USF
UNIVERSITY OF SOUTH FLORIDA
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Bits & Bytes

The newsletter of Information Systems & Decision Sciences

Winter 2007

Chair's Message, Kaushal Chari

Many exciting things have happened in the Information Systems & Decision Sciences (ISDS) Department at USF during the Summer and Fall semesters of 2007.

Some highlights:

- Balaji Padmanabhan, a leading scholar in data mining, joined our department as an Associate Professor & Anderson Professor of Global Management. Read more about his work on page 2.
- Two faculty members joined the editorial boards of premier journals for MIS research. Alan Hevner was appointed as a senior editor of Management Information Systems Quarterly, while Balaji Padmanabhan became an associate editor for Information Systems Research.
- Grandon Gill, Associate Professor, was one of two College of Business faculty to receive the USF Undergraduate Teaching Award.
- The University approved changes to our MS/MIS curriculum, admission requirements, and program prerequisites, offering flexibility in taking electives.
- Many new electives were taught for the first time at the undergraduate and graduate levels including Information Security & Risk Management (graduate and undergraduate), ERP and Business Process Management using SAP (graduate), and Project Management (undergraduate).
- Our PhD program was significantly revised to better prepare PhD graduates for current market needs.
- We hosted a Hewlett Packard (HP) class on Open System Services (OSS) for Guardian Developers.

Our newest grads report that the job market and career opportunities in IT continue to improve. Many graduating students snagged good placements. We hosted several events related to career opportunities and professional development of our students, including a highly successful panel organized by the MIS Society titled: "Skills Needed in Today's World of IT." Panelists (pictured, l-r) included Brian Roulstone from Bisk Education, Robert Green from Depository Trust & Clearing Corporation, and Dar Isler from JP Morgan Chase.

Some things to look for in this issue:

The ISDS Department is reaching out to the local business community by organizing a number of continuing professional education classes and workshops. In the Calendar of Events section, you'll find information on a Java class that will be offered in March and a Business Intelligence summit that will be held on April 18.

Check out the alumnus spotlight on Sanjeet Hedge Desai, as well as the feature story on one of our star students, Robin Cornett. She shares her experiences that led her to major in IT.

Our research feature summarizes a research article published by two department faculty members related to software effort, quality and cycle time. It's great info.

Cordially,

K Chari

Kaushal Chari
Professor & Chair
ISDS

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Faculty Focus

Balaji Padmanabhan
Associate Professor and Anderson Professor of Global Management

Balaji Padmanabhan is the newest member of our department. Here, in his own words, he shares his background and interests

I am delighted to be a part of USF since August 2007. I joined the ISDS Department as an Associate Professor and the Anderson Professor of Global Management. I previously spent nine years on the faculty of the University of Pennsylvania's Wharton School. In this note I'd like to share my thoughts on the problems I hope to work on at USF.

Classroom to career

In the mid 90s I was in the PhD program at NYU, where I was fortunate to work on an NSF project on pattern discovery. Our application domain then was retail, where we looked at scanner data that tracked user purchases at supermarkets, a project that led me into what is now called "Data Mining." During the last decade, much of my work has focused on understanding how Web clickstream data can be used to understand user behavior online.

Data Mining and "Data-Based"

Firms today generally recognize that data tracked online can be useful for various business objectives. But several questions arise: What infrastructure is needed to take raw clickstream data and make it into something that specific business units can work with? What kinds of data mining models exist? What questions should be asked of this data? How can online "data-based strategy" be evaluated?

Academic research and industry solutions can answer some of these questions, but there is still a long way to go. My view? We are still in the midst of a transformation that will result in most business units becoming what I call more "data-based."

Data Mining and "Data-Based"

There is likely useful macroeconomic insights that might be learned from online usage data. One of the projects I expect to work on with the Kiran Patel Center for Global Solutions at USF is to document online user behavior and economic impact for specific countries from studying Web usage data.

Industry and Academics

Academics in the area of data mining have posed very interesting questions and have developed good methods to learn from Web clickstream datasets. Unfortunately, a big bottleneck exists when trying to gain access to good data. Firms have always been interested in working with academics but are generally reluctant to provide online usage data for research. Access to good real data is critical for research though, and partnerships between academia and industry must thrive to build a better understanding of this domain. There are certainly ways in which these projects can be structured such that mutual benefits exist and confidentiality is protected. I hope to see more of these industry-education projects happen.

Another source of real data is a data vendor, who employs panels of users who consent to have their online behavior tracked in return for incentives. This often provides a quicker avenue for mutual benefit, and I was fortunate to have worked with data provided by such vendors in the past. I look forward to continuing to work with such data and firms here in the Bay area.

Online panel data vendors recognize the value of their data and sell some of this (or results from these) to clients. Academic research and ideas triggered from research can potentially suggest newer uses of the data that might benefit the data vendors.

Online Privacy

Most firms today face a tradeoff between mining customer data and protecting privacy, and this tradeoff is motivation for a lot of interesting future research. Data miners sometimes get carried away by the potential of "doing interesting things" with the data. Firms should adopt a balanced approach, and it is not clear if most firms know where the line is. I am eager to build a better understanding of this over the next few years by looking at optimal uses of the data that can clearly benefit firms and customers, but still protect privacy to the extent possible,

working to understand online privacy policies and how firms specifically set these.

Online Behavioral Profiling

Closely related to the data mining and privacy tradeoff is the concept of "online behavioral profiling." Several media reports have discussed how users are being profiled online by various firms. These articles essentially bring out two points:

- Behavioral profiling can result in highly targeted online advertising or product recommendations. Would Toyota prefer its online ads to be shown to users who are tagged as "likely auto buyers" or to an urban family that has zero interest in cars?
- These articles also suggest that behavioral profiling may be dangerous to consumers in that it might result in detailed profiles of their interests generated and stored in a database somewhere that might one day be used inappropriately (what is "appropriate" itself is hard to exactly define here).

I hope to continue to study and document both of these aspects. How targeted are product recommendations and online advertising? How much "better" can they become and what would drive increased effectiveness?

On the flip side, can firms have their cake and eat it too? Can there be mechanisms to retain the advantages of such profiling, yet eliminate risks online users are concerned about today? These are some of the things I think about when I show up at work.

Sometimes a good problem, a method of solving it, and a source of data all come together, resulting in an academic research paper. Most of the time, though, all three don't come together. Sometimes the problem is too difficult, sometimes the data is hard to come by, and sometimes the problem is perhaps too academic. Still, the process of learning and thinking about these is fun and is what, I think, keeps academics going. §

Questions and Answers

Student Profile: Robin Cornett

Barbara Warner (BW), ISDS Department Advisor, spoke with Robin Cornett, current MS MIS student.

BW: Tell us a little bit about yourself.

RC: I am a "career changer." I have an undergraduate degree from UF in Business Administration – Management I have more than 10 years experience in inventory management, accounts receivable, credit, and collections. I am bilingual and have studied and have lived in France.

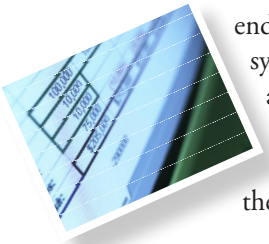
I came to USF to get a Master of Science in MIS because of my work with IT. I am intrigued by what it can do. I am currently working as an intern doing user support documentation and aim to find a part-time business analysis position this spring.

BW: How did you get interested in computers/MIS? What work-related IT experiences have you had?

I have been involved in three conversions. The first was actually working for my parents back when I was just a kid. They put me in front of a computer and gave me the One-Write-System cards (did I just give away my age!??) for customers. I entered the data into their system and swore then I would never have a job that had anything to do with computers! (Good luck with that, right?!)

I guess the first time I actually "worked in IT" was when I was doing purchasing and inventory management for a small distribution company. We had a good system, but the purchasing reports gave us limited information and weren't timely. An Excel fan, I prepared spreadsheets for all of our product lines, averaged usage, converted quantity on hand into time and… it reduced outages! I could generate a purchase order in a fraction of the time and used the same reports to identify and clean up slow movers and to reallocate costs.

I was working for this small distribution company and, when Y2K occurred, I became involved in the selection and decision-making process for the company's new computer system. It was a good lesson in communications. The designer could not understand our business rules, and we



ended up actually returning the first system we purchased. We selected a second company and some of the columns from my Excel purchasing spreadsheets found their way into the new system!

Some years later, I was working for a larger government organization where we converted from several disparate applications to one *huge* integrated system. Even though I was a junior employee, I had good computer skills and ended up assisting many of my colleagues who struggled with the transition to the new system. I didn't realize it then, but as I worked with a member of our training team to develop workarounds to "just get the work done," I was learning a lot about change management, training and user support.

"I'm discovering the business side of things is just as important [as the technical side]. If you don't understand the customer's application, the rest doesn't matter."

BW: What do you like best about MIS?

I like the blend between the business and the technical education. IT is an area where you have to keep learning.

BW: What are some of your favorite USF experiences?

I've come to realize that MIS is something that I enjoy and is an area where I can excel. I've been introduced to some great software – SQL Server & Business Intelligence Development Studios, Visio (I can diagram a business process in half a dozen ways, at least!), MS Project, and C#. It is some very cool stuff.

I'm a huge fan of Dr. Joni Jones' Systems Analysis and Design course. We had a great project where we had to "interview" our client, analyze their needs, provide a written proposal and present our system to the client, Dr. Jones and our classmates. I absolutely loved every part of it, especially the interview and analysis.

I had the good fortune of being teamed up Brandy Hall, a fellow student who has great technical skills. We really hit it off and worked together again on another really challenging project in Professor Weymon Whitlock's class, Database Design and Administration.

In those classes (and in Dr. Rick Will's Advanced Systems Analysis class) what I like best is analyzing the client's needs and trying to design something that will make their job easier. Having been an end-user, I empathize!

BW: What awards/honors have you received?

I was admitted to Beta Gamma Sigma at UF. I am very proud to have been selected (along with Brandy Hall) by Dr. Jones to present our systems analysis and design project to IT executives at the recent ISDS Advisory Board meeting. The phrase heard over and over again from board members: "Determining Business Requirements." I learned that it's not just about the technical skills. I'm discovering the business side of things is just as important. If you don't understand the customer's application, the rest doesn't matter.

BW: What are your career and/or educational goals?

I plan to complete my degree by December 2008. I aim to get started as a business analyst and see where that takes me. §

BW: Dr. Jones was pleased to hear that her course is a hit with students – especially one as talented as Robin. "Robin is a born leader as was evident in the results of her group project. My goal in ISM3113 is to teach and mold problem solving skills…skills that students can use in whatever avenue they pursue after graduation. Depth of analysis, effort, and inventiveness are only one part of the equation – Robin excelled in these areas as well as being able to sell her ideas in both written and oral form. She deserves recognition as someone who epitomizes all the qualities we want our MIS graduates to have – intellect, enthusiasm, maturity, and ambition."

Newsletter Editorial Team: Manish Agrawal and Lorie Briggs

Faculty Recognition

Congratulations to the following ISDS faculty members who were recognized for their accomplishments.

- **Alan Hevner**, Professor & Eminent Scholar, was appointed a Senior Editor of MIS Quarterly, one of the premier journals for MIS research.

- **Balaji Padmanabhan**, Associate Professor and Anderson Professor of Global Management, was appointed Associate Editor of Information Systems Research, another premier journal for MIS research.

- **Stan Birkin**, Professor and former chair of the department, retired after serving many years at USF. He was honored with the Emeriti status.

- Associate Professor **Grandon Gill** (third from left), was recognized as one of the two best undergraduate teachers in the College of Business in 2007 by Dr. Judy Genshaft, USF President (pictured, seventh from left, with several of Gill's students).

Gill also received the 2007 Decision Science Institute's Instructional Innovation Award Competition in Phoenix, Arizona, making him the first two-time winner in the history of the competition (he previously received the award in 2005). Kudos!

- Professors **Grandon Gill** and **Anol Bhattacharjee** received the best paper award at the InSITE Conference held in Ljubljana, Slovenia. Their paper, entitled "The Informing Sciences at a Crossroads: The Role of the Client," examined how research was failing to cross the academic-practitioner boundary and steps that could be taken to improve the impact of such research.

Upcoming Events

Business Intelligence Summit, April 18

Location: USF Tampa Campus, Room BSN 115

Contact Person(s): Don Berndt (dberndt@coba.usf.edu) or Balaji Padmanabhan (bpadmana@coba.usf.edu)
We are excited to announce plans for the first Business Intelligence (BI) Summit. The summit will bring together visionaries and practitioners of BI to discuss current challenges, share experiences, and collectively develop and promote this niche. The summit will provide opportunities for professionals to network with like-minded peers. The one-day event will feature three keynotes and three panels discussing issues facing BI practitioners in industry. For more information, or to register online, visit http://coba.usf.edu/department/isds/events/html.

Java for Business Critical Systems, March 10 – 14, 2008

Location: USF Tampa Campus, Room CIS 1036

Contact Person: Nadia Khouri, (813) 974-6748
This intense, five-day course will provide attendees with everything they need to know to develop and deploy Business Critical Java Web Applications and Web Services. Daily labs will provide hands-on experience. Further information is available at: http://coba.usf.edu/departments/isds/events.html.

Software Effort, Quality and Cycle-Time: A Study of CMM Level 5 Projects

In March 2007, two faculty members in the department, Manish Agrawal (top right) and Kaushal Chari published an article in the journal, IEEE Transactions on Software Engineering (TSE), titled "Software Effort, Quality and Cycle-Time: A Study of CMM Level 5 Projects"[1]. This article was the top download at IEEE TSE in March 2007. During Feb – April 2007, it was among the top 100 downloads in the IEEE Digital Library. A summary of this article is presented below.

Conventional wisdom suggests that there are conflicting influences on software development effort, quality and cycle-time. Cycle-time may be compressed at the cost of quality; experienced professionals may improve quality but at increased costs; quality may be achieved at the cost of increased testing effort; larger team sizes may reduce development time while raising total costs; process maturity may improve quality but at high cost etc. However, one of the most important consequences of improved process maturity could be superior conformance quality. Further, the reduction in variability is likely to be most pronounced in organizations at CMM level 5, the highest level of process maturity as per the Software Engineering Institute (SEI) located at Carnegie Mellon University.

Potential Insights

Valuable insights can be gained from a study that focuses exclusively on CMM level 5 software development projects. For example, it would be possible to determine the factors that really matter in determining project development outcomes as well as the benefits that are accrued when software development processes are at the highest levels of maturity. Furthermore, benchmarks based on CMM level 5 projects could be useful goals that many non-CMM level 5 software development organizations could strive to achieve for their own projects. Yet, few prior studies have focused exclusively on CMM level 5 projects. Our goal is to obtain generalizable estimation models from CMM level 5 organizations that may serve as a benchmark for all software development organizations in their own process improvement efforts.

In this paper, we make two major contributions. First, we identify key project factors such as software size that determine software project development outcomes for CMM level 5 projects. Second, we provide benchmarks for effort, quality and cycle time based on CMM level 5 project data. Our results suggest that estimation models based on CMM level 5 data are portable across multiple CMM level 5 organizations. The results are based on data collected for 37 projects from four CMM level 5 organizations. The applications are mostly in the general category of MIS/ business applications, with 34 out of 37 projects reported in this category. The project end dates ranged from May 2001 to October 2004. The four organizations chosen in our study represent a convenience sample from a population of 141 CMM level 5 organizations worldwide.

Kemerer [1] compared software estimation models such as COCOMO, SLIM, Function Points and ESTIMACS. He found that various estimation models resulted in average effort estimation error rates ranging from 85% to 772%. This wide range was attributed to the differences in productivity between the test environment and the environments in which the models were calibrated, suggesting wide variations in software development outcomes across organizations.

Specifically focusing on the impact of capability maturity, improvements in process maturity were found to be associated with reductions in effort. According to a SEI report [2], by adopting Capability Maturity Model Integration (CMMI) based process improvements, Boeing Australia had a 60% reduction in work, while Lockheed Martin achieved a 30% increase in software productivity.

The definition of software quality has evolved over time. Initially, it was defined as conformance to a standard or specification. In 1991, the International Organization for Standardization (ISO) adopted ISO 9126 as the standard for software quality. This standard defines quality as "the totality of features and characteristics of a product or service that bears on its ability to satisfy given needs". A commonly used

1 Agrawal, M. and K. Chari, "Software Effort, Quality and Cycle-Time: A Study of CMM Level 5 Projects", IEEE Transactions on Software Engineering, 2007. 33(3): p. 145-156.

definition is the density of post-release defects in a software program, measured as the number of defects per thousand lines of code lines of code.

We obtained data on the following variables for each project - project size, complexity, schedule pressure, team, personnel capability, requirements volatility, requirements quality, manager's industry experience, manager's experience in current role, and modular complexity of the project. We measured the impacts of these factors on effort, quality and cycle-time after suitably transforming the data for statistical purposes. The following relationships between effort, quality, cycle-time and project-size were derived from the analysis:

$$\ln(EFFORT) = 4.49 + 0.61*\ln(SIZE)$$

$$\ln(QUAL) = 1.38 + 0.3*\ln(SIZE)$$

$$\ln(CTIME) = 4.23 + 0.27*\ln(SIZE)$$

We tested our models for portability across organizations and across projects within an organization. We found that estimates for effort and cycle-time from our model were within about 10% of actuals across projects and organizations. Estimates for defects were within about 50% of actuals. This compares very favorably to prior research that had error rates of up to 700%.

Overall, our results indicated that the adoption of highly mature software development processes during software development reduced the significance of many factors such as personnel capability, requirements specifications, requirements volatility identified in prior research on software engineering.

References:

[1] C. F. Kemerer, "An Empirical Validation of Software Cost Estimation Models," Communications of ACM, vol. 30, pp. 416-429, 1987.

[2] D. R. Goldenson and D. L. Gibson, "Demonstrating the Impact and Benefits of CMMI: An Update and Preliminary Results," Software Engineering Institute, Pittsburgh, PA CMU/SEI-2003-SR-009, 2003. §

Questions and Answers

Alumnus Feature: Sangeet Hegde Desai

An Oracle Applications Consultant with Accenture, Sangeet is one of our successful MS MIS alumni.

Tell us about your current responsibilities and your team?

I'm an Oracle Applications consultant with Accenture's Systems Integration & Technology workforce (San Jose, CA), working as a business analyst/project manager at a global communications enterprise client on an Oracle CRM implementation. I represent the cross-functional Business Intelligence Group. Our 20+ person team of Accenture consultants helps clients with different business process tracks, contributing to the ultimate vision of radically transforming the way client conducts its business. Prior to joining Accenture, I worked on the development of E-Business Suite-procurement applications at Oracle, Redwood Shores.

Describe your educational background.

I earned my Bachelors in Computer Engineering from the Government Engineering College in Goa, India. I graduated from USF's MS MIS program in 2001.

Did you work while going to school at USF?

I worked part time as a research assistant in the ISDS department on the CATCH data warehousing project.

What courses outside the ISDS department did you find to be most useful either then, or in later stages of working in your career?

I remember having thoroughly enjoying "Managing International Cultural Differences" taught by Professor Charles Michaels. Being from a culture perhaps on the other extreme of the several cultural dimensions than the U.S., I found the course to be educational and fascinating. Professor Michaels' anecdotes and experiences from his travels made it very engaging. I still flip through Trompenaars' "Riding the waves of culture" once in a while. If I'm ever presented an opportunity to travel, I am certain that it would be quite handy.

Another ISDS course in the same vein was "International Aspects of Information Systems" – particularly i18n or internationalization concepts taught by Professor Rosann Collins – was useful when I was developing Oracle enterprise applications for a global user base.

What do you remember as the most rewarding experience at the ISDS department?

By far the most rewarding experience at ISDS department was my association with the CATCH data warehouse – a solution to assess the community health. It presented a great opportunity to apply the Data Warehousing concepts learnt in Dr. Berndt's class and Oracle programming knowledge to a very practical and incredibly valuable research initiative. It was a multi-disciplinary effort involving Health Sciences, Statistics and Information Technology where Dr. Berndt's stream of design and delivery ideas complemented domain expertise of Dr. Studnicki and Dr. Hevner. Further it was quite gratifying to know that in many ways the output directly impacted the dollar spent on the community health initiatives at the county level.

I fondly remember long hours spent at the Bear Stearns Lab in the ISDS department with all my colleagues then, Manish, Barb & Barb, Dennis, Marc and others.

My experience with Data Warehousing has given me a distinct edge in my current role.

Were there courses you wished you had taken at USF, in the MIS major or elsewhere?

Topics of interest would be effective visual representation of information, effective presentation skills and basic project management concepts and tools. I can see the latter being a need as I grow in my current organization. It would have been useful to have learnt about user interface design concepts for enterprise applications as well as consumer websites. I also wish I had taken western music classes at school.

Any advice to current students?

Ability to focus on specifics with an awareness of the bigger picture, to add measurable value to a job and have a result oriented approach would be my personal objectives in any role. §