NEWSLETTER

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Guest Editorial

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Elements of Software Services

The BMW that I worked on for two years early in my career was not the car but Boiler Maintenance Workstation, a software system. Built on the foundation of EPRI's boiler tube failure reduction program, BMW allowed users to store, analyze, and report boiler maintenance information. Based on a graphical interface using CAD drawings of the actual equipment, it was intuitively easy to use. Also, the ability to look at failures across the fleet on the actual drawing enabled the user to identify repeat failures. Reporting tools allowed customized reports, which would query hundreds of records in the database to build summary or detailed reports on demand. Similarly, the heat exchanger workstation we developed helped analyze condensers and feed water heaters. In this case, we also integrated a decision system based on a fuzzy rule base to determine cause of a performance issue and suggest corrective actions. Also integrated was an operations and maintenance (O&M) manual which enabled the user to make quick O&M decisions.

The basic principles of the tools I describe above are still very relevant and are aided by faster graphic cards, larger databases, and higher computing speeds. I would look at the role of software in Energy services through the following grid:

1. **Knowledge system:** allow the user to capture and easily add tribal knowledge into an intelligence platform as rules or trees. This platform then assists in making quick and informed decisions on demand, or on a predetermined schedule.

2. **Historical database**: allow the user to capture and store data pertaining to operating conditions, performance, operations, maintenance, repairs, etc. The data could be from online sensors or offline data entry.

3. **Ubiquitous access:** allow the user access to information where he wants it when he wants it. This would include a central remote monitoring and diagnostic station (RM&D), an offsite computer, or a smart phone on the road.

Also, from a standpoint of the how the software tools have evolved, the following aspects need to be considered:

1. **3D data visualization**: we can now create virtual a walkthrough of a plant, on a computer or in an immersive environment. A user can walk through clicking at equipment accessing historical information and upcoming maintenance schedules. The question is what will the user pay for visualization? The answer would be based on the sophistication of the user, and the impact of the application. For a power plant operator, a simple spreadsheet based application might be the right interface. For a power user in the RM&D center, a 3D capability might be desirable.

2. **Real-time number crunching:** in addition to the rule or tree based intelligence, we can now run sophisticated inverse models based on operating conditions to give more accurate information to optimize plant performance in real-time. These tools should be deployed at the plant system level for decisions which have a significant impact of the overall plant performance.

3. Wireless sensor network: availability of lower cost wireless sensors now enables us to have much more infor with relative ease of access. These sensors have the capability to talk to each other rather than only to a central s hence enabling faster decisions and controls. Tied to this is also the ability to handle 'big data.'

As with any service, the critical aspect will still be people who have the ability to use tools such as software systems to help them deliver higher quality at greater speeds.

Dr. Gopichand Katragadda

From Chairman's Desk

There has been hectic activity recently in Technical Education in the country for understanding the new accreditation system and processes of NBA, consequent on the approaching deadline for aligning with Washington Accord requirements to progress from the present provisional status to a Full Member status. The pending Accreditation Bill envisages making Accreditation mandatory. This is ample proof that Accreditation and Regulations can drive Change in the Technical Education system.

The new NBA accreditation norms require the institutions to define a matrix of Program Educational Objectives and Program Outcomes, and demonstrate the correlation between the two in their academic programs – a move towards the Washington Accord system.

As a matter of fact, Accreditation provides a direction to the Institution and its Faculty, Students and Leadership. The mandatory peer review mechanism enables an outside-in view of the Institution. It is great opportunity for review and reflection of the activities and performance of the different constituents of the Institution; it enables a prioritization of activities. Periodic accreditation prevents complacency and creates an Institution "on the move". Accreditation processes serve as both change agents as well as catalysts in Engineering Education, in particular, for promoting Quality in all academic systems and processes.

In her recent Book *Rankings and the Reshaping of Higher Education - The Battle for World-Class Excellence*, Ellen Hazelkorn argues that "Rankings are arguably having a more profound impact on higher education and the construction of knowledge." "HEIs are responding to league tables and rankings (LTRS), which are having an impact or influence — positive or perverse — on institutional behavior, decision-making and actions". "While HE leaders are concerned about the impact of rankings, they are also increasingly responsive and reactive to them". "Rankings demonstrate the new environment of higher education , and act as a driver of change". "The extent to which these changes are productive or useless is still controversial, but HEIs are worried about their impact on the reputation of their institution, individuals, and the country as a whole".

Prof R Natarajan

BITES Guest Lecture on “Social Computing”
by Dr. Praphul Chandra, Research Scientist, HP Labs

Date: 15th March 2012
Venue: Global Academy of Technology, Bangalore

The past decade has seen the emergence of a highly inter-disciplinary research field under the umbrella term: Social Computing. The most prominent artifacts of this field are websites like Facebook & Twitter but a study of the structures & dynamics reveals interesting phenomena shared with fields as diverse as epidemiology & biology. We present a quick overview.

Network Structure: At the very base, a social network can be represented as a graph which can be represented in a data structure like an adjacency-matrix. However, given the scale of these networks, it is often easier (and more intuitive) to study at the patterns that emerge in the structure – this is the structural approach to social network analysis. The aim here is identify certain characteristic properties of the network structure and study their impact for e.g. the degree distribution (i.e. the probability distribution of number of edges incident on a vertex) is an oft studied property of various networks. It is interesting to observe that many social networks follow a power law degree distribution – in the social context, this means that even though most people have ~ 150 “friends”, there are a few people who can be expected to have ~1500 friends. Unlike the normal distribution, the probability mass in a power law degree distribution is not concentrated around the mean; rather the distribution has a “fat tail”. Curiously, such power law degree distributions are observed in other domains e.g. neural networks in biology, air-transport networks, hyperlinks between websites etc. Other structural properties of interest are path length, clustering coefficients & centrality measures.

Network Dynamics: Many descriptive models which can be used to generate network structures with the said properties have been proposed e.g. random graphs, Watts-Strogatz model etc. Such models create useful insights to explain why such patterns are observed in social networks. A deeper analysis aims to explain these patterns as a result of network evolution over time for e.g. the preferential attachment model seeks to explain the power law degree distribution.

Dynamics (Processes) on Networks: How does the underlying network structure affect the interaction in a social system – the study of processes taking place on a network structure is of interest to a wide variety of practitioners from epidemiologists to marketing executives since, it studies how ‘Information’ (rumors, best-practices, diseases) diffuses over a network when neighbors influence each other.

Collective Intelligence: Last, but not the least, is the study of exploiting the intelligence embedded in social media i.e. content generated by users. Probably the most famous example is collaborative filtering where the reviews submitted by users are used to improve product recommendations of other users with the aim to increase sales. A measure of the importance of this technique is the Million dollar prize that Netflix gave away to the team which improved their collaborative filtering algorithm by 10%. Finally, another emerging dimension in social computing is crowd-sourcing: the practice of exploiting human intelligence at large scales for tasks where automation is unsuitable e.g. image tagging, video analysis etc. The DARPA challenge in December, 2009 wherein $40,000/- was awarded to the first team which spotted DARPA-hosted 10 red-balloons in the US has given an impetus to research in crowd-sourcing. We can expect to see much more research & application in social computing in the next decade.

BITES Guest Lecture on "Success in Abundance Era"
by Mr. Kalyan Kumar Banerjee, Senior VP & Head, Leadership Development, MindTree

Date: 25th April 2012
Venue: RV College of Engineering, Bangalore

We are living in an Abundance era, deluged with choices in almost anything we need, and don't need. While it's good to enjoy the variety of choices we have, the rules to succeed in this era are different from what it was in the past.

The need to manage amidst an abundance of information has led to complexity, rapid change, and a desperate race for differentiation. The old world success formula of resilience, persistence and being on top of data are not enough. So what are the new age leadership attributes? Well, making sense beyond the noise, creating your point of view, empathy, networking, curiosity, persistent questioning especially of the unquestionable, are some to begin with …

In a short span of thirty years a scarcity driven society has rapidly transformed itself in to a society with a profusion of abundance providing a bewildering array of choices in almost anything you need : be it toothpastes, soaps, cars, jobs and opportunities; making it difficult to choose both for individuals as well as organizations. Rules for success in an abundant society are different from the rules of success in a scarcity-driven society.

While abundance is good, it creates its own problems: more wisdom than one can absorb, low attention span leading to confused decision making - resulting in focusing on speed over substance. There is a tyranny of the majority with numbers ruling the roost. Abundance puts life in a fast forward mode demanding high speed, high achievement and we also age faster fighting obsolescence. It also leads to choice anxiety; did I make the right choice; target seems to move even as we choose. So what are the precepts for success in an abundance era?.

For Individuals: Ask yourself: What difference does it make? How is it relevant to me? Do not be fooled by the game of numbers and generalize wrongly; Spot the differences and synthesize available clues to form a whole. Try to connect across the contexts: what did I learn and where else does it apply? Cultivate diverse interests. Do what you need - not what you can and commit to your choice and don't compare. Keep looking and don't settle; Agility is the key.

For Organizations:

Know your people: Know their concerns
Appreciate their uniqueness

Create Trust Networks: Reward value creation over style
Develop Emotive Bonding

Refine Decision life Cycle: How good was our decision?
What did we fail to consider?
Where else can this be applied?