>Cost of Fixing</th>
<th>Effect on IS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authenticity</td>
<td>user interface</td>
<td>Less costly when fixed at Design level</td>
<td>An unauthorized user will be successful in accessing the system</td>
</tr>
<tr>
<td>Confidentiality</td>
<td>communication channel information storage</td>
<td>Cost effective way is by using patches</td>
<td>Information breach</td>
</tr>
<tr>
<td>Possession</td>
<td>information storage</td>
<td>Less Costly to fix</td>
<td>Data and Information leak</td>
</tr>
<tr>
<td>Integrity</td>
<td>communication channel information storage</td>
<td>Cost is less when handled at design level</td>
<td>Theft of Information, File system or virtual file system</td>
</tr>
<tr>
<td>Utility</td>
<td>information storage</td>
<td>Medium level costly</td>
<td>Information can be altered</td>
</tr>
<tr>
<td>Availability</td>
<td>Information storage</td>
<td>Very costly if found later</td>
<td>An authorized user may be denied the access</td>
</tr>
</tbody>
</table>

Table 2. Cost of fixing the damage to IS Architecture when Exploited

vulnerabilities get introduced during the architectural design of the software or a component. Being aware of a security weakness and being able to determine that a separate security control in the form of patch would compensate for it, a developer may willingly cause it to occur. But creating a feature without evaluating the risks should not be recommended. Interestingly, threats sometime also change over the lifetime of software or a protocol used in software.

**Physical Threats to Information Systems and Cost issues**

Physical threats are also able to damage the information systems as listed in table 3. Information system based business is a relatively very big business with a global reach and unlimited resources. These systems need to be robust with at least cursory protection mechanisms. Many employees with access to the system are likely low-cost data entry employees with little awareness or training in information technology security. Intentionally or unintentionally the information system is in continuous risk from the man power of competitors both within the business house and outside. The disgruntled former employee can also trigger phishing enabled theft of data or some other kind of virus infection. The enemy nation can use services of hackers. Some personnel interests can also prompt someone to do mischievous manipulation in the information.

**Conclusion**

This study describes interrelationships between security risks, cost to fix the risks and potential damage on information systems architecture when the risk are exploited. A qualitative analysis of known facts has been presented, which is a necessary and an important step toward goal of estimation of cost to fix the after effects of risks to the information systems. This study was conducted to determine the cost to fix effects of security risks on the system architecture. Future research should focus on the quantitative constructs themselves. An empirical and measurable analysis will be planned and conducted by taking suitable parameter to quantify the above results.

**References**


<table>
<thead>
<tr>
<th>Physical Threat</th>
<th>Method and Cost of Fixing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insider</td>
<td>By keeping an eye on employees It is less costly</td>
</tr>
<tr>
<td>Criminal</td>
<td>Costly to monitor the traffic over network</td>
</tr>
<tr>
<td>Hacker and cracker</td>
<td>Costly affair to check pattern of access to systems</td>
</tr>
<tr>
<td>Enemy Countries/ Governments</td>
<td>Very costly as sophisticatedly skilled intruder are involved</td>
</tr>
</tbody>
</table>

Table 3: Cost involved in fixing the Physical threats to Information Systems


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**Dr. Hardeep Singh** is working as Professor in department of computer science and Engineering, Guru Nanak Dev University Amritsar. He has more than hundred publications in reputed National/International journals and conferences. He is life member computer society of India. His area of research is Software Engineering.

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Parallel Computing with Message Passing Interface

The article focuses on Message Passing Interface programming for parallel computing paradigm and is setup in two parts. In this issue, we are focusing on the first part, which covers a general introduction to parallel computing and Message Passing Interface. The upcoming issue will focus more on programming for MPI Subroutines with toy examples.

Introduction

Living in the era of computing beckons various scientific domains from astrophysics to biology demands more computing power than traditional sequential computers for analysing the huge data generated every day. Parallel computing paradigm exploits the simultaneous use of various computer resources for solving a computational task. Not all computational problems require parallel computing resources for executing the various operations. Therefore, a primary check needs to do in the compatibility of parallel processes. For instance, the problem to be parallelized is "watching the movie-Gods own country and writing a critique on it". Initially, we can divide the movie into four parts of half an hour long and can assign four different people to watch each part of it and write reports based on their observation. However, integrating the four reports will not produce a good review, which means parallelizing the problem will not produce a good result or the problem is not compatible with the parallel computing paradigm.

Let us consider another trivial job of summing 1 to 100. The problem execution needs to be parallelized for better time utilization. For example, summing the numbers from 1 to 25 can be assigned to master processor(node), summing numbers from 26 to 50 can be assigned to processor 1, summing numbers from 51 to 75 can be assigned to processor 2 and the rest (from 76 to 100) to processor 3. Finally, every processor will give their sum values to the master node and it will again sum up all the intermediate values to get the final sum. Thus, the parallel computing improves the efficient usage of time compared to that of sequential computing.

Message Passing Interface (MPI)

MPI is the dominant model used in high performance computing (hpc) and generally used as the industry standard for writing Message Passing Programs on hpc platforms. It is a language independent communication protocol. It allows users to create programs that can run efficiently on most parallel architectures.

Some basic concepts in MPI

The basic terminologies using MPI is listed.

An example for understanding the compatibility of parallel computing –The task of writing a critique of the film cannot be parallelized, while the task of cooking a curry can be parallelized.
as Point to point communication. Fig. 2 depicts a conventional representation of a Point to point communication.

**Collective communication:** While performing a task, it may be required for one processor to communicate with all other processors of the communicator. For instance, the Master node needs to communicate with all of its slave nodes for integrating the end result. MPI communication can be called using languages such as C, C++, FORTRAN77 and FORTRAN90. Figure 3 shows a schematic representation of a sample collective communication.

**MPI Using C**

For writing an MPI program in C language, the following facts need to remember.

❖ Include the header file mpi.h using the command `#include<mpi.h>`. In C programming, all library functions are included in different header files, in different categories with .h extension. For an MPI program, `#include<mpi.h>` command will include all MPI subroutines. During the MPI subroutine call from the main program, compiler will go to MPI subroutine definition, which is available at the MPI library and executes the function definition. After execution, result is returned to the program from where it was called.

❖ C language is case-sensitive. All the MPI subroutines have the form `MPI_Subroutine`. For instance in `MPI_Init`, `MPI_Comm_size` where MPI, I, and C are in upper-case. Constants defined in mpi.h are all in upper-case such as `MPI_INT`, `MPI_SUM`, and `MPI_COMM_WORLD`.

❖ In an MPI function call, the arguments that specify the address of a buffer should be specified as pointers.

❖ Return code of an MPI function call should be an integer value.

❖ Data types defined in the C semantics is in way that is more individual. A comparison of pre defined MPI data types with C data types is listed in Table 1.

We will introduce more about MPI subroutines and its programming in the next issue. Wishing you all a fruitful month ahead.

**References**


<table>
<thead>
<tr>
<th>MPI Datatypes</th>
<th>C datatypes</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPI_CHAR</td>
<td>signed char</td>
</tr>
<tr>
<td>MPI_SHORT</td>
<td>signed short int</td>
</tr>
<tr>
<td>MPI_INT</td>
<td>signed int</td>
</tr>
<tr>
<td>MPI_LONG</td>
<td>signed long int</td>
</tr>
<tr>
<td>MPI_UNSIGNED_CHAR</td>
<td>unsigned char</td>
</tr>
<tr>
<td>MPI_UNSIGNED_SHORT</td>
<td>unsigned short int</td>
</tr>
<tr>
<td>MPI_UNSIGNED</td>
<td>unsigned int</td>
</tr>
<tr>
<td>MPI_UNSIGNED_LONG</td>
<td>unsigned long int</td>
</tr>
<tr>
<td>MPI_FLOAT</td>
<td>float</td>
</tr>
<tr>
<td>MPI_DOUBLE</td>
<td>double</td>
</tr>
<tr>
<td>MPI_LONG_DOUBLE</td>
<td>long double</td>
</tr>
<tr>
<td>MPI_BYTE</td>
<td></td>
</tr>
<tr>
<td>MPI_PACKED</td>
<td></td>
</tr>
</tbody>
</table>

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Measuring Changeability of Object Oriented Classes and Packages by Mining Change History

As a software system evolves, the classes are changed due to some development or maintenance activity, which is inevitable in software life cycle. These class changes can produce ripple effect or can lead to subsequent changes to other classes in the same package. The extent of this ripple effect can be measured in terms of changeability of classes and packages. In this article, this changeability for the classes and packages are measured on the basis of past change pattern i.e. change history of the classes which is recorded during the evolution of software application.

Introduction

As we know, classes in an object oriented application, mostly work in a collaborative environment where they participate with other classes in order to achieve a similar goal or to implement the required functionality of an application. Due to this collaborative nature of the classes they require proper attention during designing as well as maintaining an application. One can understand this collaboration by analyzing change-coupling among the classes. Two classes can be considered as change-coupled if they are frequently changed together in past. The software engineering community has recognized that the excessive change coupling among the classes of a package can lead to serious problems during development as well as maintenance. Fowler described excessive change coupling as “when every time you make a kind of change, you have to make a lot of little changes all over the place, they are hard to find, and it’s easy to miss an important change”. Change-coupling has been considered as a bad symptom in software system. For change-coupled classes, more often change in a class C_i possibly will lead changes to C_j, which in turn may further be change-coupled with C_k. So, single change may propagate a long way and a series of changes may be necessary for performing a single desired change. It can be safely assumed that the past change pattern of classes will reflect in their future change pattern behavior also. So, by mining the software change history, developer can predict the future changeability of classes and packages. Where, changeability of a class can be defined as how much a class is ready to accommodate any change without much changing the other classes. The changeability of a class or package is required to know how easily it can be changed or maintained.

This past change behavior can be analyzed through applying data mining techniques. During development or maintenance phase of an object oriented application whenever a change event occurs, it is required to reflect that change in concerned classes or packages. Change event may be of any kind like due to bug removal, requirement change, new requirement etc.

Mining Software Change History

Nowadays, huge amount of data is generated during the evolution of software applications. The data related to software development are stored or logged manually in change database/reports or can be recorded semi-automatically in version repositories like CVS (Concurrent Version System) or SVN (Subversion). Such data can be purposely mined to predict the quality of software as well as to improve the future software development. Mining has been widely used to solve many business problems such as customer profiling, customer behavior modeling, product recommendation, fraud detection, document clustering etc. Data mining techniques also have potential to analyze software engineering data to better understand the software, to assist software engineering tasks like defect detection, testing, and maintenance. The use of data mining techniques for extracting the useful information from software evolution data has emerged as an integral part of software development for predicting changeability. Robbes et al. reported the trend to evaluate impact using the data stored in the versions histories. Zimmerman et al. also mined version history to guide software changes. They use a priori association analysis technique for change prediction. Thus, the application domains of data mining techniques have extensively expended to be used in the area of software engineering.

Changeability Measures

Whenever a developer works on a change related to a class, he should know their changeability. The changeability tells to what extent the other classes should be changed due to the change in the given class say C_i. In this article, past change behavior of classes has been mined to measure their changeability index for future reference. For this purpose, changeability metrics are proposed for the classes and packages named as Class Changeability Index – CChI(C_j), Package Changeability Index – PChI(P_j) respectively. Each class C_i represents ith class of jth package. These metrics take past change history of the classes into consideration.

Metrics Definitions

1 Class Changeability Index of a Class C_i – CChI(C_i): It measures the extent of changeability of a class on the scale of 0 to 1. A class is supposed to be perfectly changeable if CChI(C_i)=1 and adversely changeable if CChI(C_i)=0. So, for every class CChI(C_i) will be measured by the equation (1):

\[ CChI(C_i) = \frac{\text{SoC}(C_i)}{\text{SoFChC}(C_i)} \]  

Where SoC(C_i) is the Support of a Class C_i. It gives average count of change transactions of a package j in which C_i has been changed. It is to be calculated as in equation (2):

\[ \text{SoC}(C_i) = \frac{\text{No.s of change transactions having class } C_i}{\text{Total no. of change transactions of package } P_j} \]  

In other words, SoC(C_i) measures the proportion of change transactions in the transaction set of package P_j which contain the class C_i. Further in equation 1, Support of Frequently Change Class-SoFChC(C_i) quantitatively measures how frequently the class C_i is changed together with other classes. To measure this firstly, Frequently Changed Class Set
of package P. \( FChCS(P) \) is mined with \textit{apriori} algorithm of data mining and then its support \( SoFChCS(P) \) is calculated according to the equation (3):

\[
SoFChCS(P) = \frac{\text{No of change transactions having } FChCS(P) \text{ as subset to the past}}{\text{Total No of change transactions of package} (P) (\text{Ch}_T)} \tag{3}
\]

\( FChCS(P) \) comprises of set of classes that are mostly changed together in past and \( SoFChCS(P) \) gives proportion of change transactions in which these classes are changed together. After measuring these, the same metric needs to be calculated for the class i.e. \( SoFChC(C_i) \) as:

\[
\text{if } C_i \in FChCS(P) \text{ then } SoFChC(C_i) = SoFChCS(P)
\]

So, A class \( C_i \) will be called as changeable or ready to change if the changeability index of \( C_i \) - \( CChI(C_i) \) is above the predefined (required/permissible) threshold - \( CCh_Th \). For a class \( C_i \), the change-readiness can also be represented as TRUE or FALSE if \( CChI(C_i) \geq CCh_Th \) then Change-Readiness \( (C_i) = \text{TRUE} \)

\[
\text{otherwise Change-Readiness } (C_i) = \text{FALSE}
\]

The classes having \( CChI(C_i) \) as TRUE are said to be easily changeable/maintainable or ready to change. These classes will require less change efforts because they are not much change coupled with other classes. The classes having \( CChI(C_i) \) as FALSE are highly change-coupled with other classes. So, these classes are supposed to be difficult to change/maintain or not ready to change. It means when a change request comes for these classes they will require more attention.

Further, according to the past change behavior/history of classes, the classes came under the \( FChCS(P) \) will have ample chance to be changed.

\textbf{2 Package Changeability Index- \( PChI(P) \)}: It measures the extent of changeability of a package on the scale of 0 to 1. \( PChI(P) \) depends upon the changeability index of its classes. A package is supposed to be perfectly changeable if \( PChI(P) = 1 \) and adversely changeable if \( PChI(P) = 0 \). One can measure the changeability index of the package \( P \), as per the equation (4):

\[
PChI(P) = \frac{\text{Max}[CChI(C_i)] + \text{Min}[CChI(C_i)]]}{2} \tag{4}
\]

So, a package \( P \) will be called as changeable or ready to change if \( PChI(P) \) is above the predefined (required/permissible) package changeability threshold \( PCh_Th \). For a package- \( P \), we can also categorize it in terms of its change readiness as:

\[
\text{if } PChI(P) \geq PCh_Th \text{ then Change-Readiness } (P) = \text{TRUE}
\]

\[
\text{otherwise Change-Readiness } (P) = \text{FALSE}
\]

The packages having Change-Readiness \( (P) = \text{TRUE} \) are said to be easily changeable/maintainable or ready to change. The packages having Change-Readiness \( (P) = \text{FALSE} \) are supposed to be difficult to changeable/maintainable or not ready to change. It means when a change request comes for these packages they require more attention.

In next section, we demonstrate the methodology to compute changeability measures with the help of a small example.

\textbf{Methodology to Compute Changeability Measures}:

As a prerequisite for our changeability metrics, it has been assumed that developer recorded the changes made to classes related to any package over the time and built change history in terms of change reports related to the packages. Given these change reports, we give the framework to compute \( CChI(C) \) & \( PChI(P) \) for each class and package respectively.

\textbf{Input}:

Change reports available at time \( T \) of an application- \( A \) i.e. \( Ch_R = \{ Ch_R_1, Ch_R_2, Ch_R_3, Ch_R_4, Ch_R_5 \} \), \( NoCP(A) = 6 \). During the evolution of package PKG, there are 5 change reports recorded by the developers up to time \( T \). So, for demonstration purpose the following assumptions have been taken and further the calculation of proposed metrics has been shown in next subsections:

\( PKG = \{ C_1, C_2, C_3, C_4, C_5, C_6 \} \), \( NoCP(PKG) = 6 \), \( Ch_R = \{ Ch_R_1, Ch_R_2, Ch_R_3, Ch_R_4, Ch_R_5 \} \), \( Ch_T = 6 \). \( CCh_Th = 0.60 \) and \( PCh_Th = 0.60 \)

\textbf{Extraction of Change Transactions}:

Suppose at any time \( T \), change reports \( Ch_T = \{ Ch_T_1, \ldots, Ch_T_m \} \) are available. For any package \( P \), having \( n \) classes, all change reports \( Ch_R \) are mined to form change transactions \( (Ch_T_1, \ldots, Ch_T_m) \) where each \( Ch_T_i \) consists of set of classes \( \{ C_i \} \) that are changed together. For each change report \( -Ch_T_i \) of application \( A \), change transactions \( -Ch_T_i \) for package \( PKG \) are formed by collecting set of classes \( \{ C \} \) of \( PKG \) changed together in \( Ch_T_i \). For demonstration purpose 05 change transactions are assumed for package \( PKG \) as shown in table I.

\[
\begin{align*}
\text{Change Transaction} & \quad \text{Classes Changed} \\
Ch_T_1 & \{ C_1, C_2, C_4, C_6 \} \\
Ch_T_2 & \{ C_2, C_6 \} \\
Ch_T_3 & \{ C_1, C_2, C_4, C_6 \} \\
Ch_T_4 & \{ C_1 \} \\
Ch_T_5 & \{ C_2, C_4, C_6 \}
\end{align*}
\]

\textbf{Table 1: Class change transaction set of package PKG}
Calculation of Support of Each Class

After having change transactions, in step 2 the support of each class has been calculated using $\text{SoC}(C_i)$. The $\text{SoC}(C_i)$ of a class provides the proportion of change transactions in the transaction set which contain the class $C_i$. For package PKG, $\text{SoC}(C_i)$ of each class is calculated from the change transactions build in step 1 and shown in table II.

<table>
<thead>
<tr>
<th>Class ($C_i$)</th>
<th>$\text{SoC}(C_i)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_1$</td>
<td>0.6</td>
</tr>
<tr>
<td>$C_2$</td>
<td>0.8</td>
</tr>
<tr>
<td>$C_3$</td>
<td>0</td>
</tr>
<tr>
<td>$C_4$</td>
<td>0.8</td>
</tr>
<tr>
<td>$C_5$</td>
<td>0.2</td>
</tr>
<tr>
<td>$C_6$</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Table 2: Support of classes of package PKG

The change transactions $(C_{i_1}, T_{j_1}, \ldots, C_{i_n}, T_{j_n})$ build in step 1 of PKG and $\text{SoC}(C_i)$ calculated in step 2 are used in step 3 to calculate $\text{FChCS}(P_i)$ and its support $\text{SoFChC}(P_i)$.

Mining Frequently Change Class Set and its Support

In this step, the apriori algorithm for frequent set mining has been used to extract frequent change class set $\text{FChCS}(P_i)$ for package $P_i$. $\text{FChCS}(P_i)$ gives the class set that are frequently changed together as per the history of changes reflected through change transactions. After having $\text{FChCS}(P_i)$ its support $\text{SoFChC}(P_i)$ has been calculated. It gives the proportion of change transactions in the transaction set which contain the combination of class $C_i \in \text{FChCS}(P_i)$. For our assumed package-PKG, Frequently Changed Classes Set $\text{FChCS}(\text{PKG})$ is mined and $\text{FChCS}(P_i)$, $\text{SoFChCS}(P_i)$ and $\text{SoFChC}(C_i)$ are calculated per their definition:

$\text{FChCS}(\text{PKG}) = \{C_1, C_2, C_3, C_4, C_5, C_6\}$, $\text{SoFChCS}(\text{PKG}) = 0.8$, $\text{SoFChCS}(C_1) = 1$, $\text{SoFChCS}(C_2) = 0.8$, $\text{SoFChCS}(C_3) = 0.2$, $\text{SoFChCS}(C_4) = 0.4$.

Computation of Changeability Index and Change-Readiness of Class & Package

In step 4, Class Changeability Index - $\text{CChI}(C_i)$ of every class $i$ of package $j$ has been calculated. For the computation of $\text{CChI}(C_i)$ basically three parameters $\text{SoC}(C_i)$, $\text{SoFChCS}(P_i)$ and $\text{NoCP}(P_i)$ are required. $\text{SoC}(C_i)$ is calculated in step 2, $\text{SoFChCS}(P_i)$ is calculated in step 3 and $\text{NoCP}(P_i)$ is number of classes in package $P_i$. After this the classes are categorized in two groups depending upon their Class Changeability Index $\text{CChI}(C_i)$. First group of classes are those classes whose $\text{CChI}(C_i)$ is TRUE. It means their $\text{CChI}(C_i)$ are above the permissible/required class Changeability Threshold $\text{CCh_Th}$. Rest of the classes having FALSE $\text{CChI}(C_i)$ are to be placed in second group.

Finally in step 5, Package Changeability Index $\text{PChI}(P_i)$ and Change-Readiness $\text{PChI}(P_i)$ have been computed. To calculate $\text{PChI}(P_i)$, maximum $\text{CChI}(C_i)$ and minimum $\text{CChI}(C_i)$ of all classes belonging to package $P_i$ is taken in to account. After computing it, this package $P_i$ is categorized as ready to change or not based on its Change-Readiness($P_i$).

For example package PKG, after getting $\text{SoC}(C_i)$ and $\text{SoFChC}(C_i)$ in steps 2 & 3, $\text{CChI}(C_i)$, $\text{Change-Readiness}(C_i)$ of each class of package PKG are calculated and shown in table III. Further, $\text{PChI}(\text{PKG})$ is also computed as 0.58 and Change-Readiness (PKG) is categorized as FALSE.

In next section, we give the results and findings drawn from case study done on a small java application.

<table>
<thead>
<tr>
<th>Class ($C_i$)</th>
<th>$\text{CChI}(C_i)$</th>
<th>Change-Readiness ($C_i$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$C_1$</td>
<td>0.4</td>
<td>FALSE</td>
</tr>
<tr>
<td>$C_2$</td>
<td>0.16</td>
<td>FALSE</td>
</tr>
<tr>
<td>$C_3$</td>
<td>1</td>
<td>TRUE</td>
</tr>
<tr>
<td>$C_4$</td>
<td>0.16</td>
<td>FALSE</td>
</tr>
<tr>
<td>$C_5$</td>
<td>0.8</td>
<td>TRUE</td>
</tr>
<tr>
<td>$C_6$</td>
<td>0.6</td>
<td>TRUE</td>
</tr>
</tbody>
</table>

Table 3: Class Changeability Index and Change-Readiness of the Classes of package PKG

Case Study and Findings

A case study has been done on small java application HRM (Human Resource Management). The proposed changeability measures are calculated from the changes recorded by the development team during the evolution of the project HRM. Here, we briefly discuss the findings derived from the result. To properly evaluate our proposed measures, we chose classes and packages that have been covered by change reports.

The packages that are considered are $P_1$- default, $P_2$-salary and $P_3$-emp. Further, each class $i$ of package $j$ is annotated as $C_i$ to mention precisely in results. For package default, results show that change coupling index of class’s loginpage, mainpage, stuprint, and feestatus are the lowest among all classes of package default. We classify these classes under the FALSE change-readiness category. So by exploring these measures development team predicts that these classes need to be changed carefully because of their low changeability index. The changeability index of class’s student, fees and get are above high and their change readiness is TRUE. It indicates that these classes are less change coupled and can be easily changeable as compare to rest of the classes of package default. Further, all the three classes salary, mnthsalary and salaryprint of package salary are highly change-coupled as indicated by their changeability index. Again for package emp, the changeability measures show that classes stafflist and searchid both are highly change coupled. Classes newemp, emprint and Delete are less change coupled with other classes of package emp. For all three packages, their frequently changed class set mined from their change history are measured as $\text{FChCS}(\text{default})=$ {loginpage, mainpage, stuprint, feestatus}, $\text{FChCS}(\text{salary})=$ {student, fees, get} and $\text{FChCS}(\text{emp})=$ {Stafflist, Searchid}. So by viewing $\text{FChCS}(\text{salary})$ developer can predict that the classes are frequently changed together. So change in any one of these classes will produce ripple effect to other classes. In other words it can be implicit that if any change comes for any class of $\text{FChCS}(\text{salary})$, the other classes in this set should be considered for change.

Further, changeability measures computed for packages default, salary and emp indicate that all three packages default, salary and emp come under the FALSE category. It shows that most of the classes are dependent on each other with in same package. So, if any change is to be made for these packages that should be handled carefully.

Conclusion

The change history shows how the system actually evolved. It indicates the real time change coupling and through analyzing this, the actual change coupling pattern between the classes can be predicted. Our results show that, knowing the past change coupling
can be helpful to effectively maintain it in future. In this paper, through mining change history, we are able to measure the changeability index of classes and packages. The proposed changeability metrics can be helpful in different ways. Firstly, by exploring the changeability index of class/package, designer/maintainer can have the idea about the future change behavior of classes within package. Secondly, they can categorize the classes based on their change readiness. The developers can give appropriate attention to the classes whose changeability index is very low i.e. which are highly change-coupled. Thirdly, through identifying the frequently changed class set for packages, development/maintaining team can also get to know the most likely set of classes that should be changed together while changing any class of the package. Moreover, we can say that before implementing any change related to a class, by exploring the proposed changeability measures the developer can effectively manage the future changes.

References

About the Authors

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Visualizing EEG Data using EEG Lab Tool Box in Matlab

Conceptions and Perceptions

EEG Lab
EEG Lab is an interactive Matlab toolbox for processing continuous and event-related EEG, MEG and other electrophysiological data incorporating independent component analysis (ICA), time/frequency analysis, event-related statistics.

EEGLab-Features
• Graphic user interface
• Multiformat data importing
• High-density data scrolling
• Defined EEG data structure
• Open source plug-in facility
• Interactive plotting functions
• Semi-automated artifact removal
• ICA & time/frequency transforms
• Many advanced plug-in toolboxes
• Event & channel location handling
• Forward/inverse head/source modeling

Opening EEG Lab
EEGLAB window below should pop up, with its seven menu headings:

File Edit Tools Plot Study Datasets Help
• Opening an existing dataset
• Load the sample EEGLAB dataset
• Select menu item File--> Load existing dataset (Fig. 1)

Editing Event Values
The fields “type”, “position” and “latency” (Fig. 4) have different values for each of the 154 events in the dataset (Fig. 2).

![Fig. 1 Continuous EEG data](image1)

![Fig. 2 Editing events](image2)

A window will appear for Editing Event values (Fig. 3).

![Fig. 3 Editing event values](image3)
Scrolling Data
Scroll Channel Activities Function eegplot() is executed. Click on Plot-->Channel Data (Fig. 4).

Rejecting Range of Data
We can reject continuous Data by clicking REJECT. Select the range of Data to reject then click Reject and save it with new Data set this is done only for illustrative purpose (Fig. 5).

Number of Channels to Display
We can set number of channels also by clicking settings--> number of channels to display (Fig. 6).
Rejecting Artifacts in Continuous and Epoked Data

We will apply EEGLAB rejection methods to independent components of the data, using a seven-stage method outlined below.

Rejecting Artifacts in Continuous Data

There are some methods of Rejecting data by visual inspection. Click on Tools-->Reject continuous data (Fig. 7).

This will open a warning message window, simply press “Continue”. Select data for rejection by dragging the mouse over a data region. Mark some portions of the data for rejection. Then click “REJECT” and a new data set will be created with the rejected data omitted and window will appear (Fig. 8).

New dataset will be stored with new name (Fig. 9)

Rejecting Artifacts in Epoched Data

Since we want to work with epoched dataset, we should either load an earlier saved epoched dataset. We have tried to import Neuroscan .EEG file. File for testing is available on [http://sccn.ucsd.edu/eeglab/download/TESTEEG.EEG](http://sccn.ucsd.edu/eeglab/download/TESTEEG.EEG).

Importing Neuroscan .EEG File

Click on File > Import data > From .EEG data file. Then a window will appear. Data epochs have now been extracted from the EEG data (Fig. 10).
**Plotting Neuroscan .EEG Data**

Then select menu item click on Plot > EEG data (scroll) to inspect the imported data. In this case, epoch events have also been imported from the file and can be visualized using menu item Edit > Event values (Fig. 11).

**Plotting Channel Spectra for Neuroscan .EEG Data**

Plotting can be obtained by clicking Plot-->Channel Spectra Neuro Scan EEG Data is obtained (Fig. 12).

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**About the Authors**

**Madhulika** is working as a Assistant Professor in Department of Computer Science and Engineering at Amity University, Noida. She holds diploma in Computer Science Engineering, B.E in Computer Science Engineering, MBA in Information Technology, M.Tech in Computer Science & Pursuing Ph.D from Amity University, Noida. She has total 8 years of Teaching experience. She published almost 15 Research Papers in National, International conferences and journals. She is also Author of two Books. She Filed one Provisional Patent also 2772/DEL/2013. She attended and organised many workshops, Guest Lectures and seminars. She is also member of many Technical societies like IET, ACM and UACEE.

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K-means clustering in R

Clustering is the process of grouping elements or objects in a set, based on certain similarity. Several algorithms are available for clustering process. We discuss below one such algorithm named K-means clustering.

K-means is one among the simplest and popular clustering algorithm. K-means proceeds in such a way that the elements are assigned randomly to k clusters and the centroid (mean) is calculated for each cluster. In the next step, the elements are reassigned in such a manner that it belongs to the cluster with closest centroid. The process is iterated until two consecutive steps end up in the same assignment of elements. In R package, k-means clustering is done using the function `kmeans()`.

Here `x` is the data matrix. The attribute `centers` gives the number of clusters. If the value is a number, then a random set of distinct rows in `x` is chosen as the initial center. `iter.max` determines the maximum number of permitted iterations. `nstart` gives the number of random sets to be chosen and `algorithm` determines the algorithm to be used. `Trace` will be a logical value which produce the tracing information on the progress of the algorithm, if `TRUE` and vice versa.

Let us illustrate this with the help of an example. We shall calculate the k-means of the height and weight of fourteen students in the file Sampledata.csv.

Since the data lies in different range, we have to normalize it. The function `scale()` is used for this purpose.

```r
> Scaled_data<-scale(x[,2:3], center = TRUE, scale = TRUE)
```

The first statement generates two clusters while the second generates three. We can generate plots for visualizing the result of `kmeans()`. See the following script to generate plots for the two variables `cluster1` and `cluster2` and the obtained plot. In the script, function `par()` enables to combine the plots of `cluster1` and `cluster2` in one single graph. Its attribute `mfrow` with values 2 and 1 enables to create a matrix of 2 rows and 1 column filled by row. The function `points()` will indicate the location of the centroid in the plot. The attribute `pch` of the `points()` function denotes the plotting character to be used. Its value will be an integer code indicating the symbol. `col` attribute is meant for the color of the symbol.

```r
> par(mfrow=c(2,1))
> plot(Scaled_data, col=cl1$cluster, main="Plot with two clusters")
> points(cl1$centers, col = "blue", pch = 8)
> plot(Scaled_data, col=cl2$cluster, main="Plot with three clusters")
> points(cl2$centers, col = "blue", pch = 8)
```

The plot obtained for the above script is given in Fig.2. We have indicated clusters of students having similar height and weight using dotted lines.
A Case Study of Quick Fix Engineering

Sudha Mathur is a software engineer in the railway business division of Quick Fix Engineering, a large software engineering firm. For the past one and a half years she has been part of the Metro Rail Operating System Project assigned to work as a test and quality control in charge. The project aims to develop, build and deliver RailOps a software system for the state of the art Operations Control Centre of the Metro Rail network of a large city that is expected to control movement of Metro trains on the tracks during running operations as well as within the depot including maintenance. The system is integrated with the power supply, signals, points, crossover switches and railway crossings in real time and is designed to monitor and control train operations. The project has been part of a contract funded through a Public Private Partnership of the State Government and a large Private Player – industrial house.

The contract is very important and critical for Quick Fix Engineering. With the current economic slowdown in the industry worldwide, stiff competition from global players, cost constraints and supply side pressures the company has been incurring losses, which makes this a make or break project. There are plans to introduce Metro train services in all major cities in the region and if this contract is successfully completed it would generate huge business as all the other Metro projects will also come to the company. Keeping this in mind the company has quoted and accepted a very tight cost budget and timeline. Despite availability of software cost estimation techniques and its past experience in supplying similar systems of much smaller size it has opted for a very aggressive quote which is 60% of the actual estimates. In fact the project in-charge Mr. Sridhar is worried that the agreed price is less than what it would actually cost them if they were to do a proper development. To save time and costs they will now have to rush the development and cut corners. The top management and sales team are convinced that this is the only way for the company to survive in the face of such stiff international competition. The CFO Mr. Ganesh has insisted that given the bad results in the first quarter they cannot take any loss on the project and as a result there is a severe shortage of funds and staff allotted to the project. However given the fact that all the senior engineers and coders working on the project are with the company since inception and the promoter, himself a technocrat, has made them always feel to be a part of the family, the entire team working on the project...
The contract requires that the company deliver a fully certified, working version of the software in three days for system integration and test. The contract has clauses for heavy per day penalty which may add up to 30% of project cost in case the deadline is missed or if the cost exceeds the budget. Quick Fix top management is worried that if the project misses its deadline they will be heavily penalized, would lose the other contracts and may even be blacklisted for all other projects. This would ruin the company and will also be devastating for its employees who would lose their jobs and suffer very badly.

They consider whether they can do a quick patch to the software before turning it over, but Sudha adamantly refuses to release any code that has not been tested thoroughly. There is always a chance that the patch would interact with some other part of the program to create a new bug.

"Then we’ll have to deliver the software as it is," decides Mr. Sridhar. "I can’t jeopardize the RailOps project or put at stake the jobs of all my colleagues by missing the deadline."

"We can’t do that!" exclaims Sudha. "That is like delivering a train with brakes that may fail."

"Don’t worry," Sridhar reassures her. "We have contacts in the PPP Metro Rail Project, and we know their testing plans. They will do a lot of simulations to make sure the software works with the hardware and has all the functionality as per the specifications. Then they will do live tests. All this will take about a month. Also currently only phase I of the project is going to be operational which involves only 10 trains. There is no way in which the system will be overloaded at present. After that I am sure they will have some change requests. Even if they don’t, we can give them an updated version of the program before the phase II becomes operational which is expected to be completed only next year. We can easily put the bug fix into the software without any problem. They will never encounter the problem anyway and we will be able to fix it before anyone can ever discover it. Even if they do, we can claim it was a random occurrence that would not necessarily show up in our tests. The important thing is no one is in any danger given that only 10 trains are going to function."

“Maybe they won’t ever find the bug, but I know it’s there. I would be wrong if I said the system passed all the necessary tests. I can’t do that. Anyway, it would be highly unprofessional.” said Sudha.

“You can certify that it is safe, because it is, the way they are going to use it” retorted Mr. Sridhar.

And so ultimately after much persuasion, finally Ms. Sudha Mathur certifies the software. It is delivered to the Metro Rail Project and passes all the preliminary tests, including live tests using 3 trains in phase I which will at maximum be running only 10 trains. As a result of these tests, the PPP Metro Project Authority requested some changes in the graphical user interface, and when Quick Fix Engineering delivers the new software, it includes a proper solution to the problem of the lost trains in case of overload. No one outside the development team ever discovers the problem. In fact Quick Fix’s success in this project leads to award of major contracts of all other Metro projects in the region to Quick Fix. The company is able to revive and turn around successfully. This not only saves all the employees their jobs, but they get handsome bonuses and ESOPs too.

Ms. Sudha Mathur, however, takes voluntary retirement once the project is finished and joins a management institute to teach Information Technology.

What do you think about Ms. Sudha and Mr. Sridhar’s conduct and the company’s decision? Was it ethical?

Solution

The context

Ethics in software engineering has become an issue. Software engineers
Ethical issues and dilemmas are seldom black and white. It is the shades of grey which are the most difficult to handle. The developer in the process of software development has obligation to a large group of stakeholders- clients, users, customers, colleagues, the organization, and even the general public. The developer also has to follow the discipline of his profession-software engineering - its codes of practice. This encompasses the entire process of development right from capturing the requirements up to the end product.

Professional concern for the user is what drives the efforts to reduce threats, bugs, malware in the software and a commitment to maintain software product quality based on the agreement with client and the implicit assurance to the users and the public.

However, when it comes to users the focus is restricted often only to threats to human life. Even human well being and the potential of adverse impact on the user, need to be kept in mind.

The failure to maintain ethical standards in the current case is prompted by a non-ethical issue - that of ‘economics’, but it is nevertheless strong enough to affect the judgment of the software developers, the company and tester.

1. The best strategy in such a case is to provide sufficient information about cost and benefits, upside and downsides to the affected parties.
2. Ensure that all parties have understood the information and its significance.
3. Work out a feasible solution that is acceptable to all concerned.
4. The software either does or does not do what it is intended to do. It passes the required test or it does not pass. This assumes the results of the tests are honestly presented. There is nothing wrong with delivering a product that might have shortcomings as long as the customer is aware of what they are, receives it and agrees with it. This involves talking with the customer throughout the development cycle to ensure there are no surprises when it comes to the final sign off. For the individual to sign off on the software knowing there are serious flaws would be a misrepresentation of the product being delivered and a matter of ethics. Often an open and honest communication is the preferred course of action in such a case. The economics of the decision being made or the ‘fate of the company’ does not change the ethics.

There will be many voices that will argue that the disclosure may result in economic ruin if the customer does not agree, which is quite possible.

But if attempted, it may result in an ethically right as well as economically good decision. One way of ensuring this is to communicate early in the project. E.g. the company and team lead could have communicated that RailOps is designed and tested to work for up to 15 trains initially for phase I and it would be expanded before implementation of phase II to cover more trains.

To emphasize in conclusion
1. Ethical judgment involves personal values- honesty, fairness, and trust.
2. Business Judgment involves economic results- revenue, profits, orders, and employment.
3. When the two are in apparent conflict- communication is the key to resolve and avoid unethical conduct in business.
4. A good strategy is to promote a transparent environment that promotes free and fair communication involving ethical issues.

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Dr. Vishnu Kanhere

Dr. Vishnu Kanhere is an expert in taxation, fraud examination, information systems security and system audit and has done his PhD in Software Valuation. He is a practicing Chartered Accountant, a qualified Cost Accountant and a Certified Fraud Examiner. He has over 30 years of experience in consulting, assurance and taxation for listed companies, leading players from industry and authorities, multinational and private organizations. A renowned faculty at several management institutes, government academies and corporate training programs, he has been a key speaker at national and international conferences and seminars on a wide range of topics and has several books and publications to his credit. He has also contributed to the National Standards Development on Software Systems as a member of the Sectional Committee LITD17 on Information Security and Biometrics of the Bureau of Indian Standards, GOI. He is former Chairman of CSI, Mumbai Chapter and has been a member of Balanced Score Card focus group and CGEIT- QAT of ISACA, USA. He is currently Convener of SIG on Humane Computing of CSI and Topic Leader - Cyber Crime of ISACA(USA). He can be contacted at email id vkanhere@gmail.com
Brain Teaser

Crossword »

Test your Knowledge on Software Development
Solution to the crossword with name of first all correct solution provider(s) will appear in the next issue. Send your answers to CSI Communications at email address csic@csi-india.org with subject: Crossword Solution - CSIC August 2014

CLUES

ACROSS

1. Type of test with a representative subset of the test cases (5)
3. Type of diagram showing database design in terms of entity and relationship (3)
5. An agile methodology for software project management (5)
7. A software development lifecycle (9)
9. A point at which some deliverable produced is put under formal change control (8)
11. A standardized general-purpose modeling language (3)
14. A sequence of transactions in a dialogue between an actor and a component or system (3, 4)
15. Type of diagram showing data flow in a system (3)
18. Tests to ensure correctness (12)
20. Type of chart popularly used in project management (5)
21. A mutually binding agreement (8)
24. A minimal part of software that can be tested in isolation (9)
26. A type of role played by an entity (5)
27. Creation of a mock-up of an application (11)
29. A set of activities that attempt to find errors (7)

DOWN

1. An evolutionary software engineering paradigm (6, 5)
2. OMG adopted standard for kernel and language for Software Engineering methods (7)
4. Work performed to modify a baselined work product (6)
6. A hierarchical decomposition of the work activities in a software project (3)
8. Lines of code (3)
10. A software engineering methodology used within agile software (7, 11)
12. Software Engineering Method and Theory (5)
13. Tests to ensure that the software conforms to its requirements (10)
15. A flaw in a part or system causing to fail to perform the required function (6)
16. An uncertain event or condition (4)
17. Ability to transport software from one target environment to another (11)
19. A step-by-step presentation by the author of an artifact for knowledge sharing (11)
22. A software estimation technique (6)
23. Satisfaction of customer criteria, conformance to design specifications (7)
24. A container encapsulating attributes and operations (5)
25. Term used for measurement (6)
28. A proprietary adaptable iterative software development process framework (3)

Did you know when was the term “software engineering” coined?

The term “software engineering” was coined in 1968, in the NATO Conference on Software Engineering by F.L. Bauer of the Technological University of Munich. Edsger W. Dijkstra, the famous Dutch computer scientist, welcomed this coining as design of software systems was an activity par excellence for the mathematical engineer. (More details can be found in Dijkstra’s article in http://www.cs.utexas.edu/users/EWD/transcriptions/EWD11xx/EWD1185.html)

Solution to July 2014 crossword

We are sorry for inadvertent mistake in missing 11 (across) in the puzzle printed in CSIC, July 2014, this prevented our enthusiastic readers to send us solutions

Our sincere apologies!

However, we got our mistake pointed out by two enthusiastic readers, our earnest thanks to them!

Monark Shah (Dept of Comp Sc, Shri Vaishnav Institute Of Technology & Science, Indore) and Shanta Rangaswamy (Dept of Comp Sc Engineering, R V College of Engineering, Bangalore)
On game development ideas on Android

From: S.Ramanathan, Life Member, CSI

Q Thanks for your pseudo code provided as a technique to convert a decimal number to a fraction in CSIC, July 2014 issue. I am happy that my question was answered.

Apart from the topic game theory what is the code structure for high-jump game if possible with 3-d graphics code? Regarding control-break which is necessarily a report related concept based on the logical groupings of records by themselves? Is it allowed in today's tablets & android?

A Thank you very much for the appreciation, hope the ideas worked for you. I did not get the entire idea you sought for in second and third paragraph of your question. Game theory is completely different paradigm from design for two dimensional or three dimensional visual games. Game theory is a study of strategic decision making. This requires operations research to make mathematical model of the game to decide upon the strategy of increasing chances of win or decreasing chances of loss. Wikipedia offers a nice introduction on game theory to start with, it’s at http://en.wikipedia.org/wiki/Game_theory.

However, in terms of visual games, it requires physics and mathematics to understand the dynamics and doing the graphical animations using computer graphics techniques. You had talked about jump method and are interested to know about Android programming as well. Here’s a link in stackoverflow: https://stackoverflow.com/questions/11210822/jump-method-in-android-game. This and similar postings talk about some jump routine calls. You may refer to http://gamedev.stackexchange.com/ for questions and answers for professional and independent game developers. This page, http://gamedev.stackexchange.com/questions/29617/how-to-make-a-character-jump, for example, talks about physics behind a character jump.

Regarding your next question, control-break structure is available for almost every programming language. Android uses Java and Android Software Development Kit (SDK) which can be downloaded from http://developer.android.com/sdk/index.html. Android Studio BETA version is also available for download from http://developer.android.com/sdk/installing/Studio.html. Android Studio Beta along with the Android SDK comprises of all the Android SDK Tools to design, test, and debug your mobile application running on Android. Also, you require a version of the Android platform to compile your application and a version of the Android system image to run your app in the emulator. Android Studio is a new Android development environment based on IntelliJ IDEA. It provides new features and improvements over Eclipse ADT and will be the official Android IDE once it’s ready.

Regarding game development ideas and animation techniques, there are several materials available in internet and also many books that you may refer to. One such tutorial is at http://www.kilobolt.com/game-development-tutorial.html. Google has provided a quick start information at https://developers.google.com/games/services/android/quickstart.

You may download the sample application and modify the codebase to get a feel on the same. A guide to show you how to implement a real-time multiplayer game using the Games services in an Android application can be found at https://developers.google.com/games/services/android/realtimeMultiplayer. Google Play game services is part of the Google Play services platform. To use game services, you need to set up the Google Play services SDK using help from https://developer.android.com/google/play-services/setup.html. You may refer to the Getting Started guide to set up your app from https://developers.google.com/games/services/android/quickstart.

Do you have something to ask? Send your questions to CSI Communications with subject line ‘Ask an Expert’ at email address csic@csi-india.org

“Simplicity is prerequisite for reliability.”

- Edsger Wybe Dijkstra
The following are the ICT news and headlines of interest in July 2014. They have been compiled from various news & Internet sources including the dailies - The Hindu, Business Line, and Economic Times.

**Voices & Views**
- Global IT spending to grow 2.1% to $3.7 trillion this year. Data centre systems spending is projected to reach $140 billion in 2014, a 0.4% increase from 2013. IT services is forecast to total $967 billion in 2014, up 3.8% from 2013 - Gartner.
- “We have a target of reaching out to 50,000 start-ups by 2020 and looking at the pent-up demand, in the country we are convinced that target can be achieved,” – President, Nasscom.
- Even after a year into the implementation of digitization, the cable and broadcast sector see no clarity in getting its system in place. About 12 million STBs have been seeded as of December 2013.
- A recent Akamai report pegged India 85th in broadband connectivity, globally.
- The IT-IT eS industry generated revenues of $118 billion last year, with exports contributing $86 billion and domestic market $32 billion - Nasscom.
- The IoT connectivity drive will create a global market worth up to $8.9 trillion by 2020 and would grow at a CAGR of 7.9% between now and 2020 - IDC.
- By 2020, India will have 500 million new Internet users, including mobile users, from 200 million or so now – Industry reports.
- The Indian e-commerce sector is currently pegged at $13 billion, and industry experts expect it to reach $30 – $50 billion by 2020.

**Govt, Policy, Telecom, Compliance**
- Nasscom is seeking a Rs. 500-crore for tech entrepreneurship fund aimed at start-ups from MICT. It has sweetened the kitty for start-ups with incentives such as setting up launchpads (or offices) in Silicon Valley, Singapore, Japan, London and China.
- IT industry wants incubation facilities and seed capital to be provided to the top 500 educational institutions and ICT needs of the Govt. should be procured from Indian software product companies.
- Facebook COO meets Modi and discussed ways in which the social networking platform can be used to connect the Government with people.
- Value-added services are touted to be one of the biggest revenue earners for 4G players and the panel suggests that DoT could charge a higher revenue share on such services.
- The taxman, Income Tax dept., to use the LinkedIn profile of employees as evidence that their company was conducting activities that were not permitted, and that it owed taxes.
- DoT seeks TRAI’s view on delinking telecom services licences from network operations.
- Budget – 2014 is a shot in the arm for IT. Revives SEZs. Smart cities (100 nos at Rs. 7060 crores) promise to drive domestic IT market. Abolition of duty on PC components welcomed. Online, mobile advertising come under service tax net. Investment allowance for semiconductor fabrication. Digital inclusion with broadband connectivity to boost IT industry. Telecom gear imports to get expensive. Cyber security, e-governance projects get major allocation in Budget. Govt. earmarks Rs. 3,929.10 crore for the electronics and information technology sector.
- The Finance Minister’s announcement of a Rs. 10,000-crore fund for start-ups in the Union Budget will serve as a catalyst for the sector.
- DoT to study Chinese subsidy model in telecom sector.
- Satyam case: SEBI bars Raja, 4 others for 14 years; seeks return of Rs. 1,849 cr.
- Chinese cell-makers up ante by going low cost in India.
- Payment bank services to improve telcos’ revenues.
- DoT CCell raises concerns over electronic goods category.
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**IT Manpower, Staffing & Top Moves**
- MosChip Semiconductor Technology Ltd which has about 110 employees, is planning to hire 200 engineers in the next one year.
- Infosys has introduced a quarterly promotion cycle for employees to arrest attrition.
- Software services sector to hire 6% more this fiscal with net addition of employees in the IT sector expected to be 1.7-1.8 lakh, against a national rollout of 55 lakh graduates.
- Companies will also raise salary increments in FY15 by 9-11%.
- About 63% of women in IT companies work in the entry level.
- About 44 companies said they use online social networks and job sites to pick candidates.

**Company News: Tie-ups, Joint Ventures, New Initiatives**
- Twitter decides to bet big on the television channels to further its growth prospects in India.
- US-based Progress Software Corporation’s Responsive UI (user interface) to help enterprises and start-ups cut costs by building apps at once and make them compatible with multiple devices such as smartphones, tablets, phablets, desktops, laptops and televisions.
- IBM, with 6809 patents awarded last year retains its position as the company with largest patents for the 21st consecutive year in 2013. Indian companies are far behind. TCS (443) Wipro (200) & Infosys (97).
- Airtel launches fastest dongle with 21.6 mbps connectivity.
- Nasscom eyes Japanese market to expand.
- InvestHK, in association with The Indus Entrepreneurs (TiE), invites the Indian start-ups to take part in the StartmeupHK Venture Programme. It pick 12 winners (nine in the first category and 3 in the second) across the globe that will be given prizes worth $500,000, a paid trip to the city and mentorship.
- Swipe Telecom to launch tablet for kids.
- Aspire buys SRA Systems’ services biz.
- Small filmmakers go online to click with more viewers.
- Taiwan firm Asus eyes India for manufacturing plant.
- IT product manufacturers such as Lenovo, Dell and Panasonic are keen to float their own portals.
- Dell moving global service-delivery capabilities to India.
- Tata Communications with 26% market share unto up data centre size, spend $200 million.
- Snapdeal launches its seller app “Seller Zone App”.
- In dividend largesse, TCS to share Rs. 12,750 crore with shareholders. As of June 30, the company had a cash chest of Rs. 25,900 crore.
- Microsoft lays Nokia’s Android series to rest.
- In a first for Indian co, TCS’ market cap tops Rs. 5-lakh cr. TCS’ market cap is now higher than the collective market cap of its rivals: Infosys (Rs. 1.92-lakh crore), Wipro (Rs. 1.4-lakh crore), HCL Technologies (Rs. 1.08-lakh crore) and Tech Mahindra (Rs. 50,364 crore).
- Chennai Marina Beach visitors to test the system developed as part of the DISANET (Information Network for Natural Disaster Mitigation and Recovery), a five-year (2010-15) project taken up by India and the Japan International Cooperation Agency (JICA) for crowd management.
- Uninor sets Guinness record by opening 362 retail outlets on a single day.
- Flipkart raises a billion dollars, largest in Indian e-commerce sector. It may be worth $7 billion. The company which commands 65% of the online retail market wants to grow as company of $100 billion.
- Amazon goes one up on Flipkart, to invest $2 billion in India arm.
- Sify invests Rs. 300 cr in new data centres.
Call for Papers

For the last 25 years, COMAD has served as the premier international conference on data management in India. COMAD’s scope includes all areas of data management including Database Management Systems, Web and Information Retrieval, Data Mining and Big Data Systems. COMAD’14 invites the submission of original research contributions as full papers and posters, as well as proposals for demonstrations, industrial presentations, tutorials, and panels.

SUBMISSIONS

RESEARCH PAPERS: If you have original research work that are currently not under review or published elsewhere, you can submit them as full-length research papers to COMAD’14. All full papers have to be submitted through the link provided on website with maximum of 12-pages adhering to the formatting guidelines.

POSTER PAPERS: If you are working on bleeding-edge research ideas, and the work is still in progress or it is a research that is best communicated through interactive mode, the poster track of COMAD’14 is for you. The poster track submissions are at most 4-pages in length and are to be submitted just like research papers.

DEMONSTRATION PROPOSALS: If you have built a system and are keen to demonstrate it to all participants of COMAD’14, you can submit a 4-page demonstration proposal that outlines the system, its novelty and a plan of demonstration.

INDUSTRIAL PROPOSALS: COMAD’14 strives to bring together the innovations in industry and the research community. The Industrial papers track covers innovative commercial data management systems, applications and database implementations, novel applications of database technology, and experience in applying recent research advances to real-world problems. Submissions to this track should not exceed 12-pages and must adhere to the formatting guidelines.

TUTORIALS AND PANELS: We invite proposals for tutorials on all topics of potential interest to the COMAD attendees. The proposals should not exceed more than 4-pages in the standard formatting, and clearly indicate the target audience, duration (either 1.5 hours or 3 hours), in addition to the details of the topic. Similarly, panel proposals should not exceed more than 4 pages, and should clearly state the topic of discussion in the panel, statement on the importance of the panel discussion, tentative list of panelists and the questions that will be posed to them, etc.

For the first time, COMAD’14 also features a programming challenge to encourage the active participation of graduate and undergraduate students. The details of the programming contest will be circulated separately.

AREAS OF INTEREST

Areas of interest include but are not limited to:

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<thead>
<tr>
<th>Data Management Systems</th>
<th>Web and Information Retrieval</th>
<th>Data Mining</th>
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<tr>
<td>• Big-Data management</td>
<td>• Categorization, clustering, and filtering</td>
<td>• Novel data mining algorithms and foundations</td>
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<td>• Benchmarking and performance evaluation</td>
<td>• Document representation and content analysis</td>
<td>• Innovative applications of data mining</td>
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<td>• Data exchange and integration</td>
<td>• Information extraction and summarization</td>
<td>• Data mining and KDD systems and frameworks</td>
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<td>• Database monitoring and tuning</td>
<td>• IR theory, platform, evaluation</td>
<td>• Mining data streams and sensor data</td>
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<td>• Data privacy and security</td>
<td>• Question answering and cross-language IR</td>
<td>• Mining multi-media, graph, spatio-temporal and semi-structured data</td>
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<td>• Data quality, cleaning and lineage</td>
<td>• Web and IR</td>
<td>• Security and privacy in data mining</td>
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<td>• Data warehousing</td>
<td>• Social network analysis</td>
<td>• High performance and parallel/distributed data mining</td>
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<td>• Managing uncertain, imprecise and inconsistent information</td>
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<td>• Mining tera-/peta-scale data</td>
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<td>• Multilingual data management</td>
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<td>• Visual data mining and data visualization</td>
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<td>• Novel data types</td>
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<td>• Big Data analytics</td>
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<td>• Parallel, distributed and cloud-based databases</td>
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<td>• Peer-to-peer data management</td>
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<td>• Personalized information systems</td>
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<td>• Storage and transaction management</td>
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<td>• New data management architectures (e.g., data stream management and cloud)</td>
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To ensure wide visibility for the material published at the conference, arrangements will be made with ACM SIGMOD for including the proceedings of the conference in the SIGMOD on-line archives. Two awards, for Best Paper and Best Student Paper, will be presented at the conference.

IMPORTANT DATES

| Industrial Papers: | August 11, 2014 | Notification to Authors: | September 29, 2014 |
| Posters: | August 29, 2014 | Camera-ready Copies: | October 20, 2014 |

PROCEEDINGS

The proceedings will be published by the Computer Society of India (CSI) and will also be available as part of ACM online proceedings. The entries will be indexed by DBLP.

Please see http://comad.in/comad2014 for further details including submission instructions and latest announcements.
INDIACom-2015
9th INDIACom; 2015 2nd International Conference on
“Computing for Sustainable Global Development”

(11th – 13th March, 2015)
Organized by
Bharati Vidyapeeth’s
Institute of Computer Applications and Management (BVICAM), New Delhi
Technically Sponsored by
IEEE Delhi Section
Jointly with
Computer Society of India (CSI), Region – I and Division – I, II, III, IV & V
Institution of Electronics and Telecommunications Engineers (IETE), Delhi Centre
Indian Society for Technical Education (ISTE), Delhi Section
Institution of Engineering and Technology (UK), Delhi Local Networks and
Guru Gobind Singh Indraprastha University (GGSIPU), New Delhi

Announcement and Call for Papers
Information and communication technology plays an important role in enhancing the effectiveness, efficiency, growth and development of education, healthcare and modernization of a Society. Foreseeing the importance and impact of the above and encouraged by the resounding success met with the past eight editions of INDIAComs since its inception in the year 2007; we hereby announce INDIACom-2015 which aims to invite original, unpublished and full length research papers in the field of, primarily, Computer Science and Information Technology and, generally, all interdisciplinary streams of Engineering Sciences, having central focus on sustainable computing applications, which may be of use in enhancing the quality of life and contribute effectively to realize the nations’ vision of sustainable inclusive development using Computing. INDIACom-2015 is an amalgamation of four different international conferences which will be organized parallel to each other, as parallel tracks. These are listed below:-

Track #1: International Conference on Sustainable Computing (ICSC-2015)
Track #2: International Conference on High Performance Computing (ICHPC-2015)
Track #3: International Conference on High Speed Networking & Information Security (ICHNIS-2015)
Track #4: International Conference on Software Engineering & Emerging Technologies (ICSEET-2015)

Instruction for Authors
Authors from across different parts of the world are invited to submit their papers. Authors should submit their papers online at http://www.bvicam.ac.in/indiacom/loginReqSubmitPaper.asp. Unregistered authors should first create an account on http://www.bvicam.ac.in/indiacom/addMember.asp to log on and submit paper. Only electronic submissions will be considered. E-Mailic submissions will not be considered.

Important Dates

| Submission of Camera Ready Copy (CRC) of the Paper | 22nd January, 2015 | Registration Deadline | 22nd January, 2015 |

Selected Papers will be published in IEEE Xplore. Further details are available at www.bvicam.ac.in/indiacom. All correspondences, related to INDIACom-2015 must be addressed to:

Prof. M.N. Hoda
General Chair, INDIACom-2015
Director, Bharati Vidyapeeth’s Institute of Computer Applications and Management (BVICAM)
A-4, Paschim Vihar, Rohtak Road, New Delhi-110063 (INDIA)
E-mails: conference@bvicam.ac.in, indiacom2015@gmail.com
Tel.: 011-25275055 TeleFax: 011-25255056, 09212022066 (Mobile)
The First meeting of CSI Executive Committee for the year 2014-15 was held on April 6th 2014 at Delhi and Second at Kochi on July 5th and 6th 2014. I take pleasure to share some discussion and decisions taken during these meetings.

- Reconstitution of Statutory Committees for the year 2014-15 as per CSI Byelaws.
- Re-appointment of Ms. Mini Ulanat as National Student Coordinator.
- SIGs on Formal Methods (Bangalore), Indic Computing (Cochin) & Big Data (Hyderabad) were approved.
- Mr. C G Saharabuddhe was appointed as Convenor for CSI IT Excellence Award.
- As a part of Golden Jubilee activity Senior and Fellow members, Past Chairmen or Secretaries from the city may be invited for a small get together at Chapter level with special 3 hour evening programme.
- Use of Social Media to promote CSI activities and membership to be initiated by CSI HQ.

- The RVPs are authorised to form ad hoc committee if necessary in absence of regular election process.
- CSI Documentary Committee for preparation AV presentation was constituted. Prof. Bipin Mehta will be Chairman and Prof. A K Nayak, Prof. A Basu, Prof. D P Sinha and Prof. M N Hoda as members.
- It was decided to provide 2 pages in CSIC for reporting of Regional and Divisional activities by RVPs and Divisional Chairmen.
- ExecCom ratified Mumbai Chapter Committee for the year 2014-15 as per submission from RVP VI.
- Budget allocation for new initiatives like CSIC App on mobile phones, Online Tally support and customisation, Digital initiatives, appointment of Internal Auditor and Research grant for students project were approved.
- Travel grant of upto Rs. 25,000/- to student members for presenting paper in International conference (to be disbursed after review by appropriate committees).
- New chart of accounts approved by auditors has to be implemented by all chapters in the Tally – CSI Gateway (on the cloud) for FY 2014-15.
- Service tax due from chapters (2013-14) to be recovered before August 30th based on audit.
- New centralised banking system at SBI MIDC Marol Branch, Andheri, Mumbai for all chapters was introduced. CSI Chapters to send new SBI bank account opening and KYC forms duly filled in along with resolution on signatories to operate the bank account to CSI HQ. Executive Secretary will be signatory for opening/closing and special instructions for the chapter accounts. Only those chapters complying by Aug 15th 2014 will be deemed as CSI chapters to be included in the auditor’s report entitled to further benefits from HQ.
- As a part of Golden Jubilee year of CSI, 15% discount will be given to for new Life Membership applicants (w.e.f Aug 1st upto 31st Dec 2014). Chapter share will be paid only on the amount received by HQ.
- It was decided to provide chapters a one time grant of 50k (for Cat A subject to max of 50% of expenses), 25 K (for Cat B subject to max of 50% of expenses), and 15K (for Cat C) towards CSI Golden Jubilee Events by Chapters.
Application for Travel Grants for Researchers

Research Committee of Computer Society of India has decided to partly fund CSI Life Members to the extent of Rs. 25000/- for travelling abroad to present research papers at conferences.

CSI Life Members who have been invited to present papers abroad and have received partial or no funding are eligible to apply for the same. They have to apply within December 31, 2014 to div5@csi-india.org and furnish:

1. Name of the Applicant, Organization Details and Bio Data of Applicant
2. CSI Life Membership Number
3. Name of the International Conference with details of the organizers
4. Conference Venue and Date
5. Copy of the Research Paper
6. Copy of the Invitation Letter received from the organizers
7. Details of funding received from/applied to for funding to any other agency
8. Justification for requesting support (in 100 words).
9. Two References (including one from head of the organization)

Dr Anirban Basu
Chairman,
CSI Division V (Education and Research)
CSI Reports

From CSI SIG and Divisions »
Please check detailed reports and news at:
http://www.csi-india.org/web/guest/csic-reports

<table>
<thead>
<tr>
<th>SPEAKER(S)</th>
<th>TOPIC AND GIST</th>
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<tbody>
<tr>
<td><strong>For First event</strong> - Division – I Hardware and Region – I in association with Delhi Chapter and BVICAM, New Delhi</td>
<td><strong>6 September 2013:</strong> Curtain Raiser Event for Golden Jubilee Celebrations</td>
</tr>
<tr>
<td>J. Satyanarayana (Chief Guest), Prof. S.V Raghavan, HR Mohan, S Ramanathan, Dr R Chidambaram, S Mahalingam, Dr Ratan Dutta</td>
<td>Mr Ramanathan reminisced on how CSI has grown to be the largest IT professionals society in India since 1965. He elaborated on how CSI’s SIGs lead by senior professionals to serve interests of educationists/academicians, hardware, software, security, e-governance, etc. Mr Satyanarayana highlighted challenges faced by India in cyber era. He shared his vision on how CSI could lead the nation to become global super power in terms of computing practice by amalgamating young minds of the nation through proper training towards development. There was felicitation of notable CSI members whose efforts marked growth of CSI. Chief Guest Satyanarayana honoured Brig SVS Chowdhry, Dr Rattan Dutta, Dr ML Goyal, S Mahalingam, Satish Babu and Prof SV Raghavan for their outstanding contributions to CSI. There was panel discussion on “Kal Aaj Aur Kal - Role of CSI in the Modern Cyber Era”. Dr Chidambaram, Satyanarayana, Mahalingam, Dr Dutta and Prof Raghavan were panelists. Panelists spoke on issues and challenges of cyber era. Attending guests shared their concerns and suggested novel roles CSI could take up in days to come.</td>
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</tbody>
</table>

| **For Second event** - Division-I, Hardware and Region-I in association with Science & Technology Department, Embassy of France in India and CEFIPRA | **5 April 2014:** Indo - French Round Table Workshop on “Next Generation Networks (NGN)” |
| Dr R Chidambaram, J Satyanarayana, Prof SV Raghavan, Prof Guy Pujolle, Dr Veronique Briquet-Laugier, Dr Debapriya Dutta, Prof MN Hoda, Prof RK Vyas, Prof AK Saini, SN Gupta, Hemant Kanakia, Prof OP Vyas, Othmen Braham, Prof Huzur Saran, Prof Hakima Chaouchi, Prof Ahmed Mehaoua, Dr Ashok Chandra, Dr Vinayak Naik, Prof Salim Beg and Dr Maninder Singh | Dr Briquet-Laugier expressed need for Indo-French collaboration in order to make NGNs a reality and useful service for researchers and human kind. On this occasion Mr Satish Babu felicitated S Ramadorai with Life Time Achievement Award. During session on NGN: Architecture and Technological Trends and Issues in NGN Prof Mitton highlighted challenges of next generation of wireless ubiquitous networks. She discussed INRIA’s project with applications of wireless networks and how to enhance network performance. Prof Pujolle talked on “Internet: Next Generation” & explained high speed transfer protocols and internet revolution due to virtualization. Mr Gupta talked on “NGN Architecture : The layered approach of IP based Networks” where he introduced concept of Service control layer. Mr Kanakia elucidated SDN and network virtualization for public data networks. Prof Vyas spoke on Architectural Issues and recent advances of NGN. During session on Network Infrastructure of Tomorrow Mr Braham spoke on “Metamophic networks” and Prof Saran spoke on “Software defined networking and its features”. During session on “Wireless Network and Service Control” Prof Hakima Chaouchi spoke on heterogeneous wireless networks Synergies. Prof Mehaoua spoke on Wireless Body Area Sensors for HealthCare. Dr Chandra talked about Wireless Communications and Spectrum Requirements. Dr Naik spoke on “Requirements of Wireless Networks for measuring physical analytics of mobile users”. During session on Digital Services of Tomorrow Prof Beg spoke on “Multimedia Transmission over future wireless networks” and Dr Singh on “Digital Services and applications through NGN”. |
Academic Awards 2014
Call for Applications

Computer Society of India has been honouring academic excellence through Academic Awards every year. The awards will be presented during the CSI Annual Convention to be held from 12th to 14th December, 2014 at Hyderabad. Applications are invited for the following awards for the period from April 2013 to June 2014 from the accredited student branches who meet the criteria and are currently in good standing.

The applications for the awards are invited only from the CSI members or from CSI Accredited CSI Student Branches in good standing during the current year as well as during the Award year. Application Forms are available at http://www.csi-india.org/web/guest/academic-excellence-awards.

The applications should reach Education Directorate as specified in the forms, latest by 6th October 2014. The Awardees will be invited to attend CSI 2014 @ Hyderabad and receive the awards in person.

Regional Vice Presidents, RSCs, SSCs, SBCs and Chapter OBs are requested to give wide publicity and encourage applications.

Please submit the applications for awards to edawards@csi-india.org.

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<thead>
<tr>
<th>Sl. No.</th>
<th>Name of the Award</th>
<th>Criteria</th>
<th>To be submitted by</th>
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<tbody>
<tr>
<td>1.</td>
<td>Best Accredited Student Branch Award</td>
<td>Good standing – during the award year and currently, large student strength &amp; large number of activities as defined in the specified form</td>
<td>Student Branch Counsellor (SBC)</td>
</tr>
<tr>
<td>2.</td>
<td>Largest Student Branch Award</td>
<td>Continuous good standing for the past 3 years with highest 3 years averaged strength</td>
<td>Decided by ED</td>
</tr>
<tr>
<td>3.</td>
<td>Best CSI International Students Event Host Award</td>
<td>Institutional member hosted maximum students competition participated by minimum 10 foreign students</td>
<td>SBC</td>
</tr>
<tr>
<td>4.</td>
<td>Highest Sponsorship of CSI Events Award</td>
<td>Institutional member extending maximum support for CSI events during the award year</td>
<td>SBC</td>
</tr>
<tr>
<td>5.</td>
<td>Longest Continuous SBC Award</td>
<td>Longest continuous tenure as SBC over the last 3 years</td>
<td>SBC</td>
</tr>
<tr>
<td>6.</td>
<td>Faculty with maximum publishing in CSI Publications</td>
<td>Publishing maximum articles in CSI publications during the award year</td>
<td>Self</td>
</tr>
<tr>
<td>7.</td>
<td>Paper Presenter at International Conference for Faculty</td>
<td>Presentation of paper at prestigious International Conferences during the award year</td>
<td>Self</td>
</tr>
<tr>
<td>8.</td>
<td>Students with maximum publishing - CSI publications</td>
<td>Publishing maximum articles in CSI publications during the award year</td>
<td>SBC</td>
</tr>
<tr>
<td>9.</td>
<td>Highest Committed Accredited Student Branch Activist Award</td>
<td>Most active CSI Volunteer from the Student Branch during the award year</td>
<td>SBC</td>
</tr>
<tr>
<td>10.</td>
<td>Best Ph D Thesis Award</td>
<td>CSI member, who submitted a high-quality thesis (Thesis quality to be evaluated by a panel of eminent research scientists) leading to acceptance for Ph D degree by a recognized University</td>
<td>Research Scholar (who got the Ph D during the award year) / the Research Supervisor / Current Employer</td>
</tr>
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</table>

**Awards Committee**
- Prof S.V. Raghavan - Chairman
- Prof Anirban Basu - Member
- Prof A K Nayak - Member
- Prof R P Soni - Member

**Ms. Mini Ulanat**
National Students’ Coordinator
### CSI News

From CSI Chapters »

Please check detailed news at:
http://www.csi-india.org/web/guest/csic-chapters-sbs-news

<table>
<thead>
<tr>
<th>SPEAKER(S)</th>
<th>TOPIC AND GIST</th>
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<tbody>
<tr>
<td><strong>KOLKATA (REGION II)</strong></td>
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<tr>
<td>Prof Aditya Bagchi, Dr Pinakpani Pal, Subir Lahiri, Dulal Sengupta, Dr Snehasis Mukherjee, Dr Sugata Gangopadhyay, Prof Nityananda Sarkar, Jaffar Iqbal Laskar</td>
<td>28 June 2014: Visit to School Ramchandra Khali Narendra Siksha Niketan, Block Basanti under &quot;Reaching Out&quot; Project. Project “Reaching Out” was planned by the chapter for class IX &amp; VIII students of remotely located schools. Sunderban Unnayan Niketan (SUN) agreed to help and identified 5 schools for visits on Saturdays. During the visit on 28th June, Prof Sarkar gave introduction about the project. Mr Lahiri talked about CSI, it’s aim and activities. Dr Mukherjee shared his experiences. Prof Bagchi gave introduction to Computer and explained with block diagram how it works. Dr Gangapadhyay explained how binary numbers are formed.</td>
</tr>
<tr>
<td>Prof Dipti Prasad Mukherjee, Prof Jyotsna Kumar Mandal, Dulal Sengupta, Volunteers – Saiyed Umer, Prof Nityananda Sarkar, Jaffar Iqbal Laskar</td>
<td>5 July 2014: Visit to School Kalidanga Junior High School, Basant Dist. under “Reaching Out” Project. Prof Sarkar spoke about career and obedience. Prof Mandal presented technical topics in the form of stories. Mr Umer explained basic computer architecture of hardware devices to class VIII students. He spoke about binary number system and logic gates. Prof Jyotsna Kumar spoke on basics of computer network and data communication. He conducted quiz along with Prof Dipti Prasad. Students who could answer questions were given prizes.</td>
</tr>
<tr>
<td>Deva Prasanna Sinha, Dr RT Goswami, Dr Pinakpani Pal, Dr Ambar Dutta, Dulal Sengupta, Jaffar Iqbal Laskar, Debabrata Maity</td>
<td>12 July 2014: Visit to School Kalihastra High School, P.S. Basant under “Reaching Out” Project. Mr Debabrata delivered welcome address. Mr Iqbal spoke about previous two visits to schools and gave introduction about speakers. Mr Sinha talked about CSI, it’s aim and activity. He gave introduction to Computer and explained with block diagram. At the end he gave a quiz. Dr Pal discussed why and how binary numbers are used. Dr Ambar Dutta demonstrated Binary addition.</td>
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<tr>
<td><strong>AURANGABAD (REGION VI)</strong></td>
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<tr>
<td>Selection Team: Arun Kadekodi, Sanjay Kulkarni, Mayur Wakde Tendulkar, Meenal Kadekodi, Dr SN Deshmukh</td>
<td>1 March 2014: Young IT Professional Award 2013. YITP Award ceremony was conducted to appreciate and encourage Researchers, IT professionals, Academicians, Consultants, Entrepreneurs and IT Practitioners. Award details are - Jury Award Winner Team: Accessible video for hearing impaired: Chitralekha Bhat, TCS. Runner Up Team: Tool to assist and access call center voice agents: Meghna Pandharipande. Special Mention Award: Build automation process tool: Ekta Malaviya, Rajesh Bidarkar, Banc Bridge. Jury award: Persistent Intranet: Yatim Dalvi, Amita Bhakkad, Pius Mishra, Persistent.</td>
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From Student Branches »

CHENNAI (REGION VII)
Past Presidents, CSI Fellows and Chapter Patrons

13 July 2014: Golden Jubilee Celebrations – Special Meeting
Special meeting was organized as part of the Golden Jubilee celebrations by inviting Past Presidents, CSI Fellows and Chapter Patrons. The doyens of the CSI were honoured by presenting them with Special Plaques. They shared their memories on the occasion. It was grand gala event and all the attendees were proud of being CSI members and standing ovation was given to the senior members.

CSI Past Presidents, Fellows, Chapter Patrons with all other members of the Chapter

TRIVANDRUM (REGION VII)
Mr G Neelakantan, Mr Ajit Kumar KV, Mr Shino SK and Mr Rajesh P.

12 July 2014: Workshop on “What Accelerated Web App Development MEAN?”
Workshop covered topics such as: Introduction (What is a Web Stack?, Where MEAN fits in? Getting Started), MEAN Stack Components (MongoDB, ExpressJS, Angular JS, NodeJS), MEAN Essentials (JSON, Mongoose, Jade), Environment Setup (How to create a MEAN app?, Structure of a MEAN app, Eclipse Plugins (Nodeclipse, Angular JS-Eclipse, MongoDB, How to use plugins), MEAN Stack based practical Exercise There were 22 participants of different organizations such as CDAC, KELTRON, Information Kerala Mission, VSSC, Asianet News, Elicaz Technologies and NeST.

Participants and MC Members with Faculties Rajesh P and Shino SK

CSI Communications | August 2014 | 50 www.csi-india.org
<table>
<thead>
<tr>
<th>REGION-V</th>
<th>REGION-V</th>
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<tbody>
<tr>
<td>VITS COLLEGE OF ENGINEERING, VISAKHAPATNAM</td>
<td>LENDI INSTITUTE OF ENGINEERING AND TECHNOLOGY, VISAKHAPATNAM</td>
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<td><img src="image1.png" alt="Image" /></td>
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<td>5th June 2014 Celebration World Environment Day</td>
<td>11th July 2014: Dr. Raj Kamal, Director MIST delivered about the mobile computing</td>
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<tr>
<th>REGION-VI</th>
<th>REGION-VII</th>
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<tbody>
<tr>
<td>K. K. WAGH INSTITUTE OF ENGINEERING EDUCATION &amp; RESEARCH, NASHIK</td>
<td>R.M.K. COLLEGE ENGINEERING AND TECHNOLOGY, PUDUVOYAL</td>
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<td><img src="image4.png" alt="Image" /></td>
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<tr>
<td>27th June 2014: Speaker Mr. Shirrang Korekar, Prof. Dr. S. S. Sane RVP Region VI CSI, Faculties and Students during Session on S.W.O.T. Analysis</td>
<td>12th July 2014: inauguration students activities for the year 2014 - 15</td>
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<tr>
<th>REGION-VII</th>
<th>REGION-VII</th>
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<tbody>
<tr>
<td>DR. SIVANTHI ADITANAR COLLEGE OF ENGINEERING, TIRUCHENDUR</td>
<td>VELAMMAL ENGINEERING COLLEGE - CHENNAI</td>
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<td><img src="image6.png" alt="Image" /></td>
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<tr>
<td>5th July 2014 &amp; One Day Workshop on MATLAB &amp; NS2 Mrs. G.R. Janish, AP/CSE-Speaker at the Event</td>
<td>17th July 2014: CSI Student Chapter Inauguration (AY 2014-2015)</td>
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<th>REGION-VII</th>
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<tr>
<td>SRI RAMAKRISHNA ENGINEERING COLLEGE, COIMBATORE</td>
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| 7th July 2014: Motivational Talk on “Mental Health Awareness” By Dr. S. Ananth, Consultant, Psychiatrist, SRH, Coimbatore | Repeating instruction for your Information -
Please send your student branch news to Education Director at director.edu@csi-india.org. News sent to any other email id will not be considered. Low-resolution photos and news without gist will not be published. Please send only 1 photo per event, not more. |

Please send your student branch news to Education Director at director.edu@csi-india.org. News sent to any other email id will not be considered. Low-resolution photos and news without gist will not be published. Please send only 1 photo per event, not more.
23rd July 2014: President H.R. Mohan addresses the workshop on “Cross Border Cyber Crime Security” organised by ED Chennai alone with IEEE CS, ISACA & SETS.

10th July, 2014: Enable India conducted an interview for the special children trained by CSI ED for placing in Software companies.
CSI Communications

CSI Service Awards 2014
Call for Nominations

The Annual Convention of the Computer Society of India (CSI) will be held at Hyderabad on 12th-14th December 2014. On this occasion, CSI felicitates Chapters and Individuals with awards for their significant contributions to the society during the financial year 2013-14.

The awards will be presented during the Annual General meeting, at Hyderabad

The CSI awards constituted for encouraging the persons/chapters are indicated below:

1. Best National Chapter Award
2. Best Regional Chapter Award (Category A)
3. Best Regional Chapter Award (Category B)
4. Best Regional Chapter Award (Category C)
5. Chapter Patron Award
6. Best Chapter News Letter Award
7. Significant Contribution Award
8. Active Participation Award (Youth)
9. Active Participation Award (Woman)

The norms/guidelines for each award have been well documented and are uploaded on the website (http://www.csi-india.org/web/guest/csi-service-awards)

Chapters and Individuals interested in participating for these awards, may mail their nominations in a prescribed format uploaded on the website to the Executive Secretary, CSI-HQ, Mumbai at awards_2014@csi-india.org. Incomplete application will not be considered for scrutiny.

The nomination should be routed through respective Regional Vice Presidents latest by 25th August, 2014 so that the scrutiny can be done by CSI-HQ at Mumbai and forwarded to “AWARDS COMMITTEE” headed by the Immediate Past President, for final selection. Prof R P Soni will be heading as the Convenor for CSI Service Awards for the above category of awards.

For enquires, kindly contact Mr. Suchit Gogwekar CSI HQ at hq@csi-india.org

Thanking You
Prof S V Raghavan, Chairman, Awards Committee Computer Society of India

The best national chapter award will be given on the basis of nomination for best regional chapter award, so, a separate nomination for this award is not required.
## CSI Calendar 2014

### August 2014 events

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Details &amp; Organizers</th>
<th>Contact Information</th>
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<tbody>
<tr>
<td>20 Aug 2014</td>
<td>Workshop on “Ethernet LAN Construction using Crossover and Patch Cable”</td>
<td>Mr. K C Arun</td>
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<tr>
<td></td>
<td>At Hyderabad. Organized by CSI SB and Dept. of IT, Nalla Malla Reddy Engineering College, Hyderabad</td>
<td><a href="mailto:hodit@nmrec.edu.in">hodit@nmrec.edu.in</a></td>
</tr>
<tr>
<td>22-23 Aug 2014</td>
<td>International Information Security Conference c0COn -2014</td>
<td>Ms. Mini Ulanat</td>
</tr>
<tr>
<td></td>
<td>Organized by Information Security Research Association - India Chapter in association with the Kerala State Police and POLCYB supported by CSI Cochin Chapter at Crowne Plaza, Cochin, (Kerala, India).</td>
<td><a href="mailto:mini06@gmail.com">mini06@gmail.com</a></td>
</tr>
<tr>
<td></td>
<td>Organised by CR Rao Advanced Institute of Mathematics, Statistics &amp; Computer Science. Supported by CSI Div III.</td>
<td><a href="mailto:spyne@broadinstitute.org">spyne@broadinstitute.org</a></td>
</tr>
<tr>
<td>25-27 Aug 2014</td>
<td>NITC 2014 : ICT For Inclusive Development. Organised by The Computer Society of Sri Lanka (CSSL) at Colombo, Sri Lanka.</td>
<td><a href="mailto:info@cssl.lk">info@cssl.lk</a>/events@cssl.lk</td>
</tr>
<tr>
<td>28-30 Aug 2014</td>
<td>International Contest on Programming &amp; Systems Development (ICPSD’14)</td>
<td>Dr. Anirban Basu</td>
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<td></td>
<td></td>
<td><a href="mailto:abasu@pqrsoftware.com">abasu@pqrsoftware.com</a></td>
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### September 2014 events

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<tr>
<th>Date</th>
<th>Event Details &amp; Organizers</th>
<th>Contact Information</th>
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<tbody>
<tr>
<td>3-4 Sep 2014</td>
<td>National Conference on IT in Defence 2014 at Bangalore. Organised by CSI Bangalore and CSI SIG-IS at CSIR Velliuri Auditorium, NAL, Kodihalli, Bengaluru.</td>
<td>Dr. C R Chakravarthy</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.meraevents.com/event/9th-national-conference-on-it-for-defence-2014">http://www.meraevents.com/event/9th-national-conference-on-it-for-defence-2014</a></td>
<td><a href="mailto:drchakra32@gmail.com">drchakra32@gmail.com</a></td>
</tr>
<tr>
<td>6 Sep 2014</td>
<td>CSI Ghaziabad IT Excellence Awards Organized by CSI Ghaziabad Chapter in association with Region – I and Division – I. Chapter Chairmen meeting of Region – I.</td>
<td>Mr. Saurabh Agrawal</td>
</tr>
<tr>
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<td><a href="mailto:csi.itawards@gmail.com">csi.itawards@gmail.com</a></td>
<td><a href="mailto:csi.itawards@gmail.com">csi.itawards@gmail.com</a></td>
</tr>
<tr>
<td>27 Sep 2014</td>
<td>ETIR-2014: National Workshop on “Emerging Trends in Information Retrieval” At Mathura. Organised by GLA University in technical association with CSI Mathura, Div I &amp; Region I.</td>
<td><a href="mailto:etir2014@glau.ac.in">etir2014@glau.ac.in</a></td>
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<td><a href="http://www.glau.ac.in/IRWorkshop/">http://www.glau.ac.in/IRWorkshop/</a></td>
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### October 2014 events

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<th>Date</th>
<th>Event Details &amp; Organizers</th>
<th>Organizing Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-11 Oct 2014</td>
<td>A conference on Advances in Cloud Computing (ACC) with special emphasis on Internet of Things (IoT)</td>
<td><a href="mailto:info@csi-acc.in">info@csi-acc.in</a></td>
</tr>
<tr>
<td></td>
<td>Organised by CSI Pune Chapter at Pune.</td>
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<td></td>
<td><a href="http://csi-acc.in/">http://csi-acc.in/</a></td>
<td></td>
</tr>
</tbody>
</table>

### November 2014 events

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Details &amp; Organizers</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Organized by Dept. of Computer Science and Applications, M. D. University, Rohtak in association with CSI Region – I and CS Division – I.</td>
<td><a href="mailto:chhillar02@gmail.com">chhillar02@gmail.com</a></td>
</tr>
<tr>
<td>14-16 Nov 2014</td>
<td>International Conference on Information and Communication Technology for Competitive strategies (ICTCS-2014)</td>
<td>Prof. Amit Joshi</td>
</tr>
<tr>
<td></td>
<td>Organized by: Computer Society of India, Udaipur Chapter, Division IV, I, SIG-WNs, Hosted by: Sunrise Group of Institutions, Udaipur.</td>
<td><a href="mailto:amitjoshiuadr@gmail.com">amitjoshiuadr@gmail.com</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://www.csi-udaipur.org/ictcs-2014">http://www.csi-udaipur.org/ictcs-2014</a></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Event</td>
<td>Organiser</td>
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</tr>
<tr>
<td>28-30 Nov 2014</td>
<td>International Conference on Advance in Computing Communication and Informatics</td>
<td>Dr. Vishal Singhal, Convener</td>
</tr>
<tr>
<td></td>
<td>At COER School of Management, Roorkee, Uttrakhand</td>
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<tr>
<td></td>
<td><a href="http://coer.ac.in/ICACCI2014/index.html">http://coer.ac.in/ICACCI2014/index.html</a></td>
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<td><strong>December 2014 events</strong></td>
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<tr>
<td>12-14 Dec 2014</td>
<td>49th Annual Convention, Organised by Computer Society of India, Hyderabad Chapter In association with JNTU-Hyderabad &amp; DRDO. Theme: Emerging ICT for Bridging Future Venue: JNTUH, Kukatpally, Hyderabad</td>
<td>Sri. J A Chowdary, Sri. Gautam Mahapatra</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.csihyderabad.org/csi-2014">http://www.csihyderabad.org/csi-2014</a></td>
<td></td>
</tr>
<tr>
<td>12-14 Dec 2014</td>
<td>Special session on “Cyber Security and Digital Forensics” during Computer Society of India Annual Convention - 2014 by CSI Special Interest Group on Cyber Forensics, JNTU Hyderabad</td>
<td>Dr. Vipin Tyagi</td>
</tr>
<tr>
<td>16-20 Dec 2014</td>
<td>ICISS-2014: International Conference on Information Systems Security, At Institute for Development &amp; Research in Banking Technology (IDRBT), Hyderabad, India. Co-sponsored by CSI Division IV and CSI SIG-IS.</td>
<td><a href="mailto:iciss2014@idrbt.ac.in">iciss2014@idrbt.ac.in</a></td>
</tr>
<tr>
<td>19-21 Dec 2014</td>
<td>EAIT-2014: Fourth International Conference on Emerging Applications of Information Technology</td>
<td>Prof. Aditya Bagchi, Dr. Debashish Jana, Prof. Pinakpani Pal, Prof. R T Goswami</td>
</tr>
<tr>
<td>22-24 Dec 2014</td>
<td>ICHPCA-2014: International Conference on High Performance Computing and Applications</td>
<td>Prof. (Dr.) Rachita Misra</td>
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<tr>
<td></td>
<td>Organized by: CV Raman College of Engg. in association with CSI Div-V and IEEE Kolkata Section</td>
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<td><a href="http://www.ichpca-2014.in/">http://www.ichpca-2014.in/</a></td>
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<td><strong>March 2015 events</strong></td>
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<tr>
<td>11-13 Mar 2015</td>
<td>9th INDIACOM; 2015 2nd International Conference on “Computing for Sustainable Global Development” Organized by Bharati Vidyapeeth’s Institute of Computer Applications and Management (BVICAM), New Delhi</td>
<td>Prof. M N Hoda</td>
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</tbody>
</table>

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**Kind Attention: Prospective Contributors of CSI Communications**

Please note that cover theme of CSI Communications September 2014 issue is planned as follows -

- September 2014 - IT History

Articles and contributions may be submitted in the categories such as: Cover Story, Research Front, Technical Trends and Article.

Please send your contributions before 20th August 2014 for consideration in this issue. The articles may be long (2500-3000 words) or short (1000-1500 words) authored in as the original text. (Plagiarism is strictly prohibited.)

[Issued on behalf of Editors of CSI Communications]
CALL FOR PAPERS

The Institution of Engineers (India)

THIRTIETH NATIONAL CONVENTION OF ELECTRONICS & TELECOMMUNICATION ENGINEERS

And

National Seminar on “Web Technologies & Communication: Recent Trends and Social Impact”

31st October & 1st November 2014, Kochi

In Association with

WebCon 2014 aim to provide a platform for Indian scientific and engineering computing fraternities from academics, scientific labs, R&D institutions, industry and government to share their research work, knowledge and experience in the field of web technologies and Communication. Authors are invited to submit original, unpublished research manuscripts demonstrating their current research in the following areas:

- Web application development
- Rich Internet Applications
- Web content management and data-intensive web applications
- Collaborative Web application development
- Semantic Web
- Web content management
- Adaptive Web applications
- Social web applications
- Mobile Web
- Web mining and farming
- Web security, Integrity, Privacy & Trust
- Web Services and Grid Services
- Knowledge Management
- Cyber Laws & Cyber Crime
- E Governance
- Web Protocols and Standards
- UI Design approaches
- Ethical, Cultural and Social Issues
- E Commerce and Business
- 4G and beyond
- Internet of things
- Big Data Analysis
- Wearable Technology
- Integrated Airport Management system
- Surveillance, Security, Intelligent Power System for Airports
- Wireless Sensor Network
- Deep Space Communication
- Defence Applications in Web Technology & Communication
- Bio Medical Communication
- Under water Surveillance & Communication
- Flexible Electronics
- Advances in Signal Processing
- Digital Broadcasting
- Navigational Aids
- Any other Topic

Important Deadlines

Last date for Submission: September 20, 2014, Notification of Selection: October 01, 2014
Camera-ready Paper: October 10, 2014

Full length papers have to be formatted as per the IEEE A4 format in pdf and should be submitted using the EasyChair conference management system through

Website: www.webcon2014.org, E-mail: webcon2014@gmail.com, Link for paper Submission: https://easychair.org/conferences/?conf=webcon2014

For accepted papers (at least one of the) authors is needed to register and present their work at the conference. All the selected papers will be published through WebCon 2014 conference proceedings. Selected papers will be considered for the publication through IEI Springer Series Journals / CSI Digitabi Library.

Exhibition of Products

It is planned to have a product exhibition counter at the Seminar venue. Engineers from all sectors, students and members of faculty from the academia, members from engineering professional bodies and associations, corporate members of IEI and supporting organizations as well as technician and student members are expected to attend the Seminar. The size per unit will be 6X4ft. The charges per unit will be Rs. 10,000/-.

Website: www.webcon2014.org

E-mail: webcon2014@gmail.com/ieikochi@gmail.com, Mob: 9846121201