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TAMC 2014 aims at bringing together a wide range of researchers with interests in computational theory and applications. The main themes of the conference are computability, complexity, algorithms, models of computation and systems theory. TAMC is happening in India for the first time. Typical but not exclusive topics of interest include:

- algebraic computation
- algorithmic coding theory
- algorithmic number theory
- approximation algorithms
- automata theory
- circuit complexity
- combinatorial algorithms
- computability
- computational biology, and biological computing
- computational complexity [including circuits, communication, derandomization, PCPs, proof complexity, structural complexity]
- computational game theory
- computational logic
- computational geometry
- continuous and real computation
- cryptography
- data structures
- design and analysis of algorithms
- distributed algorithms
- domain models [Assets, Price of Abstraction, frameworks]
- fixed parameter tractability
- geometric algorithms
- graph algorithms
- information and communication complexity
- learning theory
- memory hierarchy tradeoffs
- model theory for computing [modal and temporal logics, specification, verification, synthesis or automated software construction, aesthetics, software behavior, transformation of models]
- natural computation
- nature inspired computing
- network algorithms, networks in nature and society
- online algorithms
- optimization
- parallel algorithms
- philosophy of computing [emerging paradigms, morality, intentionality]
- privacy and security
- property testing
- proof complexity
- process models [for software construction, validating software under construction, supply – chain]
- quantum computing
- randomness, pseudo-randomness
- randomized algorithms
- space – time tradeoffs
- streaming algorithms
- systems theory [Concurrent, Timed, Hybrid and Secure systems]
- VLSI Models of Computation [Models for Hardware – Software Codesign]

The Programme Committee has 30 eminent experts from 11 Countries

Papers submitted will be reviewed and evaluated based on originality, technical quality and relevance to the conference. Please find the paper submission guidelines at: http://www.annauniv.edu/tamc2014

Important Dates
Submission Deadline: 15 November 2013, 11:59pm EST.
Notification of Acceptance: 15 December 2013
Final Camera Ready Version Due: 15 January 2014

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Dear Fellow CSI Members,

Christening software engineering as engineering has perhaps been a seriously debated decision in the early days of the discipline. The name stayed and the field grew. But there has been introspections at regular intervals. A philosophical redefinition of the field and establishing a common ground is beginning to emerge, in hindsight. This month’s CSIC features exactly such a pioneering effort by Ivar Jacobson and team (Pan-Wei Ng, Paul McMahon, Ian Spence and Svante Lidman), renowned contributors in the field. In their article titled “The Essence of Software Engineering: the Semat Kernel”, they describe the nature and scope of the SEMAT (Software Engineering Methods and Theory) Kernel which, in their words is actionable, extensible and practical. We hope that this sets the tone for special issue on Software Project management.

We have two articles in technical trends section. The first one by Rahul Joshi, Co-Founder, Cronilex Technology Pvt Ltd and Director, Synthesys Solutions Pvt Ltd in his article titled Software Project Management: A Synchronized Dance Between People, Process, as the creative title indicates, takes a metaphorical look at software engineering aiming to provide fresh insights. The second article in technical trends, Project Management Perspective View by Sudip Mal Group Head, Enterprise Security Solutions, Wipro Technologies presents a perspective view of project Management in general.

We start our research front section with article written by Ramanuja Bhattacharya which addresses the critical issue of managing large programs through his article: Managing Large Programs - A Practitioner’s View. Globally distributed teams that are now the norm for global giants, present new challenges for project management, Suprateek Sarkar, Professor, University of Virginia, Charlottesville, USA in his article (second one in research front) titled Managing Agility of Globally-Distributed Teams discusses this important challenge.

We hope that the assortment of articles in this issue will present the reader with a cross section of current thinking in software project management.

In article section, we have three articles, the first one: Data Migration Testing Strategy - Good Practice by Dr. R Nedunchelian, Professor, Department of CSE Saveetha School of Engineering, Saveetha University and Mrs. Jeyachitradevi, Research Scholar, Department of CSE Saveetha School of Engineering, Saveetha University. In second article, Akhil Janardanan contextualises the need for adopting efficient search strategies in view of the carbon emission caused by each irresponsible search. He gives some selected tips in this regard. We are starting series of articles on M2M (machine to machine), the first article and third one in article section is on: M2M – Concept and Architectural Overview by Pradip Roychowdhury and Manoj Ramachandran, IBM Certified Sr. IT Architect, Open Group Master Certified IT Architect.

In our regular practitioner workbench columns, we have articles on Handling Images in Color Spaces with Java Eclipse IDE by Baisa L Gunjal and Dr. Suresh N Mali under Programming, Tips. Umesh P and Silpa Bhaskaran Department of Computational Biology and Bioinformatics, University of Kerala continue their write-ups on Data Structures in R under Programming, Learn (“R”).

Under Information Security section we have article by Krishna Chaitanya Telikicherla and Harigopal K B Ponnapalli of Infosys on Understanding Web Interactions and their Security Boundaries.

IT.Yesterday() takes us memory lane down. This time we have John T George, Formerly Head, Computer Division, TERLS, Senior most member, Trivandrum Chapter who takes us through the Birth and Growth of on CSI Trivandrum Chapter.

H R Mohan, Vice President, CSI, AVP (Systems), The Hindu, Chennai brings us the ICT News Briefs at a glance under various sectors in July 2013 under regular column Happenings@ICT.

Dr. Debasish Jana, Editor, CSI Communications present crossword for those who want to test their IT knowledge on software project management under Brain Teaser column and answers questions under column: Ask an Expert: Your Question, Our Answer.

Hope our esteemed readers find this issue a great learning experience.

With warm regards,
Rajendra M Sonar, Achuthsankar S Nair, Debasish Jana and Jayshree Dhere
Editor
Dear Members

Vizag is getting ready to host the CSI Annual Convention. From the arrangements, I find that we can expect an excellent program this year. Pack your bags and get ready to reach Vizag in time. The city with lots of Critical Infrastructure welcomes you. Judging from the enthusiasm of the organizers, we can expect excellent hospitality as well. Be ready for a delicious Andhra Meal.

We are progressing well in the Launch of a Curtain Raiser for Celebrating the Golden Jubilee of our Society. Hon’ble Minister for Law and Justice, Communications, and Information Technology Shri Kapil Sibal Ji has agreed to be the Chief Guest. Please standby for actual dates and program details. An interesting Panel Discussion on “ICT and India” is expected. We are expecting some of the best talent from India and abroad to join us during the panel. We are also trying to get a Postal Stamp release organized to mark the occasion. The event will be in New Delhi and the RVP of Region-I, Prof. R K Vyas and his team of Chapter office bearers of that region is going to make the event a grand success. Of course, our veteran CSI enthusiast Dr Ratan Dutta, Past President of CSI and Chairman of NC, is guiding them through every step.

It is time for us to use ICT in full measure. Also, each Chapter should organize events that can be shared with other chapter as webinars. I would like each Division Chair and each RVP to organize webinars topic-wise and chapter-wise. We should experiment from August 15, 2013. We must have weekly webinars by Chapters and monthly webinars through Divisions. Our web site should carry the schedule well ahead of time. In order to attract our young student members, we should have apps that can take webinars to Smart Phones as well. Education Directorate can keep track of the webinars and record them as well. The National Student Coordinator can provide necessary publicity in educational institutions. All senior members should volunteer to find out and share visitors and lectures in their work place, after obtaining the necessary permissions locally. Let us set the trend in sharing knowledge. As a baby step, I volunteer to give a talk on “Designing Large Scale Systems” on August 15, 2013 at 2 pm. Divisions related to hardware and software as well as the RVP of region I have to give me the actual instructions to make it happen.

As we launch our Golden Jubilee celebrations, we can contribute towards creating India – NexGen. Perhaps, a few years from now, we will see news items that may read as follows:

India is most connected country in the world. India has its own Search Engine. India develops world’s fastest router. India creates history by driving 1000 Terabits of data through a pair of Optical Fibers across the country. India unveils world’s largest Supercomputer. Indian software assets take the world by storm. India has the largest number of software design professionals. India moves on to Quantum Computing and Communication after unprecedented success in Silicon based computing. In India, every third person is an electronics designer of sorts. India becomes the largest designer of custom-made products. India successfully integrates 3D Printing technology and personalized product design.

When it happens, Computer Society of India should be perceived as the anchor for such change. It is time that we put all our acts together to make necessary moves today. Everyone in CSI has a significant role to play in such transformation. Let us do our bit.

Another important factor that CSI should focus on is the Academia - Industry interaction. Indian academic system have always excelled and remained comparable to the best in the West. Indian industry today is moving its attention more towards products as opposed to services. Indian industry is looking up to academia for help. CSI being body of professionals from academia and industry is in a unique position to address this need. The work force, the students are also CSI members. One could start with some Brainstorming sessions to sharply define this space. Volunteers? Or should we overload NSC??

CSI Transactions on ICT is doing very well. We are getting a constant flow of articles from our educational system. Our Board of Editors are doing a wonderful job in reviewing. I would like to appeal to those of you who are in teaching and research to encourage the students and professionals near you to submit their work. Wherever necessary, help them reach the exacting standards that our Editorial Board sets. You will be doing a yeomen service to CSI as well as the fellow professionals and more so, our dear student members.

I will catch up with you soon...

With best wishes,

Prof. S V Raghavan
President
Computer Society of India
Successful software-development teams need to strike a balance between quickly delivering working software systems, satisfying their stakeholders, addressing their risks, and improving their ways of working. For that, they need an effective thinking framework that bridges the gap between their current way of working and any new ideas they want to adopt. This article presents such a thinking framework in the form of an actionable kernel, which could benefit any team wishing to balance their risks and improve their way of working.

Inspiration
Work on the kernel, the essence of software engineering, was inspired by and is a direct response to the Software Engineering Methods and Theory (SEMAT) call for action. It is, in its own way, one small step toward redefining software engineering.

SEMAT was founded in September 2009 by Ivar Jacobson, Bertrand Meyer, and Richard Soley, who felt the time had come to fundamentally change the way people work with software-development methods.[3,4,8] They wrote a call for action statement, which in a few lines identifies a number of critical problems, explains why there is a need to act, and suggests what needs to be done. The call for action is:

Some areas of software engineering today suffer from immature practices. Specific problems include:
• The prevalence of fads more typical of the fashion industry than an engineering discipline;
• The lack of a sound, widely accepted theoretical basis;
• The huge number of methods and method variants, with differences little understood and artificially magnified;
• The lack of credible experimental evaluation and validation; and
The split between industry practice and academic research. The SEMAT call for action’s assertion that the software industry is prone to fads and fashions has led some people to assume that SEMAT is resistant to new ideas. This could not be further from the truth. As you will see in this article and in the recently published book (The Essence of Software Engineering—Applying the SEMAT Kernel),(6) SEMAT supporters are very keen on new ideas. What they are against is the non-lean, non-agile behavior that comes from people adopting inappropriate solutions just because they believe these solutions are fashionable—or because of peer pressure or political correctness.

SEMAT supports a process to redefine software engineering based on a solid theory, proven principles, and best practices that:
- Include a kernel of widely agreed-upon elements, extensible for specific uses;
- Address both technology and people issues;
- Are supported by industry, academia, researchers, and users; and
- Support extension in the face of changing requirements and technology.

The SEMAT call for action received a broad base of support, including a growing list of signatories and supporters (http://www.semat.org). In February 2010 the SEMAT founders developed the call for action into a vision statement.(5) In accordance with this vision, SEMAT focused on two major goals: Finding a kernel of widely agreed-upon elements, and defining a solid theoretical basis.

To a large extent these two tasks are independent of each other. Finding the kernel and its elements is a pragmatic exercise requiring experienced software developers with knowledge of many of the existing methods. Defining the theoretical basis is academic research and may take many years to reach a successful outcome.

The Power of the Common Ground
SEMAT’s first step was to identify a common ground for software engineering. This common ground is manifested as a kernel of essential elements that are universal to all software-development efforts, and a simple language for describing methods and practices. The kernel was first published in the SEMAT OMG (Object Management Group) submission.(2,9) As shown in Fig. 1 and 2, the kernel contains a small number of “things we always work with” and “things we always do” when developing software systems. The kernel also defines a set of key competencies needed to do software engineering. However, we do not discuss the competencies in this paper.

More than just a conceptual model, the kernel provides:
- A thinking framework for teams to reason about the progress they are making and the health of their endeavors;
- Common ground for the discussion, improvement, comparison, and sharing of software-engineering methods and practices;

![Fig. 1: Things to work with](image1)

![Fig. 2: Things to do](image2)
• A framework for teams to assemble and continuously improve their way of working by the composition of separately defined, and sourced, practices;
• A foundation for defining practice-independent measures to assess the quality of the software produced and the methods used to produce it; and
• Most importantly, a way of helping teams understand where they are, what they should do next, and where they need to improve.

The Big Idea
What is it that makes the kernel more than just a conceptual model of software engineering? What is it that is really new here? This can be summed up in its founding principles (see Fig. 3), which really bring out three unique features of the kernel: it is actionable; it is extensible; and it is practical.

The kernel is actionable.
A unique feature of the kernel is the way that it handles the “things to work with.” These are captured as alphas rather than work products (such as documents). An alpha is an essential element of the software-engineering endeavor—one that is relevant to an assessment of its progress and health. As shown in Fig. 1, SEMAT has identified seven alphas: opportunity, stakeholders, requirements, software system, work, way of working, and team.

The alphas are characterized by a simple set of states that represent their progress and health. As an example, the software system moves through the states of architecture selected: demonstrable, usable, ready, operational, and retired. Each state has a checklist that specifies the criteria needed to reach the state. These states make the kernel actionable and enable it to guide the behavior of software-development teams.

The kernel presents software development not as a linear process but as a network of collaborating elements that need to be balanced and maintained so teams can make effective and efficient progress, eliminate waste, and develop great software. The alphas in the kernel provide an overall framework for driving and progressing software-development efforts, regardless of the practices applied or the philosophy followed.

As practices are added to the kernel, alphas will be added to represent the things that either drive the progress of the kernel alphas or inhibit their progress. For example, the requirements alpha will not be addressed as a whole but will move forward item by item. The progress of the individual requirement items will either drive or inhibit the progress and health of the requirements alpha. The requirements items could be of many different types: for example, features, user stories, or use-
case slices, all of which can be represented as alphas and have their states tracked. The benefit of relating these smaller items to the coarser-grained kernel elements is that it allows the tracking of the health of the endeavor as a whole. This provides a necessary balance to the lower-level tracking of the individual items, enabling teams to understand and optimize their ways of working.

The kernel is extensible. Another unique feature of the kernel is the way it can be extended to support different projects (for example, new development, legacy enhancements, in-house development, offshore development, software product lines, and so on). The kernel allows you to add practices, such as user stories, use cases, component-based development, architecture, pair-programming, daily stand-up meetings, self-organizing teams, and so on to build the methods you need. For example, different methods could be assembled for in-house and outsourced development or for the development of safety-critical embedded systems and back-office reporting systems.

Practice separation is the key idea here. While the term practice has been widely used in the industry for many years, the kernel has a specific approach to the handling and sharing of practices. Practices are presented as distinct, separate, modular units, which a team can choose to use or not to use. This contrasts with traditional approaches that treat software development as a soup of indistinguishable practices and lead teams to dump the good with the bad when they move from one method to another.

The kernel is practical. Perhaps the most important feature of the kernel is the way it is used in practice. Traditional approaches to software-development methods tend to focus on supporting process engineers or quality engineers. The kernel, in contrast, is a hands-on, tangible thinking framework focused on supporting software professionals as they carry out their work.

For example, the kernel can be touched and used through cards (see Fig. 4). The cards provide concise reminders and cues for team members as they go about their daily tasks. By providing practical checklists and prompts, as opposed to conceptual discussions, the kernel becomes something the team uses on a daily basis. This is a fundamental difference from traditional approaches, which tend to overemphasize method description as opposed to method use and tend to be consulted only by people new to the team.

Cards provide concise descriptions that serve as reminders for team members. They can keep the kernel as a small deck of cards in their pockets, which they can easily pull out to discuss the current status of development and the work assignment and collaboration.

Fig. 5: The team uses the alphas to determine the current states
among team members. Teams can also discuss areas of improvement by referring to the cards. Thus, the kernel is not merely a heavyweight description of what a team needs to do. Rather, it forms an essential part of what they are doing each day.

**The kernel in action.** The kernel has many applications in software professionals’ everyday lives. They include:
- Running an iteration (or sprint).
- Running the entire development from idea to product.
- Scaling to large organizations and complex software-development endeavors.

The first application, planning an iteration, is used here as an example of what a team can do with the kernel. The others are covered fully in *The Essence of Software Engineering—Applying the SEMAT Kernel.*

The example presented here assumes that a company has very little in the way of formal processes. In the past it has relied on having skilled and creative individuals on experienced teams, but the company is now growing and has many new hires. These new employees, mostly fresh out of university, have good technical skills—for example, in programming languages—but are less equipped in other aspects of software development, such as working with stakeholders to gain agreement on requirements.

This company has a development team that is responsible for making a mobile social-network application that lets users share and browse ideas, photos, and comments. The team began with only two developers, Smith (the team leader) and Tom, both of whom are familiar with the kernel. They are later joined by two more developers, Dick and Harriet, who are new to the job and have no previous knowledge of the kernel. Success to team leader Smith means more than functionality, schedule, and quality. This team ran development iteratively. You can think of planning an iteration as follows:

1. Determine where you are: Work out the current state of the endeavor.
2. Determine where to go: Decide what to emphasize next and what the objectives of the next iteration will be.
3. Determine how to get there: Agree on the tasks the team needs to do to achieve the objectives.

**Determine Where the Team is Using the Kernel**

Let’s assume that Smith and his team are six weeks into development. They have provided an early demonstration of the system to their stakeholders, who are pleased and provide valuable feedback. The system is not yet usable by end users, however. You can use the kernel to do this in a number of ways. If you are using alpha state cards, then you can do a walkthrough as follows:

1. Lay out the cards for each alpha in a row on a table with the first state on the left and the final state on the right.
2. Walk through each state and ask your team if you have achieved that state.
3. If the state is achieved, move that state card to the left. Continue with the next card until you get to the state that your team has not yet achieved.
4. Move this state card and the rest of the pending state cards to the right.

**Determine Where to go with the Kernel.**

Once the team agrees on the current alpha states, the members discuss what the next desired “target” states are to guide their planning. The team agrees to use the immediate next alpha states to help establish the objectives of the next iteration, as shown in Fig. 6.

The name of the alpha state supplies a hint to understanding what needs to be achieved to reach a state. Team members can find out more by reading and understanding the alpha-state checklist. By going through the states one by one for each alpha, a team quickly
becomes familiar with what is required to achieve each state. In this way the team learns about the kernel alphas at the same time as they determine their current state of development and their next target states.

**Determine how to get there with the kernel.** Smith and his team look at the next target states and agree that they need to establish some priorities. First, they need to have their way of working: working well; then the software system: usable; and finally requirements: addressed. The reason is simple; not having the way of working: working well would impede their attempts to get the software system: usable. In addition, they agree on the priority for the missing requirement-items necessary to achieve the requirements: addressed state.

Smith and his team next discuss what needs to be done to achieve these states, as shown in the accompanying Fig. 7 By going through the target alpha states, Smith is able to determine a set of objectives and tasks for the next iteration.

**How the kernel helps in planning iterations.** A good plan must be inclusive, meaning that it includes all essential items and covers the whole team. It must also be concrete, so it is actionable for the team. The team must also have a way to monitor its progress against the plan. The kernel helps you achieve this as follows:

- **Inclusive.** The kernel alphas serve as reminders across the different dimensions of software development, helping create a plan that addresses all dimensions in a balanced way.

- **Concrete.** The checklists for each alpha state hint at what you need to do in the iteration. The same checklists help determine your progress by making clear what you have done and comparing this with what you intended to do.

**The Kernel in the Real World**

Although the ideas presented here will be new to many of you, they have already been successfully applied in the real world by both industry and academia. In all cases they used the kernel and practices developed by Ivar Jacobson International.[1,10] Early adopters of the kernel idea include:

- MunichRe, the world’s leading reinsurance company, where a family of “collaboration models” has been assembled to cover the whole spectrum of software and application work. Four collaboration models—exploratory, standard, maintenance, and support—have been built on the same kernel from the same set of 12 practices.

- Fujitsu Services, where the Apt Toolkit has been built on top of an early version of the software-engineering kernel, including both agile and waterfall ways of working.[1]

- A major Japanese consumer electronics company, where the software processes have been defined on top of an early version of the kernel, helping teams apply new practices and manage an offshore development vendor.

- KPN, where a kernel-based process was adopted by more than 300 projects across 13 programs as part of a move to iterative development. The kernel also provided the basis for a new results-focused QA process, which could be applied to all projects regardless of the method or practices used.

- A major U.K. government department, where a kernel-based agile toolset was introduced to enable disciplined
agility and the tracking of project progress and health in a practice-independent fashion.

The kernel is already being used in first- and second-year software-engineering courses at KTH Royal Institute of Technology in Sweden. After students in the first-year courses conducted their projects, they went through the SEMAT alphas and matched them to their project results, under the direction of Anders Sjögren. The students had the opportunity to acquaint themselves with and evaluate the alphas and gain insight into the project’s progress and health. In the second-year courses, run by Mira Kajko-Mattsson, the students were asked to use the SEMAT kernel when running their projects along with the development method they followed. As shown in Fig. 8, Kajko-Mattsson created a software-development scenario and evaluated it for each alpha, its states, and the state checklist items. The students were then asked to do the same when conducting and evaluating their projects.

The experiences of these courses provided valuable lessons. For example, the kernel assures that all the essential aspects of software engineering are considered in a project. By matching the project results against the kernel alphas, the students could easily identify the good and bad sides of their development methods. The kernel also prepared students for future software-engineering endeavors with minimal teaching effort. By following all the kernel alphas, the students could learn the total scope of the software-engineering endeavor and thereby see what would be required of them in their future as professionals.

How the kernel relates to agile and others. The kernel can be used with all the popular management and technical practices, including Scrum, Kanban, risk-driven iterative, waterfall, use-case-driven development, acceptance-test-driven development, continuous integration, and test-driven development. It will help teams embarking on the development of new and innovative software products and those involved in enhancing and maintaining established software products. It will help all sizes of teams from one-man bands to 1,000-strong software engineering programs.

For example, the kernel supports the values of the Agile Manifesto. With its focus on checklists and results, and its inherent practice independence, it values individuals and interactions over processes and tools. With its focus on the needs of professional software-development teams, it values the way of working and fulfilling team responsibilities over methods.

The kernel does not in any way compete with existing methods, be they agile or anything else. On the contrary, the kernel is agnostic to a team’s chosen method. Even if a team is already using a particular method, the kernel can still help. Regardless of the method used, as Robert Martin pointed out in his foreword to The Essence of Software Engineering, projects—even agile ones—can get out of kilter, and when they do, teams need to know more. This is where the real value of the kernel lies. It can guide a team in the actions they need to take to get back on course, to extend their method, or to address a critical gap in their way of working. It focuses on the needs of the software professional and values the “use of methods” over “the description of method definitions” (as has been normal in the past).

The kernel does not just support modern best practices; it also recognizes that a vast amount of software is already developed and needs to be maintained. It will live for decades and will have to be maintained in an efficient way. This means the way
you work with this software will have to evolve alongside the software itself. New practices will need to be introduced in a way that complements the ones already in use. The kernel provides the mechanisms to migrate legacy methods from monolithic waterfall approaches to more modern agile ones and beyond, in an evolutionary way. It allows you to change your legacy methods practice-by-practice, while maintaining and improving the teams’ ability to deliver.

How the kernel will help you. Use of the kernel has many benefits for experienced or aspiring software professionals, and for the teams they work in. For example, it helps you assess the progress and health of software-development endeavors, evaluate current practices, and improve your way of working. It also helps you improve communication, move more easily between teams, and adopt new ideas. It will help the industry as a whole by improving interoperability among teams, suppliers, and development organizations.

By providing a practice-independent foundation for the definition of software methods, the kernel also has the power completely to transform the way that methods are defined and practices are shared. For example, by allowing teams to mix and match practices from different sources to build and improve their way of working, the kernel addresses two of the key methodological problems facing the industry:

- Teams are no longer trapped by their methods; they can continuously improve their way of working by adding or removing practices when the situation demands.
- Methodologists no longer need to waste time describing complete methods; they can easily describe their new ideas in a concise and reusable way.

Finally, the kernel benefits academia. The kernel provides a basis for the creation of foundation courses in software engineering that can then be complemented with additional courses in specific practices—either as part of the initial educational curriculum or later during the student’s professional development. Equally as important is the kernel’s ability to act as a shared reference model and enabler for further research and experimentation.

References

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 has contributed to modern business modeling and aspect-oriented software development.

Pan-Wei Ng coaches large-scale systems development involving many millions of lines of code and hundreds of people per release, helping them transition to a lean and agile way of working, not forgetting to improve their code and architecture and to test through use cases and aspects. He is the coauthor, with Ivar Jacobson, of Aspect-oriented Software Development with Use Cases.

Paul McMahon is an independent consultant focusing on coaching project managers, team leaders, and software professionals in the practical use of lean and agile techniques in constrained environments. He has been a leader in the SEMAT initiative since its inception.

Ian Spence is CTO at Ivar Jacobson International and the team leader for the development of the SEMAT kernel. He has introduced hundreds of projects to iterative and agile practices as well as led numerous successful largescale transformation projects working with development organizations of up to 5,000 people.

Svante Lidman has extensive experience building highperformance enterprise software-development teams. He has held positions at Hansoft AB, Ivar Jacobson International, Microsoft, Rational Software, Objectory, among others. Since mid-2010 Lidman was the leading change agent in the largest lean/agile transition ever done in Scandinavia.

About the Authors
Software Project Management

A Synchronized Dance Between People, Process, and Product

Introduction

Building software was likened to manufacturing a car. Build individual components, assemble them in some defined sequence and you have your product ready to test and roll out. Of course it was mastered over sustained period of innovation and hard work. Although at a high level, software development follows a similar path, I believe that’s where the similarity ends.

Software is still relatively new as compared to auto industry. We are still abstracting and standardizing models and programming techniques to produce consistent and reliable software. In addition, changing landscape around improved computing power constantly redefines our expectations around performance and features of the software. It also begs of the professionals to be up to speed with their skill sets at all times.

Product development cycles used to be long. Although dictated mostly by the scope, relatively medium to large scale projects taking 2-4 years was in the acceptable time range. This has significantly shrunk over last few years where product cycles are expected to be defined in weeks and months. It has now evolved into a more iterative cycle delivering incremental benefits. Part of the factor driving these short timelines is the need for business to react in near real time to changing business and market requirements. Enhanced tools available at an organizations disposal to facilitate such a schedule are also gaining favorable opinion with the stakeholders.

With all the moving parts above one still needs to do the core work of utilizing and applying resources available in a manner that produces the desired output. Not realizing the potential of these resources can set back the project in terms of time and cost, and in some cases make it prohibitive to recover from it.

This article intends to take a holistic view of factors influencing software project management that need to be carefully considered. It argues about them agnostic to any specific standard methodology, hardware or software that are essential tools in managing a project.

Discussed here are three P’s -significant areas that need to be looked at when involved with software project management:

1. People
2. Process
3. Product

A combination of people and processes that are aligned with the goal of the product (software project being worked on) form the key to a successful implementation. We will look at each of these areas in the discussion below in more detail.

People

As they say people are your greatest assets to a successful organization. Software project involves multiple stakeholders from business experts, functional analysts, skilled developers, quality testers to support teams who need to work in sync. Each of these skills uniquely contribute towards the project. Software project managers need to define the context of their specific skill as it relates to the goal of the product being built. In his book on psychology of computer programming, author Gerald M Weinberg says “...in programming situations, the primary working unit is a team, not an individual.” For these team(s) to be successful then, they should be brought together on a regular basis to review, analyze, make trade-offs and eventually conclude on a path best suited for project at hand.

Facilitating effective communication through appropriate channels and forums must be one of the key jobs of the software project managers. Although spreadsheets and tools can be used to track status and interim targets, getting the team excited and keeping them well informed and engaged along the way is the key driving force.

Process

Any large scale software development requires that the members of the team should be able to collaborate and coordinate with each other as they work on the building blocks. In order to ensure they all speak the same language, defining processes becomes essential. Processes can be standard, homegrown or a mix of the two that define steps and standards that the organization has agreed to will be followed by everyone.
There can be multiple processes defined based on the need. Process to document your requirements, development process, code review process, unit test process, source control check-in process, bug tracking, handling priority issues, process for handling security issues are some of the examples.

Every organization needs to evaluate where processes are needed and how they get defined. Introducing processes that may cause duplicate effort or introduce delays are a cause for concern and should be monitored. Sometime processes put in place due to resource constraints or infrastructure limitations few years ago may not be applicable today and should be eliminated.

Key factors to consider when deciding a process involves
• How big is the organization?
• Is the workforce local or geographically distributed across time zones?
• Is the process preventative in measure to fix potential human errors?
• Is the process in place to track and monitor progress of the project?
• Is the process to ensure standards are followed?

The goal would be to introduce minimal processes to avoid disruption as far as possible however sufficient enough to ensure project goals are met to the desired standard.

**Product**

Putting together the best team and setting up the most efficient of processes are not enough if they are not bounded together with the goal of the software to be produced in mind. A clear definition of the product being built is key to enable delivery of a successful project. Vaguely defined set of requirements are detrimental to the effort of getting the team aligned and interested. In some cases even though high level requirements are defined it is necessary to ensure that enough homework is being done to define each component or module to its details.

Scope of your current project cannot be limited to the current feature/function requirements. It has to consider any future improvements and ease of maintenance. A successfully delivered project within deadline only to find additional cost in bugs and maintenance later on carries limited credibility.

Whether you are part of an in-house product development or developing a software as part of your service offering cycles must be spent on identifying how end user will use it to run his business and take decisions.

Key factors to consider before embarking on the project
• What are your high level requirements?
• Who are the stakeholders and how have they defined their requirements?
• Is there a theme or key factors (performance, usability, security, specific functions etc.) that should be consistently driven across all its components
• What’s the vision around future scope and changes in the product?
• Is there a feedback and a feed-forward mechanism available in place to ensure product goals are on track?

Aided with project tracking tools to development methodologies like agile, software project management has come a long way. However, at its core a well-balanced effort between managing processes, building teams and defining clear objectives about the software you would like to build is the key challenge for project managers. The only thing assured is the need to continuously evolve and fine tune this balance as these factors themselves change.

**References**


**About the Author**

Rahul Joshi is an entrepreneur with more than 16 years of industry experience in designing and building large scale software applications. He holds a Masters of Engineering from Louisiana Tech University, USA in 1999. His research interest includes software development methodologies and security. Currently he is Co-Founder at Cronilex Technology Pvt Ltd and Director at Synthesys Solutions Pvt Ltd.
All those who have been involved in Project management have encountered more than often challenges like stringent deadlines, high requirement volatility, acute skill shortage, tight budget, unstated expectations etc. Whatever is the format of the project management lifecycle of choice, these problems seems to permeate and govern all forms of SDLC; be it traditional project management, critical chain project management, or agile or extreme project management. With a deeper look you will find that issue spectrum across engagements are somewhat similar; some of which I have attempted to list out below:

**Present Scenario**
- Skill base of existing resources unknown; potential and proficiency mapping for the resources are incomplete.
- Planning for revenue credit is unsystematic and at times very sketchy.
- Coupling of people, process, and technology to business needs is very loose.
- Gaps in breadth and depth of service expertise.
- Lack of objective assessments of resource competency and skill tower maturity.
- e.g.: Usually in a grid format of demand fulfillment it is more than often experienced that the same resource gets proposed for multiple opportunities, without proper skillset match due to lack of understanding and knowledge of the proficiency and potential of the resources; resulting in unwarranted rejections, wasted effort cycle for all resources connected in the fulfillment chain. More resource dissatisfaction; efforts lost in wasted time could be rechanneled for focusing on activities to fuel business growth.

The impact of the above often results in delayed and mismatched on boarding of resources, which in turn deals a severe blow to the timeliness and appropriateness of the end deliverables.

To restore some amount of semblance in the people process technology loop with the end deliverable, it is being felt to establish a framework, which will try to cover majority of these gaps in a transparent and objective manner.

**Expected Benefits of the Proposed Framework**
- Clear alignment of people process technology and competency with business requirements.
- Efficient competency based fulfillment planning and recording through framework.
- Increase of operational efficiency of the fulfillment process.
- Better supervisor team member association and alignment in business context.
- Objective assessments based on validated inputs from employees.
- Measurement of Competency and Maturity.

### Competency Framework

- **Knowledge repository + Utilization Report + Skill Tower Mapping**
- **Mapping System for Each User:**
  - **Skill Name → Proficiency Level**
- **Goals & Objectives**
- **Assessment**
  - Mentor — Mentee Rating
  - Competency Framework Assessment
  - Hands on Assessment

**Measurement Criteria:**
1. Project Performance
2. Technical
3. Process
4. Behavioral
5. Spirit of Wipro Initiatives
6. Attendance
7. Maturity
8. Leadership
- Skill set assessment.
- Administration and recording of hands on assessments and results.
- Transparent uniform scoring for skill proficiency assessments.
- Reduce significant escalation handling.

The outline of the overall competency framework is as follows:

The current skill sets of the user would be arrived at by referencing the knowledge repository, resource utilization reports and the skill tower mapping with their respective proficiency levels. Goals and objectives of a resource would be set based on the parameters provided after taking into consideration the current skill proficiency and the area of work. Following which the final score would be derived taking into consideration the work feedback, online assessments, and hands on assessment in a transparent and objective manner.

As a part of the enablement process the modules that would be coming in handy for the resource are the training modules followed by both online and practical assessments.

Once this is achieved the same information can be leveraged for fulfillment of business demands as shown here:

As an outcome of these initiatives, we should have resources well connected to process and technology and to the business requirement, which can be then met in the most efficient manner within the available means.

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Managing Large Programs - A Practitioner's View

Traditional tools and techniques for project management are effective when a project or even a program is so well defined that pre-determined planning and control is possible to a large extent. However, programs generally come with varying types, sizes, degrees of complexity, uncertainties and risks. As a result, a successful program manager needs something more than a just defined set of tools, techniques and methodologies. The diversity of program management makes it difficult for somebody to read few books and become a good program manager. However, the characteristics of a successful program manager can be described to a large extent. In this article, I plan to discuss program management from a practitioner’s point of view. However, we will restrict ourselves to more generic situations to keep the scope under control; but, we plan to provide some food for thought to inquisitive minds interested in program management with some focus on software implementation programs.

A program is typically defined as a set of interrelated projects or programs to collectively deliver a specific set of business benefits to an organization. This definition of a program appears to be deceptively simple. Naturally, many project managers aspire to become program managers as their next career move because to them program management deals with a collection of projects after all. The border between a large complex project and program management is not well defined for many project managers. For our discussion, we will assume a regular moderately complex program to keep it simple. There are big differences between a regular program and a regular project. Because of the differences, the program manager needs to have a different mindset, approach and skill set. There is no guarantee that a good project manager will automatically become a good program manager. It is important for any aspiring program manager to make an informed decision while making a career move. In order to develop the right understanding, a project manager needs to clearly understand three things – inherent meaning of interrelated projects and its impact, characteristics of a successful program manager and the responsibilities of a program manager.

Understanding “interrelated” projects and its impact - Generally the business objective or value of a program is quite significant. While the success of a program can benefit an organization immensely, the failures are also typically disastrous and very costly. As a result, a single project is not enough to achieve the business objectives and a program usually comes into rescue in such a case. The program is broken down into manageable projects without losing sight of the benefits and because of the common goal these projects become automatically interrelated. With these interrelated projects come significant complexity, higher level of risk and increased uncertainty. The initial program environment is initially very chaotic with an uncertain and unstructured environment with significantly more questions than answers. Such an environment can easily frustrate a project manager used to a relatively more structured and predictable environment. A program requires additional layers of management that typically includes a governance structure and optionally a Program Management Office (PMO) for larger programs. A program also generally impacts multiple business units of an organization whose business priorities and interests can often clash. An organization needs to plan for significant change management for a program to be successful. Typically the resources for a program come from different business units with different HR practices making it difficult to obtain the right resources at the right time at the right place at the right cost. While a program could be as simple as a collection of familiar interrelated projects, it could also be as complex as a collection of large projects and programs with dramatically different characteristics and with considerable risks and uncertainties. Therefore, the fund for programs can vary dramatically from few millions to hundreds of millions of dollars depending on the business objective the company is trying to achieve. Needless to say, a large program can have other programs under it and may be headed by a company executive. The dynamics of the environment increases the complexity of a program way more than the simple addition of all the complexity factors. In this article, we will focus on a moderately complex program – implementation of an enterprise wide integrated software suite.

Characteristics of a successful program manager - A program manager takes the business vision, objectives and desired value, lots of complex questions, chaos and general confusion and gives it a meaningful structure with a clearer vision and objectives for the project teams. So, matured levels of leadership ability, analytical and business level thinking, ability to deal with uncertainty and decision making are hallmarks of a program manager. Additionally, she must have a good understanding of the organization, its industry, business, strategic objectives, program objectives, strategy and program alignment, pain points to solve and expected business value. If the industry or the organization happens to be new, the program manager needs to invest time to come up to speed at the earliest opportunity. A successful program manager should ideally have several years of project management experience of medium to complex projects and ideally be at the expert level of project management skills. While the focus of a program manager is on the big strategic picture, she is still responsible for delivering the desired business results and should never lose sight of that. Therefore, a program manager must be able to oversee the constituent projects, coach the PMs and take corrective actions as necessary. A program manager also needs to apply the principles of project management albeit at a different level and scale.

For technical program managers, a broad understanding of the relevant technologies along with their business use is very important. A technical program manager should be able to explain technology in business terms to business leaders and executives. Program managers implementing enterprise wise software packages must have a good understanding of the software and its business value to organizations. She should also be able to clearly understand the purpose and
Expectations of the stakeholders. The technical prowess along with its business application knowledge can go a long way for a technical program manager. A program manager needs to have a seat at the table for both high level business and technical meetings and should contribute meaningfully to decision making in both areas.

A program manager should not only make decisions and stand by them but also motivate or influence the teams to follow the decisions. This could be sometimes hard with teams who may not report to the program manager directly. Ability to converse with and convince senior management one’s your viewpoint is another critical success factor. A successful program manager must also have various other skills, which include but not limited to negotiation and conflict management, leadership and management qualities, analytical and planning capability, people skills, communication skills (both written and oral), financial management skills, decision making skills in difficult situations, ability to deal with ambiguity and uncertainty, thinking outside the box and ability to motivate a team etc. Other requirements include the ability to deliver with quality under pressure, work long hours when necessary, handle intense political situations with a positive attitude. The program manager should be good in building trusted relationships and a strong network of friends to obtain help as needed.

Responsibilities of a program manager - Simply stated, a program manager manages project management from beginning to end in a cohesive and coordinated way to deliver the intended business objectives within the limits of scope, cost, schedule and quality as stated in the program charter. I would venture to provide a partial list of key responsibilities of a program manager. Again the specific responsibilities will vary based on the program needs, the business environment and expectations.

The effective technical program manager should
- Understand the relevant Software Packages and how they offer business value
- Define, initiate, lead and manage the component projects to achieve program objectives
- Possess solid knowledge of the interrelationships among the program elements
- Understand the organization, program environment, business requirements, budget, timeframe, resources, constraints, risks, activities, and motivations related to the program
- Make both strategic and tactical business and technical decisions
- Lead, plan, build and manage a schedule, organize, staff, and manage people, resources and processes in a cohesive way at the program level
- Establish program level business and technical processes for others to follow
- Work within organizational framework, processes and managerial systems to obtain funding
- Work with Governance board to make meaningful decisions and remove roadblocks
- Harmonize strategy, people, process and technology systems to produce desired results
- Deal with software vendors, consultants, contractors, Business & Technical SMEs, procurement, legal and others, assigned directly to the PMO or supporting it from outside
- Build necessary support for the program and manage negative perceptions about the program
- Manage stakeholders
- Resolve ambiguity and remove confusion
- Deliver results

Thus, we see that program management is very different. The program management could be really intense for some; however, it has its own charm and satisfaction for the people who like to build something significant, enjoy the risks and uncertainties that come with it. Next I would like to discuss certain areas of program management that I have found very useful for running a successful program - be it a business transformation program, software implementation program or other types of programs. However, I want to mention that this is not an exhaustive list and is provided for guidance purposes only.

Understand the business and Program value proposition - This is one of the critical aspects of any program management that makes it different from project management. One must be able to correlate the program and the value it brings to the overall business strategy of the organization. Depending on the correlation, the dynamics of the program can vary substantially. A program may be intended to increase sales, decrease cost, do both, increase customer satisfaction or good will, meet legal or environmental requirements, reduce risk, improve infrastructure etc. Obviously any program geared towards increasing sales has the highest visibility within an organization and followed by programs to reduce cost. Compliance of legal requirements with fixed date and high penalty also gets a lot of traction. Infrastructure programs are notoriously the most ignored programs unless there is a key business reason for improvement.

In summary, I would like to repeat that program manager should understand
- Business case and the strategic drivers for the program
- The expectations, deliverables, scope of work, risks
- What needs to be delivered, the value to the end customer
- Key success factors
- Understand the drivers behind the aggressive timeframe or other seemingly unreasonable expectations

Armed with such information and background, one should be able to understand the priorities of various requirements. One should feel comfortable to challenge or provide a different viewpoint in a business discussion as necessary. One needs to earn her place at the discussion table to provide input to critical decisions. A program manager can come out successful when she can negotiate a deal to cut the scope in a crunch situation, or by eliminating an activity endangering the program schedule.

Understand the program environment - Before starting to manage a program, a good program manager must evaluate what she is getting into.
• **Some key questions to think about**
  - Is this a program from start or changing course?
  - Why now?
  - How long the business team is mulling over and if there were any false starts?
  - Am I being assigned to the program to replace an existing Program manager?

• **Understand the strengths you bring in** - You need to review your strengths that you may bring into the program i.e. product implementation best practices experiences, previous program management experience etc.

• **Understand the risk or benefit you bring in** - Let's face it. You yourself could be a source of moderate to significant risk or bring in tremendous strength to the program with your background and experience. For example, if you have never implemented a specific brand of enterprise-wide integrated suite but you have the experience of implementing similar software you have one type challenge. If you have not implemented the particular type of suite, you have another set of challenges to solve. If you have successfully executed similar programs, you may become an asset with your expertise and knowledge of best practices. But, you can't be over-confident either as two similar programs can be very different. The program may involve technology that you haven't dealt with before. Or, it could be an industry in which you may have no experience. All I would advise is to understand your fit with the program and whether you can compensate the gap with your skills, hard work, enthusiasm, and motivation.

• **Expectations** - Do you find the program expectations are unrealistic from the very beginning and nobody seems to get it? If you do, you are not alone. Typically, business activities take more than their fair share of time before properly defining a technical program. The general assumptions I still see that the technology can be implemented very quickly and the solution would be up and running in no time (If you belong to a product and services company, don't forget to thank your sales people for adding fuel to the fire).

**Triple Constraints** - At the initial phase of a program, the triple constraints (cost, schedule and scope) are usually out of balance due to lack of quality information and various assumptions. (business likes to hang on to the business benefits no matter what new information is available at a later time). However, it is hard to define the imbalance with some degree of precision without more information and proper analysis. In the event, one has managed similar programs for a similar sized company with similar objectives in the same industry, one is definitely in a better position. However, if the program has several unknown elements, one may not have a lot of insights. If client agrees to a time and material based billing situation, one is in a better situation to deal with uncertainty but is not completely out of the woods. However, if you are in a fixed price situation, you have more issues to think about and more risks to deal with. In any case, one needs to resolve the triple constraint misalignment at the earliest. If it remains unresolved for too long, chances are the problem would only get worse. Question is when someone should tell her customer if there appears to be some significant imbalance. If you tell too early, there is a chance that the customer would write you off as incapable of handling a so called challenging situation. Should you decide to accept the challenge like a brave hero and think about balancing the constraints with hard work, you may be headed for a failure. So, what is the answer? There is no silver bullet that would solve the problem. The answer will depend on the program specifics and the environment. As a result, the program manager must be very involved in understanding the client’s real needs in business terms. Because of the uniqueness of each program, I prefer to work actively with my customers and try to gently guide them towards the right balance. I can say from my experience that client's do appreciate working on the issue collaboratively to find a solution as they see you as one of the experts in the field. If you decide to follow an aggressive plan, make sure the stakeholders know about it. Don’t hesitate to communicate that you are following an aggressive plan with say 80% chance to hit the date.

Prepare the stakeholders to sit down at the right time and discuss cutting scope or adding additional resources or other remedial actions when needed. However, these conversations usually demand good communication, interpersonal and negotiation skills among others. Finally, the triple constraints, once balanced, may not remain in balance for ever due to the dynamic nature of the program. The program manager is fully accountable to review the balance on a regular basis and discuss the options to rebalance the constraints with stakeholders if necessary and take the necessary steps to reestablish the balance within an acceptable threshold.

**Sensitivity analysis of program plan** - All programs require planning and also a corresponding schedule. This is where the creativity and the analytical abilities of the program manager and her team come together in resolving the imbalances in the triple constraints – scope, schedule, and cost. The constituent projects making up the program will have their own schedules. Each project will also have a risk profile. The program risk profile is more complex than the algebraic combination of the risk profiles of the constituent projects. A delay in one project activity can cause a ripple effect within the program. So, it is important to understand how the schedule will behave under different situations. Examples may include - what must be redefined if program budget is reduced by 10% or how to adjust the program plan if a critical activity of a project is being delayed. A program plan is much more dynamic that any single project plan. A good understanding of the program plan can equip the program manager with better information and decision making capability. I usually use a high level arrow chart (supported by detailed project plans) to understand and determine next steps in case of a sudden change in situation. If the program has multiple phases, the analysis needs to be done for each phase and also collectively for all phases.

**Team Structure and resources** - Defining a team for a program is an optimization problem that the program manager needs to solve. At the very beginning of the program, the program manager would probably be given a vision, a rough scope and some budget. Depending on the information, the program manager needs
to build the program structure which in turn help to define the team and determine when to bring what resources, their training requirements, and rate structure. I personally prefer to develop a very high level plan and resource profile just for myself and perform sensitivity analysis to understand various boundaries i.e. how long I can afford how many resources to get what scope delivered. I have found the exercise very beneficial.

- Get the required team structure – Once replacing another program manager, your choices may be limited. However, if you are building your the team from scratch, you need to design your team structure in a way that would align the team with the program. Some of the questions you may need to think about are the various ways you can break the program into projects, what would be relationships among the projects, how would the critical path for the program look like, whether the program should have different phases etc. Of course the decisions about project structure would be influenced by various factors like funding amount, availability of fund resources, schedule, scope and benefits delivery. Getting the team structure right is a critical element of your success.

- Choose the right resources – Once the structure is defined, you need to select the key members i.e. the project managers, team leads, SMEs wisely and carefully. More complex the program, more selective one should be about key resources. Mediocre resources will introduce additional risks. I prefer to obtain one of more SMEs who can help me and teams in coordinating the related activities across teams. Example of such a resource would be an enterprise architect who will make sure all stream specific technical designs and activities are aligned. Once the key resources are obtained, one can afford to relax the bar for other resources. Applicable training for the project resources should be arranged at the earliest opportunity. Be particularly careful about part-time resources (they are generally very busy when you need them the most) and their unavailability can introduce significant delay if their role is critical to certain decision making.

- Consideration for other resources – A program may require business and technical resources from various business units who may not work directly for the program manager. A business unit within an organization may have its unique HR policies, hiring budget and requirements. When resources join the program from different business units, the situation can get complex if the HR practices of the business units are different. If one of more of the participating business units can’t support adequate participation, the program may run into serious troubles based on the participation requirements. The issues need to be identified and raised for resolution at the earliest opportunity.

**Stakeholder Management** - I can’t stress the Stakeholder management strongly enough in a program environment. There are usually many stakeholders of a program – depending on the program it could include the entire organization along with their suppliers, investors etc. Some stakeholders are active and some are passive. Some are more influential than others and have the ability to skew the program benefits in their favor. In a program, stakeholders can come from multiple internal business units. The irony is that many times the powerful group’s activities or support for certain activities impact the overall program benefits. A good program manager must be able to sense the balance of power and take that into consideration for successful execution of the program. However, I am not suggesting that the program manager should blindly follow the powerful groups.

The stakeholders for a program need to be grouped based on their needs. Stakeholder strategy such as communication needs (frequency, medium and content), training needs and the timing, etc. need to be customized for each group for maximum effectiveness. A program manager should always use best practices of great communication techniques such as framing, positioning, timing etc. This becomes more important when communicating to senior management.

A program manager should also evaluate the need for information sessions. It is very important that the governance board holds its meeting on regular basis. Obviously, most of the attendees hold high positions and their calendars remain very busy. If the board decides to meet on a quarterly basis, it should be treated as a red flag based on the criticality of the program and if the business problems remain unresolved for 3 months, that can impact progress. The program manager should create calendar entries for recurring meetings well in advance to ensure stakeholders can attend the meetings.

Governance meetings are great opportunities for a program manager to build her reputation and create her mark. A program manager must be able to articulate the issues and problems to the governance board or to its members succinctly and clearly. One should avoid taking up unnecessary airtime, providing
incomplete information, or describing a problem or an issue without proposing a clear recommendations, or options to choose from. You want decisions to be made and not asking for problem resolution skills. A program manager needs to stay aligned with her business counterpart and present program updates and issues together to display how cohesively the teams work together. Senior Management would like to see that the team has done everything possible to resolve an issue by themselves. One should advocate win-win proposition in these meetings. Be prepared to take time to educate the management on critical technical issues in layman terms.

Understand what success means – It is important to establish measurable (if possible), clear and realistic success criteria from the very beginning. Many clients start with a large list of success criteria at the beginning of a program because of lack of realistic understanding. The program manager must work with the designated representative(s) to define more manageable acceptance criteria. It is important to understand the priority for each criterion. If a criterion not really required at the time of delivery of Phase I, the resources should be moved to other activities. A program manager needs to understand why each criterion is important and how it is related to the projects and the overall business value. The project managers may not have the broader view to identify the optimization opportunity. This is just one example of how business level understanding of the program can become very handy. Similarly, if the client misses anything critical, the program manager should raise the point for discussion. Bottom-line, the program manager should look at an issue from the customer standpoint and determine how the triple constraints can be kept in balance. One may not have a solution always; however, the customer confidence and satisfaction will only grow with your leadership, decision making and your ability to deliver.

Quality and Adoption - A program manager builds quality into the program from the beginning. For an enterprise wide multi-module software implementation, adoption is extremely important to realize the business benefits. So, care must be taken to ensure that not only quality of the deliverables is excellent, but also, the module functionality is adequate to entice users to use the system. For example, if an eSourcing package does not support simple RFx creation functionality for occasional buyers, they will continue to use traditional methods to do their job denying the intended benefits to the organization. For a global organization the leakages of benefits can add up very quickly. An organization may not be able to mandate the solution use in all cases. So, it is important for the program manager and senior management to understand the potential issues and take corrective actions (i.e. influencing package enhancement, find an alternative, etc.) as necessary. Another example is enterprise-wide reporting. While each module can support wonderful functionalities, the ability to create desired reports across modules might be missing severely limiting user capabilities. Similarly, if the solution has frequent timeouts or hanging threads, the users will stop using the software. So, anything that can impact quality and adoption must be carefully thought through while designing and implementing the solution for the end customers.

Conserve energy to focus on the right activities – A program manager needs to manage her time in an optimized way to focus on more important work by delegating tasks effectively and avoiding all non value-add activities such as unnecessary meetings, emails, phone calls etc. It is really an art to decide when to act, delegate or intervene. A program manager needs time to do strategic thinking and planning while empowering project teams to execute their activities. Some preach the idea of “being ready for the unexpected” and come up with a long list of activities to manage risk or other items. While the idea is good, it is not practical because time needed to work on the suggested activities leave no time for critical work. Depending on the program, the program manager needs to come up with a strategy on how she wants to spend her time managing the program and what she should delegate. A program manager should be able to synthesize her experience, analytical abilities, program risk profile and team input to determine likely risky events and prepare options for those situations. Her regular activities must include reviewing the progress, understanding the change in short- and long-term risks and evaluating any change to the course of action. That being said, one should be very much aware of the sunk cost and be ready to quickly steer the direction. Also, appropriate rules for the team must be made to avoid non value-adds.

One common example is receiving status reports in different formats on different days and time. It just makes the job harder unless the expectations are set well in advance.

I would like to conclude by emphasizing that a program manager needs to create her mark as early as possible. Once she is able to prove herself to the key stakeholders, a lot of pressure goes away and chance of success goes up significantly. So, homework is necessary as much as required to understand the program and its key drivers for success, and develop a win-win view. This may include doing research about the company and the business Unit, key personnel, their pain points etc. If the program manager has already proved herself to the same stakeholders before, she will have a great start. However, if she is new to the stakeholders, she needs to instill confidence about her in their minds. The memory of somebody else’s great work appear to be short lived and wise people say that one is remembered by one’s latest success or failure.
Managing Agility of Globally-Distributed Teams

Introduction
Managing software development teams that are distributed across geographical locations and time zones is part of the reality for many of today’s IT project managers. The complexities associated with such geographical and temporal separation of development resources and other key stakeholders make the task of project managers challenging, as they try to manage the project’s scope, time, and resources and to deliver the product or service that meets the clients’ expectations in the globally-distributed environment.

Much has been written on IT project management in general, though, in my view, there is a need for additional practitioner reflection on distributed project experiences as well as for academic analysis and theory development in this area. Some of the salient issues related to distributed teamwork that have been identified in the literature include: managing transparency across locations, managing implications of cultural differences including assumptions underlying work and ideologies informing how systems should be utilized in the economy/society, supporting trust development, supporting emergent leadership in different phases of projects, enabling effective knowledge transfer, organizing the project in ways so that time differences can be harnessed as an advantage rather than allowed to become a liability, and so on (e.g., Sarker and Sahay 2004, Sarker et al. 2011).

My goal in this article is not to offer comprehensive coverage of time-space related complications that distributed IT projects face, and potential solutions to such problems, but to briefly discuss the notion of agility that often has important impacts on projects and project teams but may not be on the list of top priorities of managers involved in managing distributed teams or projects. By consciously enhancing agility, globally distributed teams can remain effective even in the face of unanticipated and significant changes.

Agility
Agility has many formal definitions in operations management and information systems text books, but we see agility, in the context of a distributed project team, as the set of characteristics that allows the team to undertake work with speed, and to adapt to changes in the project (and its environment) rapidly and gracefully.

Imagine that one of the geographical dispersed offices of an IT consulting organization with significant IT development resources being utilized in a project is affected by a natural disaster, say an earthquake. How smoothly can the project team be reconfigured so that the project continues without noticeable interruptions? Or, due to unanticipated change in circumstances beyond the control of immediate stakeholders of the project, the requirements are redefined mid-way into the project. How effectively does the team make a transition from being focused to achieve its earlier, now irrelevant, objectives to delivering a system that satisfies the new requirements? Or, due to a new strategic alliance, a number of development and testing personnel from a country that most existing team-members have never worked with need to be included in the project team. How smoothly does the project team integrate the new members such that they can rapidly become valuable and committed members of the team? Dealing with each of these scenarios requires a different form of agility that managers need to actively develop.

Our work with distributed teams in leading global companies revealed at least three types of agility: resource agility, process agility, and linkage agility (Sarker et al. 2009). In the following subsections, we summarize some ideas from this work.

Resource Agility
This is the ability to sense and respond to changes due to access to specific resources, in particular, human and technological.

Having multi-skilled project team-members, and having access to a large flexible pool of qualified human resources at different locations across the globe to be able to ramp up and down depending on the immediate needs of the project can greatly enhance a project team’s agility. Likewise, standardized and uniform IT infrastructure at the different locations, which includes the IT development platforms and also communication platforms, can enable locational independence to some degree. An individual’s geographical location becomes relatively unimportant and he/she can relocate in any office and have access to the same tools and IT environment to be productive for the project. Having the ability to bypass public telecommunications and other infrastructure in countries or geographical areas where the government is unable to provide world-class environment may be another way to enhance this form of agility.

Process Agility
This refers to the ability to adapt to changes because of the nature of team’s processes related to systems development and implementation. Such agility arises from processes related to the development methodology and practices, the awareness of the environment, and the ability to manage time differences effectively.

One seemingly obvious way to enhance agility is to use so called agile methodologies/approaches such as SCRUM, and this is often fuelled by dissatisfaction with what one of our informants referred to as “BDUF,” an acronym for Big Design Up Front, and the belief represented by the acronym, “YAGNI” - You ain’t going to need it! Many teams also seek to merge elements of the traditional waterfall model with those of agile approaches, though with varying levels of effectiveness. It is worth mentioning that for the organizations we studied, many project managers reported difficulty in effectively implementing agile methodologies for distributed environments. (Reports included
distributed team-members completely rejecting the use of agile practices, referring to SCRM as “SCUM,” and managers being unable to justify the use of these approaches based on performance). Some of these experiences may be attributed to the absence of adapted versions for distributed team context, the lack of training of team-members and even project managers in agile approaches, unavailability of historical performance data, and finally, unreasonable pressures on work-life balance of the team-members arising from and burn down charts and daily meetings over synchronous media. The involvement of a high profile agile (say, SCRUM) evangelist and trainer in the different locations, and sensitivity to time and space considerations of each location can mitigate some of these challenges.

Yet another source of process agility is the team management’s ability to systematically scan the environment within which the project is embedded. For example, in case of a team using human resources from external vendors in different parts of the globe, it may be of value to maintain awareness regarding the ability of vendors to provide adequately qualified staff, especially when faced with tight human resource market conditions in a given country or location. Similarly, changes in ownership and/or strategic directions of the client organization need to be sensed as early as possible so that the project managers can be prepared to deal with the impacts on the project.

Finally, processes that help bridge time differences across locations relevant to the project can have a significant effect on a team’s agility. Given how challenging it is to achieve a convergence of understanding and hence seamless collaboration using asynchronous communication media, much of the coordination in global IT project teams tends to be achieved using synchronous meetings. Unless there is significant overlap in work-times of the different locations, synchronous communication does come with its price, potentially enhancing work-life conflict, because meeting times are often not compatible with project team-members’ physiological and social clocks that are associated with their geographical locations. To enable sustained commitment of the team-members to the project, effective practices may include scheduling frequent but short well-planned coordination meetings, setting up meetings equitably for each location in terms of the inconvenience or disruption to their lives, and, when absolutely necessary, to temporarily stagger work hours for different locations, for example, by using “swap teams.” Organizing teams and allocating project tasks to locations (i.e. time zones) such that work can go on, in the so-called “follow the sun” mode, with logical handovers possible between locations over the 24 hours, is another important source of process agility.

**Linkage Agility**

This form of agility is related to the nature of connections that project team-members from different locations may have with team-members from other locations as well as with client representatives. In particular, the ability to form rich, multi-faceted communicative relationships, and the ability to reach across cultures such that seamless collaboration can occur in the team can be relevant to linkage agility.

In a distributed context, communication is the basis of an effective working relationship. One of the key issues in ensuring this form of agility is the visibility and transparency of local processes to the entire team, or at the least, to the (global) team management. In a local context, team-members are often informally aware of what their colleagues are working on in the next cubicle or in the next office, but in a globally distributed setting such awareness must be actively encouraged. Keeping remote team-members and project managers updated about daily activities, rather than merely (and sometimes resentfully) sharing information about a location on a “need-to-know basis” can be helpful in rapid work reassignments and team reconfiguration, apart from building trust in relationships. Role of liaisons and relationship managers from each location and/or stakeholder group who participate in the project can critical to the formation and maintenance of linkages that can be harnessed to conduct work efficiently and to rapidly adapt to changing circumstances.

Due to globalization and professionalization of the workforce, one may assume that cross-cultural issues have a minimal impact on projects or that team-members are naturally equipped with necessary inter-cultural competencies to deal with cultural implications. Unfortunately, experience shows that without conscious efforts by team management and the team-members themselves, cultural differences can act as a rather significant inhibitor to the speed with which a project is executed and also to effectively communicating and coordinating changes in direction of a project. When a majority of project team-members are drawn from the same global organization but from different parts of the globe, encouraging the development of a strong common culture that is guided by the global organization’s culture can help in minimizing cultural clashes that may occur. In other cases, members of globally distributed project teams need to undergo mandatory cultural sensitivity training, such that they develop the ability to see reality from the perspectives of the other stakeholder groups, especially those in other locations. They need to be aware of the different systems development and economic traditions in different countries, different language competencies, terminologies, expressions and tones, communication norms and expectations, assumptions regarding ownership of information as well as security, tolerance for silence or delays in response, the flexibility in working styles, style of control and leadership that some members may be comfortable with, and so on. An ethnocentric approach to working in such environments can lead to much dissatisfaction and, in some cases, breakdowns in collaboration; thus, paying lip service to cross-cultural issues by project managers can lead to very dysfunctional teams that lack agility.

**Concluding Thoughts**

The discipline of project management provides guidelines for managing many aspects of projects – scope, cost, time, quality, team processes, etc. The current environment of many IT projects spanning multiple locations and countries, along with the fast pace of business study’s, requires that managers consciously enhance the agility of globally
distributed teams. In this paper, we highlight three types of agility (resource, process, and linkage agility) and some simple ways to enhance them. Further, our preliminary research indicates that project on-time completion is supported most significantly by resource agility, particularly human resources. Collaboration in teams is not surprisingly supported by linkage agility, particularly the communicative component (Sarker et al. 2009).

We are hopeful that the ideas in this paper will prompt project managers to think actively about agility of their teams, and encourage them to devise tactics that can help their project teams more flexible, adaptable, and dynamic.

**References**


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**Fig. 1: The many facets of agility of distributed teams**

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**About the Author**

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Software Project management is the art of managing project planning, monitoring, and control. To manage the growing demands and to achieve specific goals, well established project management methods are needed. Hence, it is really essential to adopt the best practices in every stage of the management activities: estimation, planning, development, testing, monitoring, and resource control.

Testing phase plays a vital role in software life cycle because it qualifies the functionality using various techniques. Furthermore, it formulates the release note. Testing activities are handled by a separate team called System Quality Assurance team (SQA). SQA team has its own management plan to guide the test execution. Functionality, scalability, performance, and Migration testing are the various testing being exercised by the testing team with some specific testing strategy.

The team generally works in phase wise manner such as Pre-Alpha, Alpha, Release Candidate (RC) and General Availability (GA). Before diving into the detail, a bit of basic definition - In Alpha phase, developers test using white box techniques and testing team test the software using black box techniques. Alpha phase ends when there is no more to be added to the software. Beta version is focused on usability testing to reduce the user impacts. Also, testing focuses on scalability, speed and performance. A RC build is a beta version with potential to be a final product, unless there are any show stopper defects. The GA is the stage; the software product is available for commercialization.

This article throws lights on challenges in data migration testing and a successful testing strategy.

Introduction - Data Migration
Each software release has its own objective, scope and schedule. Higher releases seem to improve performance, support new products and add features. Data migration is a gate way for the user to experience the new release. Obviously, user expects it should be simply the fastest and more efficient way; certainly no data loss.

Data migration process actually maps the data from the source release Data Base (DB) to Destination Release Data Base without data loss.

Due to Various business demands, data migration plays a major role. Key Business demands for Data Migration: Moving an application developed in legacy environment to distributed system, Change in data base management system, enhancements in the Enterprise application, merging multiple releases to new release due to company acquisition, supporting any new product, evolving new features.

Hence, qualifying the data migration functionality is an important and a challenging task of the SQA team. Different methodology has to be tailored according to the business need, technology, and criticality of data, budget, and schedule.

This article illustrates a case study of a robust data migration testing strategy and its upfront analysis of a device management system. It is limited to the scope of its own application.

Case Study
Device Management Application - Overview
• A Device Management Application provides complete end-to-end networking solutions for the network devices in Local Area Network / Wide Area Network / Storage Area Network. Its well designed Graphical User interface facilitates users to configure, manage and monitor the devices in real-time environment.
• The configurations and settings of all features are linked with its own data base tables. The tables track the user data settings, configurations and the history of changes.
• A release of a Device Management Application is intended to support
new features, devices, new firmware, licenses, and performance based enhancements.

Data Migration
The Migration wizard is activated during the installation process. It guides the user to copy data and settings to the destination as per the user requirement and license. Application facilitates two types of migration:

- **Lower release to Higher release**
  - **Purpose:** After the new release, Data migration helps the user to upgrade entire data from one lower release X to higher release Y using a preferred licence.
  - Multiple releases X1, X2 of similar type can also be migrated to higher release Y. Release Y will have combined data configurations of releases X1 and X2.
  - A release has different editions (specific to market) and flavors (specific to customer). It returns various possible migration paths.

- **Build to Build (Available only to customer not to the end user)**
  - **Purpose:** During the Beta phase, a fair build A is identified with certain metrics and delivered to the customer to perform user acceptance testing.
  - Any critical defects/enhancements requested by customer on build A, will be analyzed and considered for implementation. Again a fair build B which holds the defect fixes/changes will be delivered to customer. Meanwhile, if customer has configured any data in build A, this build to build migration helps to upgrade data from build A to build B.

Qualification process focuses on two aspects:

- Verifying source DB mapped with destination DB without data loss.
- Verifying performance and functionality post migration, intended to make sure there is no degrade in the performance compare to the source version and verify the integrity of the content is maintained.

Qualifying Data Migration - Challenges:

- **High number of migration paths:** Every release is made available to the market with different end users' flavors and various editions. With the eager to get the feel of new release, all customers will use trial license and do migration. Hence, the number of migration paths to be qualified is high.
- **Test Bed:** Setting up different DB for Customer based scenarios need tremendous effort. Configuring every feature with all possible test conditions is time consuming task.
- **Accuracy:** After Source DB is upgraded to the destination, data configurations are verified via black box testing on a feature by feature basis. Manual verification is error prone and time consuming task.
- **Automation tools Limitation:** Purpose of existing automation tools are to verify the basic functionalities of legacy features. Hence it cannot completely qualify the data migration.

Management Challenges
Generally, two main releases are planned for a year. SQA team is well trained and organized to test on two releases as per the predefined schedule. Any new testing requests will affect the time and effort schedule. Team has to dynamically reorganize and stretch to complete the task with no impact on main release.

- **Urgent Patch release request:** If a key customer raises an enhancement request, new requirement for a patch release like X.1 will pop up. This urgent request has to be qualified within two or three weeks of time. This should not impact the major release work load.
- **Quick turnaround:** Customer build qualification in beta phase has to be completed in a week time.

The Good Practice

- **Technical Enhancement:**
  Automated approach is followed for data verification to promise the accuracy. Data base of the source and destination may be different in some migration. Schema changes will increase the complexity of data verification. Meta data is providing all the details and it is available with the release packages. Automation script should be carefully designed to handle these. Script does the following activities:
  - Convert tables from DB of both the source and destination into Text files.
  - Compare the source and destination text files using the Tool Command Language (TCL) - Scripts and produce the error report.
  - Comparison is simple where the source and destination record format is quite similar.
  - Schema changes in the destination are handled by creating mapping specifications. The rules for mapping data field name and field category are defined in mapping specification. A script is developed to verify that fields’ values are migrated as per the specification.

- **Process Enhancement:**
  Performance of the application after migration is also equally important as perfect data mapping. Following few changes are exercised in the process with the intention to catch up field errors and performance issues.
  - **Test Bed:** On request basis, Customer shared some of the key end users’ configurations. These data configurations (for the older releases) are tracked in a library to create test bed for application performance testing.
  - **Post Migration Testing:** Posting the migrated server in a common environment to dry run on User
acceptance testing. This method provides an opportunity to verify the legacy data functionality in the destination system prior to production release.

- **Ensuring Automation tool Accuracy:** Revision of mapping specification is necessary to make the automation tool fit for the upcoming new releases. A formal review and sign-off from the development team is mandated. This process ensures the tool is approved by an authorized person.

**Key Benefits**

- **Improved coverage** - Automated approach and post migration testing helped to verify the 100% of the result and integrity of the content in destination release. All features can be tested with the customer DB quickly.

- **Effective time save** - Automation tool can be built in parallel with the application development. Hence, it is readily available for the first migration testing. It significantly minimizes the iterative test and debugging effort.

- **Testing Phase** - Enabled SQA team to gain effort and time. No schedule impact while handling patch release qualification in parallel with main release.

- **Customer Build Qualification** - Customer build testing during beta phase can be completed within a week time.

- **General Availability (GA)** - Sanity testing on GA build with wider combinations can be tested in short span of time.

**Conclusion**

Data Migration has gained a significant attention; due to it is a “First step” activity of a new software release that upgrades huge user configurations. So, tailoring the best testing strategy is equally significant task.

In this case study, automated testing approach promises wide coverage and accuracy; also helps to tackle critical attrition. In terms of time effectiveness it shows significant improvement; as it has reduced 75% of time in migration testing. Usage of customer configurations, sensed out the performance degrades and customer specific defects early in the test cycle. Development team has earned enough time to debug and fix it. Hence, the good practice yields the high quality application at the delivery.

Sometimes, challenges persist in implementing the best practices. Not all the customer configurations can be lived up in test environment due to limitations in availability of device, large device set up, cost and memory. Significant schema changes would result in complex mapping specification; and thus more time required to update and review the automation script. If there are investment constraints on automation, appropriate other means has to be chosen. Hence, a balance between automated approach and the manual nature of verification will work best according to the schedule and criticality of the release nature. Generally, management is willing to make a substantial investment in the automation approach to gain high benefits.

Further, it is worth to spent time to review and revise the best practice after every release. Based on the database management, volume of the data, the business trends and new technology, the testing strategy has to be fine tuned with the learning’s to achieve the goal.

**References**


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Responsible use of Google

People who rely on Internet for information and data frequently turn to “Google”, almost a synonym to Internet to many. For last 15 years Google has become the most widely used search engine. It has become part of our daily life. It has become a friend, servant and teacher to us. It helps us from planning a date to preparing an assignment.

Google was created by Larry Page and Sergey Brin. They were students of Standford University. As a research work, they created BackRub, an early form of Google. The name was changed to Google, derived from their favorite mathematical game, Googol (It is a fancy name to the hopelessly large number 1 followed by 100 zeros).

In the end of 1998 from small garage of Susan Wojcicki at 232, Santa Magrita, Google caught the eye of the world. PC Magazine said that “(Google) has an uncanny knack of returning extremely relevant results”. They were also recognized as Top 100 website for 1998.

On 15th July 2006, the word Google was added to the Oxford English Dictionary. It’s a mark that Google had become part of our daily life. At first, Google could only retrieve websites. It was only after a little flourishing, that they were able to implement various supporting aspects like Image Search, Video Search, News, Mail etc. These contributions helped Google to become a major part of world-wide-web.

As the Google average search per day increased from 9800 to 5, 134, 000, 000, the amount of energy required to run this search engine has also increased. This is unfortunately proportional to pollution. Every search cost around 0.2-7gm grams of carbon emission. To reduce this emission, Google has taken various steps. But only a common user can help Google to reduce the emission by avoiding unwanted searches. It is also possible by using appropriate keywords, use of regular expressions etc. This article glances at some features that can ensure responsible use of Google.

**Keywords**

In each search, choice of query keyword plays an important role. Each keyword given in the search is taken and searched in search index. Here, Google “Crawlers” looks for a match for single keyword.

It is better to avoid words like,”and, is, the, a etc.” These kinds of words cause unnecessary searches for keywords. For example, the search word “in India” can produce around 3 billion results. But the search, “India” only produces around 500 million.

There are other kinds of words that decrease the search results. Words like “what, when, where etc.” decreases the relevant searches. For example, “When was Internet invented” can give search results around 20 million. But the search “internet invented” can give results around 50 million.

**Regular Expressions**

As in some programming languages, in Google search query we can include regular expressions. Search query with regular expressions can fetch data more accurately. Regular Expressions are sequence of character is metacharacters with special meaning or literal meaning.

**Quotes**

A query written inside quotes is considered as a single keyword and searched out as a phrase. For example, if we type “do I really look like a guy with a plan”or “we are not beggars”, Google will take you directly to link which has exact phrase.

**Colon**

The simple Colon perhaps is the most useful regular expression in Google. It helps you to search in particular categories. For example “site:amazone.in “Matlab””. This expression will take you directly Mat lab in the site amazone.in.

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*Dialogue from famous movie Dark Knight (English) and Agadi (Malayalam)*.
**Double Period / Time Range**
This expression helps to get data in a particular time range. For example, “Khel Ratna 2008–2011”. In this result will be of this particular time range. This helps to access a records, journal, newspaper etc.

**Advanced Search**
Advanced Google Search is part of Google search that helps you to search Internet more effectively without using regular expressions.

**Google Advanced Search [Source:Google.com]**

> With little input of details that, the user can create powerful searches. Advanced Search consists of a special form. It has fields for Keywords, Exact Phrase, Logical Statements (OR statements), Excluding Statements (Hyphen or Minus Statements), Time Range specification, Region, Language, Site, Filetype etc. It covers all aspects of Regular Expression.

**I’m Feeling Lucky**
Less than 1% of Google users are said use this button. Most of them seem to assume it has same function as “Google Search” button. Unlike “Google Search” button, it does not take you to list of results. This button takes you directly to the first result. It saves unnecessary time spend on the results, where only a quick check is required.

**Google Calculator**
Google calculators are simple calculators build into the Google search to carry out simple search. We can perform very complex type of calculation also.

**Basic Arithmetic Operators**

<table>
<thead>
<tr>
<th>Signs or Symbols</th>
<th>Meaning</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ or plus</td>
<td>Addition</td>
<td>e</td>
</tr>
<tr>
<td>– or minus</td>
<td>Subtraction</td>
<td>pi/6</td>
</tr>
<tr>
<td>* or times</td>
<td>multiplication</td>
<td></td>
</tr>
<tr>
<td>/ or divided by</td>
<td>Division</td>
<td></td>
</tr>
<tr>
<td>% of or percent of</td>
<td>percentage of</td>
<td></td>
</tr>
<tr>
<td>Mod or %</td>
<td>modulo (the remainder after division)</td>
<td></td>
</tr>
<tr>
<td>^ or **</td>
<td>raise to a power</td>
<td></td>
</tr>
<tr>
<td>The nth root of</td>
<td>nth root</td>
<td></td>
</tr>
<tr>
<td>reciprocal of</td>
<td>multiplicative inverse</td>
<td></td>
</tr>
</tbody>
</table>

**Advanced Operators**

<table>
<thead>
<tr>
<th>Operators</th>
<th>Meaning</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>sin, cos, tan, sec, csc, cot</td>
<td>trig functions (arguments are assumed to be in radians)</td>
<td>cos(pi/3) cos sinh, cosh, tanh, csch, arccsc, etc.</td>
</tr>
<tr>
<td>arcsin, arccos, arctan, arccsc, etc.</td>
<td>inverse trigonometric functions</td>
<td>arccsc(.5)</td>
</tr>
<tr>
<td>sinh, cosh, tanh, csch, arsinh, arcsinh, arccsch, etc.</td>
<td>hyperbolic functions</td>
<td>cosh(6)</td>
</tr>
<tr>
<td>ln</td>
<td>logarithm base e</td>
<td>ln(16)</td>
</tr>
<tr>
<td>log</td>
<td>logarithm base 10</td>
<td>log(16)</td>
</tr>
<tr>
<td>lg</td>
<td>logarithm base 2</td>
<td>lg(16)</td>
</tr>
<tr>
<td>exp</td>
<td>exponential function</td>
<td>exp(16)</td>
</tr>
<tr>
<td>!</td>
<td>factorial</td>
<td>5!</td>
</tr>
<tr>
<td>choose</td>
<td>x choose y calculates the number of ways of choosing a set of y elements from a set of x distinct elements</td>
<td>5 choose 3</td>
</tr>
</tbody>
</table>

**Operators**

<table>
<thead>
<tr>
<th>Operators</th>
<th>Meaning</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>base of the natural system of logarithms</td>
<td>e</td>
</tr>
<tr>
<td>Pi</td>
<td>the ratio of the circumference to the diameter of a circle</td>
<td>pi/6</td>
</tr>
<tr>
<td>I</td>
<td>imaginary number, which represents one of the two square roots of -1</td>
<td>i^2</td>
</tr>
<tr>
<td>gamma</td>
<td>Euler’s constant e^gamma</td>
<td>e^gamma</td>
</tr>
</tbody>
</table>

**Unit Conversion**
It is very useful concept. This allows as to convert very hard mathematical conversion very easy. A small and easy Syntax is used here, “old units in new units”. Some examples are:

<table>
<thead>
<tr>
<th>Units</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currency (money)</td>
<td>23 USD in Euros</td>
</tr>
<tr>
<td>Mass</td>
<td>130 lbs in kg</td>
</tr>
<tr>
<td>Length</td>
<td>3 miles in km</td>
</tr>
<tr>
<td>Volume</td>
<td>three quarters of a cup in teaspoons</td>
</tr>
<tr>
<td>Area</td>
<td>2 acres in sq km</td>
</tr>
<tr>
<td>Temperature</td>
<td>98.6 Fahrenheitt in Celsius or 98.6 f in c</td>
</tr>
<tr>
<td>Time</td>
<td>1 year in seconds</td>
</tr>
<tr>
<td>Electricity</td>
<td>100 volts in picowatts</td>
</tr>
<tr>
<td>Energy</td>
<td>160 lbs * 4000 ft in Calories</td>
</tr>
<tr>
<td>Power</td>
<td>1hp in watts, 500V*3 A KW</td>
</tr>
<tr>
<td>Angle</td>
<td>90 degrees in radians</td>
</tr>
<tr>
<td>Information</td>
<td>2 bytes in bits</td>
</tr>
<tr>
<td>Quantity</td>
<td>1 great gross in dozens</td>
</tr>
<tr>
<td>Numbering Systems</td>
<td>1500 in hexa 64 in binary</td>
</tr>
<tr>
<td></td>
<td>LVII in decimal</td>
</tr>
</tbody>
</table>

**Conclusion**
The pollution caused world wide is heavily affecting not only mankind, but also every organism that we share our home, earth. Every search, cause around 0.2-7 grams of pollutions. Using Regular Expression we can reduce number of unwanted search, which will proportionally result in reduction in pollutions.

Google has been making our life easier for past 15 years, only question is whether we can help them to make tomorrow little Greener?

**About the Author**
Akhil Janardhanan currently perusing master program in Applied Science at University of Kerala. His areas of interest are Web and Database programming and he is interested in Green Academics.
M2M - Concept and Architectural Overview

Why M2M
Communication between machines is opening up an impressive area of innovation in the marketplace. M2M applications and connectivity is therefore becoming a major focus of the market players like communication service providers (CSP), industry vertical application developers to compete. Modern M2M communication has expanded beyond a one-to-one connection and changed into a system of networks that transmits data to personal appliances. The expansion of wireless and wire line networks across the world has made it far easier for M2M communication to take place and has lessened the amount of power and time necessary for information to be communicated between machines. However, M2M eco-system is highly unlikely to become any more homogeneous or simple over time; moreover, with M2M platform services still being in their early stages, it is anticipated significant business and technical evolutions are ahead of us in the industry.

This paper depicts a generalized concept of M2M and provides a high level overview of M2M domain, solution architecture, and its emerging trends. The objective of this paper is to provide a high level understanding of M2M concept and solution to the architects and consultants who would be working in developing IT solution in this area.

What is M2M
Machine to machine (M2M) refers to technologies that allow both wireless and wired systems to communicate with other devices of the same ability. M2M uses a device (such as a sensor or meter) to capture an event, which is relayed through a network (wireless, wired or hybrid) to an application, that translates the captured event into meaningful information. The modern M2M communication has expanded beyond a one-to-one connection and changed into a system of networks that transmits data to personal appliances. These networks also allow an array of new business opportunities and connections between consumers and producers in terms of the products being sold.

In a M2M system:
• Devices connected on the same network exchange information with each other
• Device data can be collected and devices can be controlled directly without human intervention
• Data collected from the devices can be utilized in a wide variety of services

M2M Domains
System Monitoring / Telemetry
Asset Tracking
Digital Signage & Advertising
Telematics

M2M Opportunities
Transportation/fleet management
Retail and finance/kiosk applications
Manufacturing/asset management
Utilities/energy demand management
Healthcare/health monitoring
Security/video surveillance
Consumer services/appliance control

M2M Landscape
M2M Domains and M2M Opportunities:
• System Monitoring / Telemetry: This includes smart meters and other devices equipped with sensors that measure and report usage, functionality, and environmental data.
• Asset Tracking: One of the largest verticals at present (and one of the earliest M2M adopters), asset tracking enables monitoring and tracing of rental cars, truck fleets, and valuable equipment, such as expensive machines on lease. It’s also been implemented by insurance companies whose devices monitor driving habits in order to create accurate personalized pricing models.

Pradip Roychowdhury* and Manoj Ramachandran**
*IBM Certified Sr. IT Architect, Open Group Master Certified IT Architect
**IBM Certified Sr. IT Architect, Open Group Master Certified IT Architect
• Digital Signage and Advertising: Dynamic pricing, dynamic advertising, and digital kiosks are a rapidly growing business, and companies have moved quickly to partner with terrestrial advertising companies to provide M2M connectivity.

• Telematics: There is some overlap with asset tracking, but telematics represents a distinct group of solutions. An example in this area is the in-vehicle monitoring and entertainment systems put in place by various car makers.

The evolutions of “Internet of Things” (IoT) are in need of more complex communication and data/event management systems as shown in the diagram below:

The IoT service delivery platform as shown above needs to have a simplified and cloud enabled connectivity across its participating components.

M2M Architecture Overview

The M2M Architecture involves various components that participate in collecting, analyzing and processing the information. The major components in the M2M Architecture are:

• Devices: These are monitoring components that are installed at various sites (e.g. Sensors) which transmit / receive data based on events that occur due to changes in parameters of a component that is connected to a M2M network (e.g. sensor installed on a pipeline)

• Gateway: These are various IT applications that receive, understand, analyze, process and present the data received from the sensors. These could be gateway appliances that collect the data, Applications that analyze and process data and User Interfaces (including web) that displays relevant information about the data.

These applications are typically made available on the cloud using various cloud computing technologies supported by cloud computing hardware.

• Back End: These are mostly key IT applications that make use of the analyzed data and perform the decision making. (e.g. ERP, CRM, Billing etc)
There are many M2M application development players who develop different industry vertical applications targeted for users and use cases specific to that industry. Some of the examples are given below -

- **Home Entertainment** - Millions of homes subscribing & publishing to head office, Head Office sends targeted advertisements and performs analytics to make home entertainment personalized.

- **Government Services** - M2M connected city enables the citizens to be more alert and plan in advance for disasters, accidents, traffic delays etc thus making safer cities.

- **Supply Chain** - M2M connected supply chain helps to track shipments, plan better for supply and demand and make informed decisions to make the supply chain process more efficient.

- **Manufacturing (Industrial)** - Real-time monitoring of the industrial process using sensors, devices that makes the operations to detect, predict and act on defects and ensure smooth operations.

- **Automotive** - M2M connected automobiles can emit key data about its engine and parts to enable the manufacturer to detect, predict and advise of any problems and also help deliver infotainment to the automobile.

- **Healthcare** - Doctors monitor M2M connected patients with pacemakers and respond to abnormalities well in advance and also reduce office visits.

**Emerging Technology**

As the concept of “Internet of Things”, “M2M” will solidify in future, there will be requirement of optimized high volume and high performance message handling component within the messaging network, which will be able to scale to handle connectivity between millions of devices, sensors, machines and applications communicating with each other. Large technology pioneering organization like IBM has been massively investing on the research and development of such components. For example, IBM recently announced a new hardware appliance IBM MessageSight, a secure, easy to deploy appliance-based messaging server that is optimized to address the massive scale requirements of machine to machine use cases. This appliance supports the MQTT protocol and can process millions of messages per second with over 1 million concurrently connected devices, predictable low latency and an asynchronous messaging pattern that supports:

- Publish and Subscribe (topic-based)
- Point-to-point (queue-based)
- Persistent and non-Persistent qualities of service
- MQ Telemetry Transport (MQTT) v3.1 specifications
- MQTT over HTML5 WebSockets
- Java Messaging Service (JMS) 1.1

This type of communications between devices along with rapid adoption of mobile applications and platform is bringing in a new concept of systems and application which supports different pattern of interaction or collaboration between application users, developers, device and application itself. These systems and applications are known as “System of Engagement”. And the new pattern of interactions or collaborations is known as “System of Interaction”.

**References**

Practitioner Workbench

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**Principal Sinhgad Institute of Technology and Science, Narhe, Pune

Programming.Tips () »

Handling Images in Color Spaces with Java Eclipse IDE

The aim of this article is to present implementation of image processing in RGB and YCbCr color spaces with Java Eclipse IDE. Eclipse is an open source Integrated Development Environment (IDE) with extensible plugin system. It is not only for Java development environment but also has multi-language software development environment like C++, COBOL etc.

Processing RGB Color Space
This color space is widely used for representation, transmission and storage of color images on both analog devices such as television sets and digital devices such as computers, scanners and digital cameras. Hence, many image processing and graphics programs use RGB color space. RGB color space encodes color as combination of three primary colors: Red (R), Green (G) and Blue (B). Java color pixel value is composed of four bytes: alpha value, red, green and blue components of image. We need to separate red, green and blue components to perform any image operation on color image. The R, G and B values can vary from 0 to 255 and allows construction of 24 bit color images.

Fig. 1: Program listing: Handling image in RGB color space

```java
import java.awt.image.BufferedImage;
import javax.imageio.ImageIO;
import java.io.File;
public class RGB{
    static BufferedImage image;
    static BufferedImage r, g, b;
    static final int TYPE = BufferedImage.TYPE_INT_ARGB;
    public static void main(String[] args) throws Exception{
        // Read input image
        image = ImageIO.read(new File("c:\rose.png"));
        int w = image.getWidth();
        int h = image.getHeight();
        r = new BufferedImage(w, h, TYPE);
        g = new BufferedImage(w, h, TYPE);
        b = new BufferedImage(w, h, TYPE);
        // Create R, G, B planes
        for (int i=0;i<h;i++)
            for (int j=0;j<w;j++)
                int pixel = image.getRGB(i, j);
                int alpha = pixel & 0xff000000;
                int r1 = (pixel >> 16) & 0xff;
                int g1 = (pixel >> 8) & 0xff;
                int b1 = (pixel) & 0xff;
                r.setRGB(i, j, alpha | (r1 << 16));
                g.setRGB(i, j, alpha | (g1 << 8));
                b.setRGB(i, j, alpha | b1);
        // write three color planes
        String f="png";
        ImageIO.write(r,f, new File("c:\r1.png"));
        ImageIO.write(g,f, new File("c:\g1.png"));
        ImageIO.write(b,f, new File("c:\b1.png"));
    }
}
```

Fig. 2: Input image with red, green and blue planes

Processing YCbCr Color Space
As RGB color space is more complex in describing patterns, RGB color space is converted in other color spaces for image processing and applications. YCbCr color space is standardized variant of YUV that is used for both digital television and image compression. YCbCr has luminance (Y) and chrominance (Cb and Cr) color values. Program listing for YCbCr color space is shown in Fig. 3 and output of same is shown in Fig. 4.

Fig. 3: Program listing: Handling image in YCbCr color space

```java
import javax.imageio.ImageIO;import java.io.*;
import java.applet.Applet;import java.awt.Image;
import java.awt.image.MemoryImageSource;
import java.awt.image.PixelGrabber;
import java.awt.Graphics;
public class YCbCr extends Applet{
    private Image I1, I2;
    private int w, h; int [] A;
    float Y, Cb, Cr, r1, g1, b1;
    int i=0, r2, g2, b2;
    public void init(){
        try {
            I1 = ImageIO.read(new File("c:\butterfly.jpg"));
            PixelGrabber grabber = new PixelGrabber(I1, 0, 0, -1, -1, true);
            if (grabber.grabPixels()) {
                w = grabber.getWidth();
                h = grabber.getHeight();
                int p[]=new int[w*h];
                A = (int[]) grabber.getPixels();
                for (i=0;i<A.length;i++)
                    int c = A[i];
                    int r= (c&0xff0000)>>16;
                    int g= (c&0x00ff00)>>8;
                    int b= (c&0x0000ff);
                    //Conversion from integer to float
                    Y = (float)(0.299*r+0.587*g+0.114*b);
                    Cb=(float)(-0.169*r-0.331*g+0.500*b);
                    Cr =(float)(0.500*r-0.419*g-0.081*b);
                    r1 =(float)(Y + 1.140 * Cr);
                    g1 = (float)(Y - 0.344 * Cb - 0.714 * Cr);
                    b1 = (float)(Y + 1.773 * Cb);
                    //Conversion from float to integer
                    r2 = Math.round(r1);
                    g2 = Math.round(g1);
                    b2 = Math.round(b1);
                    p[i]=((255<<24)|((r2&0xff)<<16)|((g2&0xff)<<8)|(b2&0xff));
            }
        } catch (InterruptedException e) {}}
        public void paint(Graphics g){
            g.drawImage(I2,0,0,this);
        }
    }
}
```

Fig. 4: Input image, Y, Cb, Cr components and output image
Baisa L Gunjal is pursuing PhD in University of Pune and working in Amrutvahini College of Engineering Sangamner, Anagar, MS. She has 15 years teaching experience and she is working on research project funded by BCUD, University of Pune. She has more than 15 International journals and conference publications including IEEE computer society, CSIC. She is recipient of ‘Lady Engineer Award-2012’ from ‘Institution of Engineers’ and Student branch coordinator, ‘Computer Society of India’ at AVCOE Sangamner, Anagar, MS.

Dr. Suresh N Mali has completed his PhD and presently working as principal, Sinhgad Institute of Technology and Science, Narhe, Pune, India. He has written 3 technical books and having more than 25 national and international publications including ACM, CSIC. He is member of ‘Board of Studies’ for Computer Engineering in various universities like University of Pune, Shivaji University, Kolhapur, MS, India. He has also worked as member of ‘Local Inquiry Committee’ on behalf of UoP. He is member of IEEE, life member of ISTE and his research interests are information security, data hiding, signal processing, digital multimedia communications, and Steganography.
In the last issue we went through the common data structures in R. This issue is a continuation of it. Here we will discuss some specific data structures in R used for various applications.

**Factors**
Factor is a data structure similar to vector. Factors have a particular way called as levels to represent category of elements. Levels will help user to represent the data in a compact manner. Factors are mostly used for representing experimental observations that includes trials at different levels of selected variables. Factors are widely used in statistical modeling purposes.

A factor is created using the `factor()` function. Elements will be given as argument to the factor function. See the below examples, which creates numeric and character factor values.

```r
> P<-factor(c(1,3,2,1,1,3,4,2,3,2,1,4,3,4))
> P
[1] 1 3 2 1 1 3 4 2 3 2 1 4 3 4
Levels: 1 2 3 4
> Q<-factor(c("aaa","bbb","eee","aaa","bbb","aaa","eee","eee"))
> Q
[1] aaa bbb eee aaa bbb aaa eee eee
Levels: aaa bbb eee
```

Even though we can create factors with numeric and character data, the levels of the factor will always be character values. Levels will be displayed automatically when we print the data elements or can be displayed using the `levels()` function with the symbol that stores the factor data as the argument, as below:

```r
>levels(P)
[1] "1" "2" "3" "4"
>levels(Q)
[1] "aaa" "bbb" "eee"
```

**Lists**
List is another data structure in R, which handles multiple data types with different length. For creating a list we can use `list()` function with the data elements or the vectors as the arguments. In the given example, the two factor data given above with different data types are stored in a single list:

```r
> listdata<-list(P=c(1,3,2,1,1,3,4,2,3,2,1,4,3,4),Q=c("aaa","bbb","eee","aaa","bbb","aaa","eee","eee"))

```

Data in list can also be accessed by using the list name and the index of the particular object/ vector. For example,

```r
>listdata$P
[1] 1 3 2 1 1 3 4 2 3 2 1 4 3 4

>listdata$Q
[1] "aaa" "bbb" "eee" "aaa" "bbb" "aaa" "eee" "eee"
```

**Data Frame**
Data frame is like a spreadsheet or table; it is most widely used for representing experimental data. A dataframe can be created using `data.frame()` function with arguments as the vector names that it represent.

Data in list can also be accessed by using the list name and the index of the particular object/ vector. For example,

```r
>listdata$P
[1] 1 3 2 1 1 3 4 2 3 2 1 4 3 4

>listdata$Q
[1] "aaa" "bbb" "eee" "aaa" "bbb" "aaa" "eee" "eee"
```

Objects in a data frame can be accessed in the same manner used for accessing list items.

```r
>table$Name
[1] ABC DEF GHI JKL MNO PQR
Levels: ABC DEF GHI JKL MNO PQR
```

Or

```r
>table[1]
Name
1 ABC
2 DEF
3 GHI
4 JKL
5 MNO
6 PQR
```

We will explore R more in the coming issues. Have a nice time ahead!
Security Corner

Information Security »

Understanding Web Interactions and their Security Boundaries

Abstract: This article is the second among the series of articles focusing on the security of web platform. In the first article, we have explained about “Same Origin Policy”, the core security policy of the web. In this article, we explain from first principles about various interactions triggered by web elements and how they align or deviate from Same Origin Policy. A clear understanding of these concepts will make it easier to understand complex web attacks, which we explain in our upcoming series of articles.

Introduction
When the World Wide Web originated, it had a set of static web pages and the only communication between any two webpages is achieved with the help of hyperlinks. After static web sites, the era of dynamic web applications that generate dynamic content started. Using web services, APIs, the trend was to aggregate content from multiple channels on server and present to user. With more demand for rich web applications, Web2.0 technologies like AJAX emerged where data generated/pulled dynamically from multiple sources (often untrusted) lead to the emergence of newer web attacks.

Even before learning about newer ways of communication between websites, a closer look at the interactions of basic web elements reveals interesting details related to security. In our previous article, we have explained that browsers follow an important security policy called Same Origin Policy (SOP) to isolate content from different websites. In this article, we explain how the network interactions triggered by basic web elements align or deviate from Same Origin Policy.

Content Inclusions and Cross Origin Requests

HTML consists of elements such as “table”, “div”, “span” etc., which give structure to a web page. Apart from these, it also consists of elements such as “img”, “script”, “iframe” etc., which trigger network (HTTP) calls. These elements can include content from remote origins and have significant importance in the security of the web platform.

Let us consider a page from A.tld having the below markup. (Note: “tld” refers to Top level domain e.g., “.com”, “.org”, etc)

```
<link type="text/css" rel="stylesheet" href="http://B.tld/theme/style.css">
<script type="text/javascript" src="http://C.tld/scripts/library.js">
<img alt="My logo" src="http://D.tld/images/logo.jpg">
<iframe src="http://E.tld">
```

Though the origin of the webpage is “http://A.tld”, it loads style sheets, scripts, and images from B.tld, C.tld and D.tld respectively. Also, it loads a remote page from E.tld via an iframe. These content inclusions make cross origin HTTP GET requests and are not subjected to same origin constraints. It would be too strict if these content inclusions are subjected to same origin restrictions. Imagine a website which cannot load images from other websites!

Similarly, form submissions are not subjected to same origin restrictions. A webpage from “http://A.tld” may have a form which can be submitted to a different origin, say “http://F.tld”.

```
<form method="POST" action = "http://F.tld/profile/update.php">
```

The above stated cross origin GET and POST requests are allowed by design and are exempted from Same Origin Policy. Due to these contradictory design principles, certain web attacks are possible, as described in next sections.

Script Inclusion and its Security Concerns

Note that in code snippet-1, though a script is loaded from the origin “http://C.tld”, after getting included into the webpage of the origin “http://A.tld”, the script will have “http://A.tld” as its origin. So as per SOP, the script can have access to DOM, storage and network calls of webpages belonging to “http://A.tld” alone.

Also, a script loaded from one origin can recursively load scripts from several other origins. This means, it is not sufficient if a developer trusts a script from one origin, since it can in turn load scripts from malicious origins.

Allowing scripts to load from any origin could be dangerous and is one of the key factors for a popular web attack called XSS (Cross Site Scripting). In a typical XSS attack, an attacker enters malicious JavaScript into input fields and submits data to the server. If the server does not
sanitize the input and respond with the same data to a genuine user, the injected script will execute in the browser of the user. Once this happens, the script can recursively load bad scripts, it can read/modify DOM, make dangerous calls to the same server (e.g., delete account), steal sensitive data etc. As an example, consider the case where scripts like JavaScript libraries, hit counters etc., are included directly from third party servers (technically called Content Delivery Networks). Though the scripts are considered to be genuine initially, if the third party servers are compromised, the same scripts could turn malicious. Hence one should be very careful while including scripts.

**Content Inclusion via Iframes and its Security Concerns**

Similar to other network capable HTML elements, iframes can make cross origin GET requests. Iframes are typically used to load a webpage inside another webpage and they have a peculiar behavior with respect to SOP compliance. An iframe can load a webpage which can belong to the same origin as that of its parent, or a different origin altogether. If the iframe loads content from same origin as that of its parent, then no SOP constraints will be applicable and the script from iframe can access the DOM of parent and vice versa. However, if the iframe loads content from an origin different from that of its parent, SOP constraints come into picture. In this case, script in the parent page cannot access the contents of the iframe due to SOP violation.

Unlike other elements, the security boundaries of iframes do not end with content access. If an iframe loads cross origin content, script in parent page cannot access its contents due to SOP, but it can navigate the iframe to a different location, thereby causing phising attack called frame phising. E.g., imagine JavaScript in an advertisement redirecting a genuine login frame to a fake login frame. This navigation is not subjected to SOP, but it is guided by a set of browser policies called Frame Navigation policies[4]. Also, iframes are notorious for several activities such as downloading malware, silently submitting forms etc. These security loopholes are addressed in HTML5 specification by introducing a security attribute called “sandbox” for iframes[5]. Sandbox sets extra restrictions on content hosted by iframes along the lines of controlling popups, form submissions, script execution and frame navigation.

**Malicious Cross Origin Interactions**

The capability of HTML elements to trigger cross origin requests, combined with certain browser-behaviors of silently exchanging the authentication data of an already logged in user is the root cause of a dangerous web attack called Cross Site Request Forgery (CSRF)[6].

E.g., Assume that a genuine user has logged into his/her bank website (which has CSRF flaw) in one tab of a browser and opens a malicious website in another tab. A script in the malicious website can trigger a forged request silently and transfer funds to the attacker’s bank account. An example of a forged request is shown in code snippet-3.

```html
<img src="http://bank.tld/funds.php?transfer=1000000&to=attacker">
```

**Code snippet-3: Cross origin request forgery (CSRF)**

In general, any HTML element, which can trigger a HTTP GET request, can be used to create a CSRF attack as shown in code snippet-3. In case the service accepts only POST requests, fake HTML forms can be created and the request can still be forged.

In addition to CSRF, once an attacker manages to inject a script through XSS vulnerability, he/she can create a fake form and submit sensitive data such as cookies, credentials etc., to attacker’s servers (since forms can be submitted to cross origins, as explained previously). This is known as data exfiltration and is commonly used to steal data on the web. Therefore, though there are restrictions set by Same Origin Policy (SOP) to isolate boundaries between different websites, owing to the innate design of the web platform, the boundaries can be bypassed, resulting in several attacks. Note that the bypasses discussed so far are only via HTML elements and not with any complex technologies or hacks.

**Conclusion**

In this article, we have discussed how Same Origin Policy, the core policy which securely isolates different websites, can be bypassed, by design, with the interactions of basic HTML elements. We have explained how cross origin content inclusion via scripts and iframes could be dangerous. We have also explained how they are responsible for attacks such as CSRF and data exfiltration. These attacks can be caused just with the design of HTML elements, without the need of any complex communication mechanisms or hacks. We shall provide more insights about other cross origin hacks, genuine cross origin communications, newer web attacks/defenses, and newer browser security policies in our upcoming series of articles.

**References**

[5] HTML5 Iframe Sandbox: http://www.w3.org/TR/HTML51/embedded-content-0.html#attr-iframe-sandbox

**About the Authors**

Krishna Chaitanya Telikicherla is a Research Associate with Security and Privacy Research Lab, Infosys Labs. His research focus is primarily on web security, specifically analyzing browser security policies, web attacks, defenses and formal verification of web specifications. He is a regular blogger and speaker at several developer and security meets in India. For his contributions to technical communities, Microsoft has presented him the prestigious “Most Valuable Professional (MVP)” award for 4 consecutive years (2010-2013). He can be contacted at KrishnaChaitanya_T@infosys.com

Harigopal K B Ponnapalli is a Principal Research Analyst at Infosys, India. His research interests include web application security assurance, strong authentication and PKI. Ponnapalli received his M.Tech from the Indian Institute of Technology, Kharagpur, India. He has 15+ years of experience in application security. He authored multiple papers and coauthored a book titled “Distributed Systems Security: Issues, Processes and Solutions” (Wiley, 2009). He also filed a few patents to his credit. You can contact him at harigopal_ponnapalli@infosys.com
CSI Trivandrum Chapter - the Birth and Growth
A stroll down the memory lane

The glad tidings, for all of us, is that the computer society of India is slated to celebrate its Golden Jubilee, shortly. Registered as a society, way back in 1965, with a few members in its fold, CSI, with Col. Balasubramanian occupying the Presidential chair and headquartered at Hyderabad, has now grown into a stupendous tree spreading its branches all over India.

Around that time, the Thumba Equatorial Rocket Launching Station (TERLS- now christened as VSSC) received a gift from the then Soviet Union, a Russian made ‘MINSK Computer’ - the computer got its prefix ‘MINSK’ because the computer factory was located in the Minsk city, the capital of Belarus, a state within the Soviet Union.

For a UN sponsored programme, for launching sounding rockets (rockets meant for scientific studies of upper atmosphere by gathering data during the upward flight and fall and not for launching satellites) from a place somewhere near the equator, THUMBA, then a sleepy town, with very little sea and air traffic, located about six kilometers away from Trivandrum, was selected. Besides the MINSK computer, gifted by the Soviet Union, to TERLS, the other Space Club nations, such as, United States - donated rockets, a launcher and a telemetry receiving station, France - a RADAR and USSR- a boat and a helicopter for surveillance.

Configuration of MINSK Computer
Since the readers would naturally be curious and interested to know what type of an animal the MINSK computer was, I am detailing below some of its attributes.

1. Hardware: 3rd Generation with transistors as logic elements, with fixed and floating point hardware and registers implemented in hardware for indexing and array processing
2. Memory: 4k words x 37 bits: wordlength- Mantissa, including sign, 29 bits Exponent, including sign, 8 bits
3. Instruction set: About 103 instructions
4. Computational speed: few microseconds/instruction
5. Input: Console, teleprinter type punched tape and two magnetic tape drives (for input/output and offline storage)
6. Output: a strip printer (could print only numerals and mathematical symbols) and two magnetic tape drives
7. Software: Machine language only. with a number of subroutines (in machine language) for solving scientific algorithms like, Newton-Rapson, Runge-kutta, etc, but with no multiprogramming feature and per se, no operating system.
8. End use: Mainly for solving scientific and technical problems and not for MIS
9. Computer footprint: The memory unit, control unit, arithmetic unit, input-output interface unit, printer interface unit and four numbers of magnetic tape units were housed, each in a Godrej Storewell sized rack. An ‘eight tonne’ air conditioning plant tended the system.

Within a few years, the TERLS augmented the system by the

1. addition of 4k memory,
2. a drum printer, capable of printing A3 size sheets with English alphanumeric characters,
3. two more tape drives raising the total number of drives to 4
4. and a high level language named AUTOCODE, almost similar to ALGOL, which was then widely used in Europe.

Indigenous development and know-how transfer.
The AUTOCODE compiler could accept commands in English and a programming manual was prepared for the benefit of computer users - may be the first such manual released in South India - and copies were circulated to users inside and outside VSSC. In-house coaching classes for AUTOCODE programming were also conducted

On the hardware side, the above system configurations were supplemented by the TERLS computer Engineers and Programmers, through the indigenous development of

1. A digital incremental plotter by adeptly adopting the stepper motors manufactured by Automatic Electric Devices, Mumbai and being extensively used by them in their digital rotary voltage stabilisers.
2. An IBM Punch Card Verifier converted as a punch card reader, as an input device to MINSK Computer. (Punched cards were in vogue as input-output medium then, mainly in IBM unit record machines.)

The plotter was a technical marvel at that time and received rave reviews in the media. The digital plotter, along with a TERLS developed analogue plotter- were the forerunners of hundreds of know-how transfers to industry by VSSC. The know-how of the plotters was transferred to KELTRON, in the presence of the then Industries Minister of Kerala, the late T.V. Thomas. Unfortunately their fate at KELTRON was that of the analytical machine conceived by Charles Babbage under the tutelage of Lady Lovelace. Babbage could only conceive it, but could never deliver it, because, history records that the then industry did not have the wherewithal to transfer his ideas into reality.

Similarly, KELTRON realized that hardly there were any computers in India at that time; besides, the omnipresent i/o interfaces, like the USB etc, were yet to be born and the hardware plotter-computer interface and drivers had to be tailor-made for each computer. So, KELTRON never ventured into its mass production and the plotters had a natural death at KELTRON.

Notwithstanding the above, the plotter at TERLS was extensively used for plotting rocket ground test parameters and sounding rocket flight trajectories and so on, in VSSC for years.

Formation of Trivandrum CSI Chapter
The main users and beneficiaries of TERLS launching centre were scientists from Physical research Laboratory, (PRL)
Ahmedabad: in addition, a few scientists from UN countries also conducted experiments from TERLS.

The PRL had a MIS team headed by Sri. S R Thakore. In the initial days, PRL borrowed time from the Ahmedabad Textile Industries Research Association’s (ATIRA) computer IBM1401. That was made possible by the close association of Dr. Vikram A. Sarabhai, (whose family owned a few textile mills in Ahmedabad) with ATIRA. The PRL, having tasted blood, went for an IBM 1620 capable of performing both scientific and administrative tasks.

During the formative days of TERLS, to some extent, it was being remotely controlled by PRL whose Director was also Dr. Vikram A Sarabhai. Dr. Sarabhai, who was an ardent exponent of computer usage in every facet of human activity, nominated Sri. S R Thakore, as an adviser to TERLS for the computer centre management.

Sri. Thakore, a mover and a doer, took active interest in TERLS computer affairs and as part of his efforts to enhance the capabilities of MINSK software identified Sri. R Narayanan, a programmer attached to MINSK computer, for developing a FORTRAN compiler for the MINSK. The existence of MINSK computer was little known outside Trivandrum: hence Sri Thakore, who was already an active member of CSI, took great initiative in enrolling MINSK computer and two of us as members of CSI.

Sri Thakore was not just content with a mere membership for TERLS in the CSI, and he wanted the name and fame of TERLS computer, as well as the launch centre, to reach all the members of CSI. With that in mind, he obtained the financial sanction from Dr. Vikram A Sarabhai for hosting a CSI convention, at Trivandrum.

CSI Annual Convention at Trivandrum
The convention was held in 1968 and the venue was Kanakakunnu Palace. The convention had all the masala, such as, an inaugural session, technical sessions, entertainment programme on the first day followed by dinner or supper, as Americans call it. A visit to TERLS and a conducted tour to Kanyakumari were also arranged.

Although, down south, there was not any other computer centre then, multinationals, especially pharma companies, had installed unit record machines in their offices. About 200 delegates registered for the convention and we had a very tough time in providing good accommodation for them. Delegates from some pharma companies sought accommodation in five star hotels and at that time there were only two hotels, viz., Hotel Mascot and Hotel Amritha, worth the name, in the city. In spite of such minor shortcomings the delegates returned with sweet memories of the convention, the visit to the launch centre and MINSK computer, Kerala scenery and landscape.

By 1970, Unit Record Machines were installed at the newly established centre named Space Science and Technology Centre (SSTC), the R&D hub of VSSC, at Veli hills, located a few kilometers away from TERLS and MIS tasks, such as, Salary, PF ledgers etc, were being churned out there.

**MINSK computer ‘free time’ for Kerala Government**
As wished by Dr. Sarabhai, computer time was offered free to Kerala Government for which I received a letter from a Secretary to Government asserting that the Kerala Government had no plans to use computers for any application. Despite that a few Govt officials did avail the services of MINSK Computer, the notable and frequent users were Sri. V A Shenoi of KSEB, the father in law of present IISU/ ISRO Director Sri. G Ravindranath and Dr. A Sukumaran Nair, from the Education department, the father of Dr. Achuthsanker Nair who is currently on the editorial board of the CSI journal.

During the 1972-73 period, VSSC acquired an IBM 360/44 computer, which was installed at SSTC (Veli) and most of the programs that were running on MINSK were rewritten in FORTRAN to be compatible with IBM. Few years later, the Trivandrum chapter was officially established and inaugurated by Dr. Kohli, the then President of CSI, installing Dr. D S Rane, who was then Head of SSTC (Veli) Computer, as the first Chairman of Trivandrum Chapter.

In the 70-80 period, there was a spurt in IT activities in Trivandrum and about thirty to fifty IT professionals became members of CSI Trivandrum chapter. But now, though there are about 50000 IT professional in and around Trivandrum, yet CSI membership has not witnessed a growth anywhere near it. This may be due to the fact that most of the IT clusters and hubs are located away from the centre of CSI city activities and commuting has become almost a nightmare.

CSI meetings, in the early days, were one of the avenues for intercommunication and exchange of information among the members: but now, the omnipresent and omnipotent Internet has usurped its role. Another factor is that, in the early days, members could find some leisure to participate in the CSI activities, whereas now, most of the IT professional have to put in more than twenty-four hours of work to meet the tight schedules. The desired growth in CSI membership, proportional to the growth of IT professionals in and around Trivandrum and Kerala could not be realised. This phenomenon is not unique or exclusive to CSI, Trivandrum. Other professional institutions are also sailing in the same boat. A stage has come to rename them as ‘senior citizens’ society’ and they are able to keep the shutters open, mainly from the income generated from conducting courses and examinations.

Hence, I am of the view that ‘the mountain has to go to the Mohamed’ and CSI will have to establish a branch or a sub centre somewhere around Technopark in Trivandrum to bring in many IT professional to its fold, thereby redeeming its past sheen and glory, so far as Trivandrum centre is concerned.

Summing up, I may say that the MINSK computer, no doubt, had demystified the computer for many in Kerala and the formation of CSI centre at Trivandrum opened a window to the then Kerala IT professionals to the fast developing Indian computer scenario.
Brain Teaser

Crossword »

Test your Knowledge on Software Project Management
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 2013

CLUES

ACROSS
1. An uncertain event or condition (4)
3. Term for measurement (6)
4. Type of testing (10)
6. The process of synthesizing a system (6)
8. Satisfaction of customer criteria, conformance to design specifications (7)
9. Software Engineering Method and Theory (5)
10. An agile methodology for software project management (5)
12. In project scheduling, a task that must be begun before another task to begin (11)
14. Process of evaluating whether the work products fulfill the requirements (12)
16. A hierarchical decomposition of the work activities in a software project (3)
19. A family of quality management standards (3, 5)
20. A mutually binding agreement (8)
21. A statement of general principles (6)
22. A histogram type chart (6)
25. A department that oversees and mentors group of projects (3)
26. An element of work in a software project (8)
28. Used to determine the probability distributions for achieving various milestones (4)
29. Anyone having interest in a project and its deliverables (11)

DOWN
1. A person, hardware, room or anything else required for a project (8)
2. Behavior that is counter to specified requirement (6)
5. Base for measurement of metric (8)
7. An approved estimate for the project (6)
11. Individuals who use specific software (4)
13. Set of date and time data attributes (9)
14. Examination of a deliverable for specific content (6)
15. An estimation technique (6)
17. A technique used to predict project duration (3)
18. A software development lifecycle (9)
19. Type of test with a representative subset of the test cases (5)
21. Project Management Professional (3)
23. Work performed to modify a baselined work product (6)
24. Individuals who use specific software (4)

Solution to July 2013 crossword

We are overwhelmed by the responses and solutions received from our enthusiastic readers

Congratulations to
V R Mote, Y S Pagar and D T Rathod (Dept of Information Technology, PES. College of Engineering, Aurangabad, Maharashtra),
The Faculty Members (MCA Department, Union Christian College, Aluva), Madhu S Nair (Dept of Computer Science, University of Kerala, Kariavattom, Thiruvananthapuram, Kerala)
for ALMOST ALL correct answers to July 2013 month’s crossword.
Ask an Expert

Your Question, Our Answer

“Wisdom is not a product of schooling but of the lifelong attempt to acquire it.”

~ Albert Einstein

From: Prof. Balu John, Department of Information Technology, Government Engineering College, Barton Hill, Thiruvananthapuram, Kerala

Dear Sir

This is regarding the question/answer published in the July 2013 issue.

The question from the student seemed to be based on his understanding of the basic (text-book) scheduling algorithms like SJF (Shortest Job First) wherein the (next) CPU burst time is given as the basic input parameter for the algorithm. So he was wondering how to calculate the CPU burst time (in advance) and how to get this information using some programming.

While your answer was quite lucid and informative, it did not answer the above queries. The student should be informed that such algorithms expect the CPU burst times to be estimated and provided to them initially by the process itself (meaning the user, operator or a profiler utility) or by means of some prediction method. Remember the JCL cards in old IBM mainframes? And, in any case, algorithms like SJF exist only in text-books and are meant to serve the purpose of illustrating basic principles of scheduling.

Thanks & regards
Prof. Balu John

Q I am Prem S. Upare and I am pursuing BCA final year in Bharti vidyapeeth in Solapur. Yesterday, I was reading your article in Security Corner section of CSI communications. It was wonderful article.

Actually, I want to do career in Ethical hacking and Cyber security after completing BCA. Can you guide for the cyber security and ethical hacking courses and future scope or any, suggest good institute for that Please guide for that and thank you to read my e-mail for your busy schedule.

Regards / Prem S. Upare

A Ethical hacking has emerged as an interesting subject these days among many enthusiasts. In fact, there are number of courses and certification too in ethical hacking. Little Googling will help you to find one. You may appreciate the fact that we should not recommend of a particular course or certification, as that is out of scope of our practice. Just for example, if you visit official website of famous Ankit Fadia, http://www.ankitfadia.in/ to get some guidance upon. Regarding cyber security, we run series of articles in pages of CSI Communications in Security Corner section and other sections, too. Regarding certification in ethical hacking, you may visit website of International Council of E-Commerce Consultants (EC-Council), http://www.eccouncil.org. Information related to certification can be found at http://www.eccouncil.org/Certification/certified-ethical-hacker.

Having said all these, we must add the disclaimer is that CSI Communications is no way recommending any such course or certification. These are just some pointers to look at and you must judge yourself to choose the course you should study.

Regarding formal study, standard Masters in Computer Applications courses, and other Baccalaureate or Masters degree course in Computer Science, Information Technology cover variety of subjects that will make you having profound knowledge in Computing as well as information science so that you may become professionally qualified to master the intricacies.

Send your questions to CSI Communications with subject line 'Ask an Expert' at email address csic@csi-india.org
ICT News Briefs in July 2013

The following are the ICT news and headlines of interest in July 2013. They have been compiled from various news & Internet sources including the daily – The Hindu, Business Line, and Economic Times.

Voices & Views
- The global IT services market is $900 billion. There are opportunities at the intersections of mobility and networks; mobility and social media, analytics and sensors; and cloud and mobility – Manoj Chugh of Tech Mahindra.
- The Govt. should put the strategy in place regarding hiring of five lakh information security professionals as it has only around 22,000 such people now – Kapil Sibal.
- Worldwide PC shipments totalled 79.2 million units in the first quarter of 2013 and declined 11.2% compared with the first quarter of 2012. It was the fourth consecutive quarter that showed a drop – Gartner.
- Cyber crimes in India have gone up by 60% in 2012 at 3.500 as against 2,070 in the previous year. Maharashtra topped the list with 561 (393 in 2011) crimes, followed by Andhra Pradesh with 454 (372) and Karnataka 437 (160) – National Crime Records Bureau (NCRB).
- The electronic hardware industry registered a business Rs 35,000 crore nationally.
- Nasscom sticks to 12-14% growth forecast. The industry is likely to touch $84-$87 billion in exports this year against last year’s $75.8 billion.
- While MAIT projected the sale of 12.42 million units of PCs for 2012-13, actual sales were at 11.31 million.

Govt, Policy, Telecom, Compliance
- New transfer pricing rules from Income Tax Dept., to help multinational firms increase R&D work in India.
- Telecom Commission backs 100% FDI. Govt. allows 100% in telecom against the current 74%.
- Govt. releases the National Cyber Security Policy-2013 on 2nd Jul.
- Govt. extends the date for registering electronics products with Bureauc of Indian Standards (BIS) by three months.
- Indian Govt. invites Vietnam to set up electronics cluster city.
- Govt. decides to acquire (through CDOT) the 51% stake from Alcatel Lucent in the Chennai based WiMax R & D Centre.
- BlackBerry declines to have funded training of Indian security officials on the new interception system it has set up in the country.
- Airtel seeks DoT nod for voice trials on 4G network allocated for broadband services.
- Cyber pornography: Panel seeks opinion on changes to IT Act.
- Two e-hardware clusters in Hyderabad, AP may see total investment of Rs 3,540 cr. It could generate 35,000 jobs.
- Bharat Broadband plans to hook up all 2.5 lakh panchayats by Dec-end.
- With just 13% of the total mobile subscribers using roaming services, the recent rollout of free incoming is unlikely to impact the margins.
- Govt blocks Reliance Industries’ application to own Indians domain.
- Govt to fund with 15-25% of total investments in start-ups in electronics space.
- The National Policy on Electronics includes achieving a turnover of $55 billion for the chip design and embedded software industry, and $80 billion of exports and setting up over 200 electronic manufacturing clusters.
- DoE plans financial support for setting up testing labs.
- The TN Govt. to procure 5.65 lakh laptops for giving to school and college students.
- Telcos’ revenues have grown at a meagre 1.9% in the last six years if adjusted for 10.8% retail inflation during the period. The industry’s gross revenues were Rs 1,51,234 crore during FY13. While the subscriber base (897 million at June-end) is over 13% of the world mobile subscriber base (6.99 billion).
- Under Bharat Mobile scheme, households where at least one member has completed 100 days of work under the MGNREG Act in 2012 will be eligible for a phone.

IT Manpower, Staffing & Top Moves
- Aggis, BPO arm of Essar Group, plans to add 5,000 taking its total headcount to 60,000 in the next 12 months.
- Convergys India, having 12,000 people plans to add 500-1,000 people or even more in the next six months to a year.
- R. Chandrasekhar to succeed the current Nasscom President Som Mittal, whose term ends in March 2014. His main responsibility would be to take forward the Indian IT industry’s target of achieving $300 billion by 2020.
- Srini Koppolu, former MD of Microsoft India Development Centre to set up Mission R&D, to train final year engineering students in CSE and IT. Average entry level salary in product firms is put at Rs 7.5 lakh against Rs 3-3.5 lakh in the IT services industry.
- Amar G. Bose, the visionary engineer, inventor and entrepreneur who became synonymous with high-quality audio systems and speakers died on 12th Jul.
- TCS sticks to hiring plans to add 45,000, this fiscal despite low attrition.
- Net hiring by TCS, Infosys drops to lowest in last 4 years.
- From 2011 onwards, hiring based on technical skills was at 40%, with domain skills getting equal importance with 40% and soft skills forming the rest at 20% – Nascom.
- In the last one decade, nearly 2 million have been added in IT sector which now employs around 3 million people - Nasscom.
- Capgemini to grow to 70,000 by 2015 from the current 40,000.
- US President @BarackObama is the most followed global leader on Twitter with 33,510,157 followers.
- US firm Lender Processing to hire 300 in India.

Company News: Tie-ups, Joint Ventures, New Initiatives
- Flipkart has launched an online payments solution PayZippy for Indian merchants.
- Micromax founder, Rahul Sharma dreams of smartphone at Rs 2,000.
- Flipkart nets Rs 1,200 crore in single-largest funding for an e-commerce company in India.
- Nokia brings 41 megapixel camera to new Lumia 1020 phone.
- Yahoo! has upgraded photo-sharing network Flickr by revamping the site and offering one terabyte (1,000 GB) of storage.
- Facebook and mobile body – IAMAI launched safe browsing campaign for students.
- Airtel’s India, Bangladesh terrestrial link is now operational.
- Lenovo to build made-to-order personal computers
I AM BUILDING for my future

For more information and to register for an ISACA exam, visit www.isaca.org/myfuture-CSI.

UPCOMING EXAM DATE
DECEMBER 2013

Register Online and Save US $75.00!
Early registration deadline: 21 August 2013
Final registration deadline: 25 October 2013

Note: The CISA German, Italian and Dutch languages will not be offered at the December 2013 exam. Please contact exam@isaca.org for further information.
## CSI News

### From CSI Chapters »


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<th>SPEAKER(S)</th>
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| **SILIGURI** *(REGION II)* | 15 May 2013: One Day Workshop on “Application of Information Technology in the Modern Civilization”  
There were sessions of technical paper presentation and invited technical talks. Participants were encouraged to become CSI members and appeal was made to open student branch at the college. Altogether the event is a great success. |
| Dr. Ardhendu Mandal |  
![Faculty members and participants of the workshop](image1) |
| **AHMEDABAD** *(REGION III)* | 17 May 2013: Celebration of 45th World Telecommunication and Information Society Day  
As Chief Guest he Mr. Gupta highlighted facts about road safety and how usage of ICT has helped it. Prof. Swamy showcased pros and cons of BRTS, lifeline of Ahmedabad. Theme Lecture was delivered by Prof. Gundaliya. Event was supported by Association of British Scholars, Ahmedabad Chapter and Broadcast Engineering Society, Ahmedabad Chapter. |
| Mr. J P Gupta, IAS, Prof. H M Shivanand Swamy, Prof. Pradip Gundaliya |  
![CSI AC members with dignitaries](image2) |
| **RANCHI** *(REGION IV)* | 18-19 December 2012: Inter School IT Quiz Competition  
Elimination round was written round for 45 minutes. Questions included multiple choice & direct questions. Six teams each from Junior and Senior categories were selected based on performance in written round. Finals had five rounds – Warm-up, Visual, Rapid-fire, Pick & Bid and Buzzer rounds. Mr. Singh was quiz master. |
| Mr. Rajeev Kumar Singh, Sr. Manager, RDCIS, SAIL |  
![Quiz Master Mr. Rajeev Kumar Singh asking question from students during final round on 19.12.2013](image3) |
| **BANGALORE** *(REGION V)* | 14 June 2013: Workshop on “Cloud Computing”  
| Mrs. Bhanumathi K S, Mr. B G Suresh CEO and co-founder of Saranyu Technologies |  
![Participants during workshop](image4) |
**COCHIN (REGION VII)**

**29 April 2013:** Presentation/ Demo on “Exploring Google Apps”

Mr. Dwarakanath introduced Google Apps and tools that are available as part of the offering. He explained how these tools can be used by nonprogrammers/laymen who are not too tech savvy. He also showed demo of all tools in Google Apps.

*Mr. Dwarakanath Cheyyur during his lecture*

**15 May 2013:** Presentation on “Linked In: Enhance Your Social Media Presence And Get Found For Your Needs”

Mr. Raghunath touched upon seven building blocks of Social Media and mapped features of Linked In. He focused primarily on two core aspects of Linked In, the importance of building an Ideal Linked In profile and follow that up with a strategy to Network.

*Members in the meeting*

**COIMBATORE (REGION VII)**

**20 June 2013:** Speech on “Business Intelligence, a Case Study RedBus.in”

Mr. Alok spoke about company and highlighted that it is the largest bus ticketing and distribution network. He pointed out operations before RedBus and market problems of ticket availability, double booking, agents relationship with the bus operators and commission negotiation by agents. He talked about the product for customers, bus operators and agents. He explained how the websites are managed like giving rating to the buses quality using stars and operations of buses.

*Mr. Alok, Chief product office of redBus with CSI Office bearers*

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**From Student Branches »**

http://www.csi-india.org/web/guest/csic-chapters-sbs-news

**KRISHNA INSTITUTE OF ENGINEERING & TECHNOLOGY, GHAZIABAD (REGION-I)**

**6 April 2013:** Paper Presentation Contest on “Innovation In Computing Technologies and its Social Impact” (ICTSI-2013)

In all 41 papers were presented by 77 students coming from various colleges and Universities. Dr. Arun Sharma, Mr. Ravi Shankar Singhal, Ms. Vaishali Aggarwal and other faculty members took efforts to make the event a success.

*Prize distribution*

**AES INSTITUTE OF COMPUTER STUDIES (AESICS), AHMEDABAD (REGION-III)**

**9 March 2013:** Workshop on “Image Editing using Photoshop”

The workshop emphasized on the basics of Photoshop and covered various tips and tricks for Photo Manipulation, Photo Adjustment and Image Retouching. Participants were given hands-on exposure for various techniques. An expert talk on “Opportunities and Applications of Multimedia” was also organized.

*Expert lecturer during the Workshop*
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<td>Mrs. Trushali Jambudi</td>
<td><strong>30 March 2013:</strong> Workshop on “N-Tier Programming Approach using ASP.Net and C#.Net”</td>
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<td>Mrs. Jambudi discussed N-tier Programming Approach and effective coding techniques, which increase scalability, reusability and improve ability to detect and correct errors. These techniques were explained and demonstrated with the help of an application. Participants were given hands-on exposure.</td>
</tr>
<tr>
<td>Dr. R Venkateswaran, Mr. C G Sahasrabudhe and Prof. Bipin Mehta</td>
<td><strong>3 April 2013:</strong> Lecture on “Past, Present and Future of Internet”</td>
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<td>Dr. Venkateswaran started with brief history of Internet and spoke about challenges with today’s internet. He discussed various research problems and future directions for research which will shape the future of internet. Interesting case studies on Big Data Analytics and research projects were also discussed.</td>
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<tr>
<td><strong>PARUL INSTITUTE OF ENGINEERING AND TECHNOLOGY, VADODARA, GUJRAT (REGION-III)</strong></td>
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<tr>
<td>Prof Pritesh Upadhyaya, Hardik Dalal, Niyanta Sheth, Smit Nayakar and Shivang Bhatt</td>
<td><strong>5 April 2013:</strong> Competition “Battle of C”</td>
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<td>Event was focused on making students learn C as procedure-oriented language. Intranet software was used to conduct elimination round. It tested basic concepts of C and procedure oriented paradigm. Next round was programming round, consisting of 2 programs, out of which one was to be done in 45 minutes.</td>
</tr>
<tr>
<td>Prof. Pritesh Upadhyaya and Prof. Shubhada Talegaon</td>
<td><strong>26 April 2013:</strong> Competition “Poster Making”</td>
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<td>Theme was “Social Media in Education”. Student groups were given necessary accessories. Voluntary members were appointed to maintain the decorum and discipline. Winners were awarded a trophy and every participant was given participation certificate.</td>
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<tr>
<td>Mr. Rana Mukhopadhyay</td>
<td><strong>3 May 2013:</strong> Expert Session on “Understanding the principles of Computer Networks &amp; Computer Network Security”</td>
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<td></td>
<td>The session was on Computer Network Security which gave starting point to learn advance subjects like web applications, web services etc. After explaining basics of computer network, security in cyber world was introduced as the next major subject to learn.</td>
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<tr>
<td><strong>TRUBA COLLEGE OF ENGINEERING &amp; TECHNOLOGY, INDORE (REGION-III)</strong></td>
<td></td>
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<tr>
<td>Dr. Parag Kulkarni, Dr. Pratosh Bansal and Dr. P K Chande</td>
<td><strong>8-9 March 2013:</strong> Two-days Workshop on “Machine Learning &amp; Decision Support System”</td>
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<td>Dr. Kulkarni covered topic of machine learning and decision support system. A quiz was organized later based on content delivered in the workshop. First round was filtering round and final round consisted of more difficult questions and reasoning. Various prizes like, tablet, USB hard-disk along with some consolation prizes were distributed.</td>
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<tr>
<td>SPEAKER(S)</td>
<td>TOPIC AND GIST</td>
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<tr>
<td><strong>SILICON INSTITUTE OF TECHNOLOGY, BHUBANESWAR (REGION-IV)</strong>&lt;br&gt;Prof. A K Tripathy, Dr. P Kabisatapathy, Dr. A K Panda, Biswajit Nayak and A B Mishra</td>
<td>18 May 2013: Students’ workshop on “Electronic systems Design and Manufacturing” (ESDM-2013)&lt;br&gt;Prof Tripathy explained applications of modern Electronics. Dr. Kabisatapathy spoke on emerging technologies in ESDM field, its scope in the current R &amp; D activities and high entrepreneurship potential. Dr. Panda explained how unused sand can become costlier than gold ornaments by modern semiconductor design. Mr. Nayak and Mr. Mishra explained steps followed in design and manufacturing of PCB and PLC with examples for single sided and multilayer PCB design.</td>
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<tr>
<td>Dr. Anirban Basu, Chairman, Div. V</td>
<td>6 July 2013: Seminar Talk on “Software Quality Management”&lt;br&gt;Prof. Basu started with some major software failures that had happened around the world &amp; emphasized “human error” as the major cause of all these failures. He explained with some real life examples of unnoticed bugs, how the quality of software deteriorates &amp; suggested some measures to control them.</td>
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<tr>
<td><strong>ADHIYAMAAN ENGINEERING COLLEGE, HOSUR (REGION-V)</strong>&lt;br&gt;Mr. Ramasamy, Mr. Sankar and Mr. Ayyadurai</td>
<td>21-22 June 2013: Two-days National Workshop on “Android Mobile Applications Development”&lt;br&gt;Mr. Sankar delivered a lecture on Android architecture, open sources and various components of Android, and also gave hands on training on mobile application development. Mr. Ayyadurai, delivered speech on Android Intents, Broadcast Receivers and Adaptors, Maps, Geo-coding and Location based services and Accessing Android Hardware.</td>
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<tr>
<td><strong>ANDHRA MAHILA SABHA SCHOOL OF INFORMATICS, (AMSSOI), ANDHRA PRADESH (REGION-V)</strong>&lt;br&gt;Ms Jagadamba Krovvid, Principal Architect, SET Labs, Infosys Technologies Ltd</td>
<td>17 April 2013: 6th Prof. R Narasimhan Commemoration Lecture&lt;br&gt;Ms. Krovvid talked about prominence of Big data in areas like Health care, Telecom, Social Networking etc. Big Data represents new era in data exploration and utilization. Big Data Analytics is a process of examining large amounts of data and different types of data sources. Technologies used for Big Data Analytics include NoSQL databases, Hadoop and MapReduce. Big Data combined with Cloud platforms makes analysis of huge volumes of transactional data simple and efficient.</td>
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<tr>
<td><strong>ATME COLLEGE OF ENGINEERING, MYSORE, KARNATAKA (REGION-V)</strong>&lt;br&gt;Dr. K Chidananda Gowda</td>
<td>9 April 2013: Celebration of First Anniversary and Lecture on “Computing Trends: Convergence”&lt;br&gt;Dr. Chidananda gowda explained advancement in Nano technology, Cloud computing and Genetic Engineering, and opportunities available for research. As part of the anniversary a Quiz competition was held and winners Mr. Ajay S and Mr. Sharath Kumar M K of VI semester and the runner-up Ms. Sayima Afra and Ms. Ranjana of II semester were awarded prizes.</td>
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<td>SPEAKER(S)</td>
<td>TOPIC AND GIST</td>
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<td><strong>KLS GOGTE INSTITUTE OF TECHNOLOGY, BELGAUM, KARNATAKA (KLSGIT)</strong> (REGION-V)</td>
<td>Govind Kanshi, Mahesh Guru, M R Kulkarni, Dr. A S Deshpande, Prof. V R Kulkarni, Dr. S A Kulkarni, and Nagaraj Bhat</td>
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<tr>
<td>22-23 March 2013: Two-Days National Level Tech Fest “Genesys v4.0 Renaissance of Cerebration”</td>
<td>Chief Guest was Mr. Govind Kanshi. As one of the events under Genesys v4.0, Panel Discussion on “Gearing up for the Corporate World” was organized. Total of 23 events, technical, quasi-technical and informal were conducted. A technical talk by Mr. Bhat on “Emerging Trends in Embedded Technologies” was held.</td>
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<tr>
<td><strong>REVA INSTITUTE OF TECHNOLOGY &amp; MANAGEMENT, BANGALORE</strong> (REGION-V)</td>
<td>Dr. Subhash Kulkarni, Dr. Lingangouda Kulkarni and Dr. Rohini Deshpande</td>
</tr>
<tr>
<td>3 May 2013: Workshop on “Electronic System Design &amp; Manufacturing”</td>
<td>Dr. Rohini introduced ESDM and explained various terminologies. With examples she explained importance of electronic system design and manufacturing process. She gave overview of career opportunities in ESDM field. Dr Subhash emphasized on how Govt has taken initiative to create awareness towards R &amp; D in the field. Dr. Lingangouda spoke about manufacturing in ESDM and explained tax benefits given by Government for entrepreneurs. Participant were taken to ISRO for Industrial visit.</td>
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<tr>
<td><strong>VITS COLLEGE OF ENGINEERING, SONTYAM, VISAKHAPATNAM</strong> (REGION-V)</td>
<td>Prof. P G Sastry and Principal Dr. B Murali Krishna</td>
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<td>8 June 2013: One day Faculty Development Program on “Outcome-Based Engineering Education for Employability Enhancement (OBE4-2K13)”</td>
<td>Prof. Sastry said that method of teaching needs to be reviewed and changed so that students can learn better and apply learning to develop efficient applications. He emphasized that 21st century teaching learning system will be based on learner’s pull rather than teacher’s push strategy. He opined that teacher’s growth will be based on quality research.</td>
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<td><strong>MARATHWADA INSTITUTE OF TECHNOLOGY (MIT), AURANGABAD</strong> (REGION-VI)</td>
<td>Ms. Chamundeshwari</td>
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<td>1-6 April 2013: Workshop on “Soft Skill”</td>
<td>Workshop focused on developing soft skills among participants which included basic grammar, communication skills, body language, assertive skills, listening skills, telephone skills, email skills, team building, decision making and grooming. Participants were taught some essential rules to be followed while facing group discussions and personal interviews.</td>
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<tr>
<td>SPEAKER(S)</td>
<td>TOPIC AND GIST</td>
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</table>
| **S.S.D.C.T SANJAY GHODAWAT TECHNICAL CAMPUS, ATIGRE, KOLHAPUR (REGION-VI)** | 8 April 2013: Ethical Hacking and Cyber Security Workshop **“HACK-O-MANIA”**  
Contents covered during workshop include Introduction to Ethical Hacking, System & Windows Hacking, Data Hiding Techniques (Steganography & Cryptography), Proxy Server and VPN Technologies, Google Hacking, Hacking Email Accounts & Email Security, Social Networking Websites (Face book, Twitter) Hacking & Security Policies, Website Hacking and Security Standards etc. |
| Mr. OoPpSs | |

**AVS ENGINEERING COLLEGE, SALEM, TAMILNADU (REGION-VII)**  
Dr. S Selvarajan, Mr. G Narendra and Mr. G Nagendra  
14 March 2013: National Conference on **“Recent Trends in Information Technology and Computer Science and Engineering”**  
Papers were presented by students of various colleges on topics like Adhoc and Sensor networks, Cloud computing, Digital image processing, Distributed databases, Grid computing, Image Processing, Machine Learning, Mobile Computing Neural Networks, Parallel Computing, Pervasive Computing, Soft Computing and Web Intelligence. There was a guest lecture on “Recent Trends in IT” delivered by Mr. Nagendra.  

**EINSTEIN COLLEGE OF ENGINEERING, TIRUNELVELI, TAMILNADU (REGION-VII)**  
Dr. K Ramar, Prof. R Velayutham, & Prof. M Suresh Thangakrishnan  
10 May 2013: Seminar cum Training Program  
Summer camp was organized for school students. Computer awareness and training was provided to them. Dr. Ramar pointed out importance of digital world. Participation Certificates were given to students.  

**SRI SAI RAM ENGINEERING COLLEGE, CHENNAI, TAMILNADU (REGION-VII)**  
Mr. S Ramasamy, J Venkatesan Prabu, Mr. K Baskaran, Dr. R Indra Gandhi and Dr. J Raja  
6 February 2013: National Conference on **“Web Technology – NCWT’13”**  
Papers were selected after a double blind review by expert members and included in proceedings with ISBN 978-93-81208-16-8. Tutorial session on “Cloud Computing” was handled by J. Venkatesan Prabu, Managing Director, KaaShiv Info Tech.
One-day Intra-department Project Exhibition “PROJECT EXPO - 2K13”

The exhibition was organized by final year B.Tech - IT students and visitors were second and third year students of IT dept. There were 33 batches totally out of which 4 projects were selected as best projects and certificates were given by Dr. Murugan and Mr. Vijayravikumaran.

Inauguration

Following new Student Branches Were Opened as Detailed Below –

REGION VII

- KGisL Institute of Information Management, Coimbatore

CSI student branch at KGisL Institute of Information Management and Computer Science was inaugurated on July 5th, 2013 for the Academic Year 2013-2014. Dr. A. Selvakumar headed the function as Chief Guest. He presented speech on “BIG DATA”. Students participated in “Intra Collegiate Meet” on the same day, which was organized on the occasion. The meet had various activities like Seminar, Quiz, C Prodigy, Adzap, Mock Interview and Blood Donation Camp.

CSI BRINGS MEMBERS AND OPPORTUNITY TOGETHER

Computer Society of India is the recognized association for Information and Communications Technology (ICT) professionals, attracting a large and active membership from all levels of the industry. A member of the Computer Society of India is the public voice of the ICT profession and the guardian of professional ethics and standards in the ICT industry. We also work closely with other industry associations, government bodies, and academia to ensure that the benefits of IT advancement ultimately percolate down to every single citizen of India. Membership demonstrates IT professionalism and gives a member the status and recognition deserved.

Learn more at www.csi-india.org

Join CSI

I am interested in the work of CSI. Please send me information on how to become an individual/institutional* member

Name __________________________ Position held ______________________________

Address _________________________________________________________________

________________________________________________________________________

City ____________Postal Code _____________

Telephone: ___________ Mobile: __________ Fax: __________ Email: _____________

*[Delete whichever is not applicable]*

Interested in joining CSI? Please send your details in the above format on the following email address. helpdesk@csi-india.org
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Details &amp; Organizers</th>
<th>Contact Information</th>
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<tbody>
<tr>
<td>August 2013 Events</td>
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<tr>
<td></td>
<td>CUSAT Kochi</td>
<td><a href="mailto:ncsoft@cusat.ac.in">ncsoft@cusat.ac.in</a></td>
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<td></td>
<td><a href="http://ncsoft.cusat.ac.in">http://ncsoft.cusat.ac.in</a></td>
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<td>September 2013 events</td>
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<td></td>
<td>Faculty of Computer Application, MEFGI in association with Computer Society of India (CSI)</td>
<td><a href="mailto:sridaran.rajagopal@gmail.com">sridaran.rajagopal@gmail.com</a></td>
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<td></td>
<td>Rajkot Chapter and International Journal of Computer Applications (IJCA).</td>
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<td>14-15 Sept. 2013</td>
<td>National Seminar on ICT in Health Care for Inclusive Development</td>
<td>Prof. A K Nayak, <a href="mailto:aknayak@iibm.in">aknayak@iibm.in</a></td>
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<tr>
<td></td>
<td>at Patna</td>
<td>Prof. T V Gopal, <a href="mailto:gopal@annauniv.edu">gopal@annauniv.edu</a></td>
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<tr>
<td></td>
<td>CSI Bangalore Chapter and CSI Divisions (I, III, IV, and V)</td>
<td><a href="mailto:abasu@pqrssoftware.com">abasu@pqrssoftware.com</a></td>
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<td><a href="http://icacci-conference.org/site/cloudid2013">http://icacci-conference.org/site/cloudid2013</a></td>
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<td>20-21 Sept. 2013</td>
<td>International Conference on Innovations in Computer Science and Engineering (ICICSE)</td>
<td>Dr. D D Sarma</td>
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<td>Organised by Guru Nanak Engg. College, Ibrahimpatnam, Hyderabad. Supported by CSI DIV IV, CSI-Hyderabad</td>
<td><a href="mailto:dirma@gniindia.org">dirma@gniindia.org</a></td>
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<td><a href="mailto:hodcse.gnec@gniindia.org">hodcse.gnec@gniindia.org</a></td>
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<td>23-26 Sept. 2013</td>
<td>Third IFIP International Conference on Bioinformatics</td>
<td>Dr. K R Pardasani</td>
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<td>Organised by IFIP TC-5 and Computer Society of India at Bhopal</td>
<td><a href="mailto:kamalraj@rediffmail.com">kamalraj@rediffmail.com</a></td>
</tr>
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<td></td>
<td>Organised by IFIP TC-13 and supported by CSI at Bangalore</td>
<td><a href="mailto:chari@apchi2013.org">chari@apchi2013.org</a></td>
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<tr>
<td>30 Sept. 2013 &amp; 1st Oct. 2013</td>
<td>CSI Student Convention Region - III on Enterprise Mobility</td>
<td>Dr. Harshal A Arolkar</td>
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<tr>
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<td>CSI GLS Student Branch, supported by CSI Ahmedabad Chapter</td>
<td><a href="mailto:harshalrokar@yahoo.com">harshalrokar@yahoo.com</a></td>
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<td><a href="http://www.glsict.org/csiR3sc/">http://www.glsict.org/csiR3sc/</a></td>
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<td>October 2013 events</td>
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<td></td>
<td>at Institute of Technology and Science, Mohan Nagar, Ghaziabad, UP</td>
<td><a href="mailto:sunilpandey@its.edu.in">sunilpandey@its.edu.in</a></td>
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<tr>
<td>November 2013 events</td>
<td></td>
<td>Prof. A K Nayak, <a href="mailto:aknayak@iibm.in">aknayak@iibm.in</a></td>
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<tr>
<td>12-13 Nov. 2013</td>
<td>International Seminar on “Knowledge Based Software Engineering”</td>
<td>Dr. Dharm Singh</td>
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<td>CSI Udaipur Chapter</td>
<td><a href="mailto:singhdharm@hotmail.com">singhdharm@hotmail.com</a></td>
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<td>15-17 Nov. 2013</td>
<td>7th International Conference on Software Engineering - CONSEG 2013</td>
<td>Mr. Shekhar Sahasrabudhe</td>
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<td></td>
<td>CSI Division II, Pune</td>
<td><a href="mailto:shekhar_sahasrabudhe@persistent.co.in">shekhar_sahasrabudhe@persistent.co.in</a></td>
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<td>Dr. T V Gopal, <a href="mailto:gopal@annauniv.edu">gopal@annauniv.edu</a></td>
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<tr>
<td>29-30 Nov. 2013</td>
<td>National Conference on Cyber Space Security (NCCSS) - 2013 Research Challenges &amp; Trends</td>
<td>Mr. Bindhumadhava B S</td>
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<td></td>
<td>at Bangalore</td>
<td><a href="mailto:bindhu@cdac.in">bindhu@cdac.in</a></td>
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<td>December 2013 events</td>
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<td></td>
<td>at Visakapatnam</td>
<td><a href="mailto:s_paramata@vizagsteel.com">s_paramata@vizagsteel.com</a></td>
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<td><a href="http://www.csi-2013.org">http://www.csi-2013.org</a></td>
<td><a href="mailto:convener@col2013.org">convener@col2013.org</a></td>
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<td></td>
<td>at Ahmedabad Website: <a href="http://gator1795.hostgator.com/-sigdata/comad2013/">http://gator1795.hostgator.com/-sigdata/comad2013/</a></td>
<td><a href="mailto:bvmehata@aesics.ac.in">bvmehata@aesics.ac.in</a></td>
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<td>Arnab Bhattacharya</td>
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<td><a href="mailto:arnabb@iitk.ac.in">arnabb@iitk.ac.in</a></td>
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<td>Dr. Harshal A Arolkar</td>
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<td><a href="mailto:harshalrokar@yahoo.com">harshalrokar@yahoo.com</a></td>
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INDIACom-2014

8th INDIACom; 2014 IEEE International Conference on

“Computing for Sustainable Global Development”

(05th - 07th March, 2014)

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
Institutions of Electronics and Telecommunications Engineers (IETE), Delhi Centre
Institution of Engineers (India), 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 seven editions of INDIACom since its inception in the year 2007; we hereby announce INDIACom-2014, 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 some use in enhancing the quality of life and contribute effectively to realize the nations’ vision of sustainable inclusive development using Computing. INDIACom-2014 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-2014)
Track #2: International Conference on High Performance Computing (ICHPC-2014)
Track #3: International Conference on High Speed Networking & Information Security (ICHNIS-2014)
Track #4: International Conference on Software Engineering & Emerging Technologies (ICSEET-2014)

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-Maillic submissions will not be considered.

Important Dates

<table>
<thead>
<tr>
<th>Activity</th>
<th>Date</th>
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<tbody>
<tr>
<td>Submission of Full Length Paper</td>
<td>04th November, 2013</td>
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<tr>
<td>Paper Acceptance Notification</td>
<td>13th January, 2014</td>
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<tr>
<td>Submission of Camera Ready Copy (CRC) of the Paper</td>
<td>20th January, 2014</td>
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<tr>
<td>Registration Deadline (for inclusion of Paper in Proceedings)</td>
<td>31st January, 2014</td>
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</table>

Selected papers will be published in IEEE Xplore. Further details are available at www.bvicam.ac.in/indiacom. All correspondences, related to INDIACom-2014 must be addressed to:

Prof. M.N. Hoda
General Chair, INDIACom-2014
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, indiacom2014@gmail.com
Tel.: 011-25275055 TeleFax: 011-25255056, 09212022066 (Mobile)