

ISIS 2008

# Book of Abstracts

International Symposium of Information Systems (ISIS 2008)

December 19-21, 2008



# ISIS 2008



**19-21 December 2008**

## **The Third International Symposium of Information Systems**

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## FOREWORD

The third International Symposium of Information Systems (ISIS 2008), from December 19-21, 2008 hosted by the Centre for Information Technology and the Networked Economy (CITNE), and the Business and Technology Club at the Indian School of Business (ISB) witnessed a gathering of various researchers and practitioners from all over the world.

After the remarkable success of ISIS 2006 and ISIS 2007, this year also the symposium brought out leading academic researchers in the IT field who gave a productive interface with the business leaders about the Information Systems Environment not just in India but around the world. The symposium induced copious opinions and encouraged the participants to impart and debate on role of IT in enhancing global competitiveness and economic development as well as discuss current unpublished work and research topics that are relevant and rigorous.

ISIS 2008 commenced with a vibrant Industry day with a vivacious key note address by Kris Gopalkrishnan, CEO and MD of Infosys, who highlighted the changing trends in IT and to become competitive and qualitative with the changing IT Scenario. He further spoke about Infosys spending 4% of its revenues on training and from proving technical solutions to business solutions. He concluded himself by adding that the IT industry has survived and done well in spite of the significant changes.

The first day also witnessed a series of Panel discussions by eminent personalities from all over the industry who spoke on various topics like Captive v III Parties:- Defining the value Efficiency frontier, Transformational IT Management: New trends in IT consumption for business value and Human capital development in the IT/ITes sector. Each Panel was made up of three to four industry level leaders and moderated by a leading academic. The subsequent two days focused on current academic research, which included a series of paper presentations followed by discussant comments.

In total 26 abstracts were selected for presentation at the symposium. This booklet comprises the abstracts of the final papers presented at ISIS 2008. it provides a rich insight into the diversity of the ongoing research at the intersection of ICT, business and society at ISB and related research institutes.

To end with, we would like to express our gratitude to all the contributors- authors, speakers, program committee members, and every single participant. We also thank our Associate Director (Reema Gupta) and team CITNE (Tina Dalmia, Richa Bhandari, Arun Kumar and Swati Domalpally) who worked hard behind the scenes to make the symposium a success.

We look forward to your inputs to make ISIS 2009 a greater success.

Co-Chairs:-

Rajiv Banker (Temple University)

Ravi Bapna (Indian School of Business)

V Sambamurthy (Michigan State University)



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# PANEL DISCUSSIONS



# Panel I

## Captive V/s III Parties: Defining the Value-Efficiency Frontier

### Panel Members

Pari Natrajan, Zinnov  
Nina Nagpal, Morgan Stanley Advantage Services  
Amresh Ramaswamy, Microsoft, India (R&D)  
Kashyap Kompella, TPI, India

### Moderator

Prof Rajiv Banker (Temple University)

The first panel on Captive v III Parties : Defining value efficiency frontier comprised of eminent panelists who presented their views on defining value efficiency through research and development, core competency and leadership.

Amresh Ramaswamy , Director Finance, Microsoft India, R&D, spoke about the evolution of R&D at Microsoft and how it aims to attract the best talent and retain them. He further said that, “The Indian ecosystem is still weak and the emphasis is still on programme management skills rather than research.” Kashyap Kompella, Advisor and Head of Research, TPI India traced out some changes in this arena. He highlighted some interesting points about the preference of Bangalore going down, that the number of manufacturing companies operating now in India have increased, there is a lot of emphasis on competency creation in specific areas, the increased importance of organizational alignment between leadership teams in US , and the increased role of Indian leadership in global responsibilities. Pari Natrajan, CEO, Zinnov maintained that his company’ success was all bout customer access and about execution. He said that, “ it is about co-creating with your customers and execution of your strategies that is extremely important.”



## Panel II

### Transformational IT Management : New trends in IT Consumption for Business Value

#### Panel Members

Bipin Paracha, Wipro  
Prashun Dutta, Reliance Energy  
Manik Gupta, Google  
Narasimham V Peri, IBM

#### Moderator

Prof V Sambhamurthy (Michigan State University)

The second panel spoke about enhancing the business value of IT.

Bipin Paracha, Practice Head, Wipro noted that according to the upcoming trends most of the younger generations are using less of email and more of Non-Enterprise infrastructure giving rise to management challenges of handling huge data and its security. While Prashun Dutta, Sr VP-IT, Reliance Energy, showed us four ways (a) Understanding the basic business nature and aligning IT with it accordingly (b) Adding values to integrate operation technology with IT (c ) Coming up with ideas which are sustainable and help in enhancing the value (d) Looking for its usability- through which we can add value to the business and sustain it.

Narasimham V. Peri, Partner, GBS Leader for CRM, Performance Management, Analytics and IOD for India/SA, IBM , added that a value driven company is a reality and it needs to sustain it's value on a gradual basis. The business value should be felt by the end users and Incremental Value is a must for a business. He further added that there is a need to clearly define a value metrics and empower the consumers asking them what they want. Manik Gupta from Google described the new trends in IT from an Innovation perspective where everything is provided by the customers and consumers who organize world's information and make it accessible to the users.



## Panel III

### Human Capital Development in the Indian IT/ITes Sector

#### Panel Members

Prithvi Sher Gill, Accenture  
Ashok Reddy, Teamlease  
Tan Moorthy, Infosys  
Prof Ritu Agarwal, University of Maryland

#### Moderator

Prof Ravi Bapna (University of Minnesota)

The third panel discussed the need for developing human capital in the IT sector. According to Prithvi Sher Gill, Accenture Head, HR, “There is a pool of talent still unexplored and to recreate this pool of talent, we need to explore it, invest in it and make it accessible for everybody.” Ashok Reddy from Team lease highlighted that there should be movements from the rural to urban, farm to unfarm, school to work to make up with the challenges. As also there is a connection between the demand and supply but when there is a mismatch, the element of repair comes which in itself is a challenge.

Tan Moorthy, VP and Head Education and Research, Infosys noted the need for 3 I’s– Infrastructue, Intellectual and Industry. He further added that change could be brought in the industry by raising the capabilities of faculty in schools, giving exposure, encouraging team work, developing communication skills and providing education for a survival perspective. Prof. Ritu Agarwal from The University of Maryland was of the opinion that one of the key challenges today is to train and develop Human Capital Development (HCM). According to her HCM is team work, motivation, ideas and openness to new ideas. It is a complex activity and involves a key set of trade offs like managing mindsets, benchmarking the profile and leveraging long term employment.





# ABSTRACTS





# Outsourcing Governance



# Task Complementarity, Modular Architecture and Incentives in Contracting for “Software as a Service”

Anjana Susarla (University of Washington )  
Anitesh Barua (University of Texas at Austin)

In recent years, advances in communications technologies have resulted in the unbundling of the corporation. A related development is modularization, where processes can be outsourced to suppliers and managed through well-defined interfaces, enabling firms to distribute tasks to suppliers without extensive communication. With the growth in web service frameworks and service-oriented architectures (SOA), business functions can be linked through standardized application program interfaces. We examine the economic implications of “Software as a service” (SaaS), which is an IT service innovation that transforms IT resources into a continuously provided service. To realize the promise of SaaS, IT service processes need a clear demarcation of roles and responsibilities between providers and clients. Standards need to be defined to measure process execution by the service provider, including processes to trace failures in service execution by the provider. The outsourcing initiative should be structured so that appropriate reward systems are provided for performance.

When the above conditions are met, IT services outsourcing can be governed through process level service level agreements (SLAs) and incentives for performance. We argue that one of the problems in the ‘software as a service’ model is the role of knowledge interdependencies between clients and vendors. A part of the service provided by a SaaS provider consists of automation of tasks that involve substitution of labor and IT for increased efficiency. However, another aspect of service is to provide informational capabilities to enable decision-making, which we refer to as business analytic capabilities. To perform on this dimension, the provider need to understand client-specific routines and processes, which creates knowledge interdependencies between the client and the provider, resulting in the provider’s effort being observable but not verifiable.

We build upon the multitask agency framework to highlight the provider’s incentives to allocate effort across automation and business analytics. High-powered incentives on a subset of tasks that are verifiable create the problem of distortion of effort away from crucial tasks that are not readily reflected in the performance measures. The absence of codification and lack of standardization in business processes result in tight coupling between the provider and client, and the consequent interdependencies between providers and clients create a difficulty in verification of business analytic capabilities. Service level agreements emphasize the aspects of verifiable performance on the automation dimension, accentuating the distortion in incentives faced by the provider. We present an empirical test based on data from 154 providers to test the prediction that when the value to a client is complementary in the dimension of analytics and automation, and when performance on business analytics is difficult to verify, incentives should be low powered. We also find that adoption of modular architectures can reduce the multitask agency problem associated with SaaS through the use of design principles such as loose coupling among processes and standardized interfaces across tasks that lower process interdependencies between the provider and client.



# The Impact of Idiosyncratic Firm Learning on Value Creation in Strategic Outsourcing Relationships

Deepa Mani (Indian School of Business)  
Anitesh Barua (University of Texas at Austin)

We investigate whether managers in outsourcing firms, through their prior experience and association with the provider, learn to better manage outsourcing relationships. In addition to these measures, we identify learning effects from unobserved heterogeneity in outsourcing and contracting capabilities. We find that learning effects are more significant in simpler fixed price contracts than in contingent variable price contracts. This is evidenced by greater insider purchases of the outsourcing firm's stock and long-term abnormal returns following the implementation of the outsourcing contract. The results suggest that while managers forecast superior performance for their firms, the market is inefficient in pricing learning effects. The results provide evidence against the use of announcement period returns to assess the financial value of strategic management and explain why prior research may have identified large learning effects in relational contexts characterized by greater contractual ambiguity.



# Relational Contracts in IT Outsourcing

Anjana Susarla (University of Washington)

Ming Fan (University of Washington)

Debabrata Dey (University of Washington)

Business exchanges involve both formal and informal contracts. In IT outsourcing, while fixed price and time and materials contracts are formal contractual relationships between firms, relational contracts are informal in the sense that the contractual outcomes could be prohibitively costly to specify ex ante and firms have to rely on repeated interactions to sustain cooperation. Building upon prior literature in economics, this paper suggests that relational contracting affects the design of formal contracts by lowering the costs of contracting. Using a comprehensive data set on information technology outsourcing contracts drawn from public disclosure filings mandated by the guidelines of the U.S. Securities and Exchange Commission (SEC), we examine the role of formal contracts and relationships between parties.

Since repeated interactions can motivate long-term cooperation and may act as a substitute for formal, tightly defined contracts (Baker et. al 2002), relational contracts can provide incentives to the vendor in both cost reduction and quality provision. The effect of relationships on contract choice depends on which effect prevails, i.e., if relationships induce incentives for cost reduction or whether relationships provide incentives for quality. When the nature of the service requires asset-specific investments, relational contracts may reduce the need for stringent damage measures for non-performance. While formal contracts provide incentives for vendors to concentrate on measurable performance dimensions, obligations and rights of parties to a contract are not always enumerated in a contract. Relationships in conjunction with formal contracts can reduce the potential for effort distortion associated with arms-length contracting arrangements. We are continuing this work by building analytical models to develop testable predictions about relational contracting structures in the market for outsourced IT services.





# Outsourcing Risk Management



# **Attrition of IT Workers in the Context of Offshore Outsourcing: The Economic Impact of Training**

Ravi Bapna (University of Minnesota)  
Alok Gupta (University of Minnesota)  
Amit Mehra (Indian School of Business)  
V. Sambamurthy (Michigan State University)

The turnover of IT workers within MIS organizations of firms has long attracted research attention as replacing IS workers is costly. The focus of the extant research has been on explaining the turnover intentions of IS professionals with a variety of factors playing a significant role. These include job satisfaction, work exhaustion, fairness of rewards, and more recently life-career goal frustration. IS professionals working within business firms primarily seek to contribute to their firm's effective leverage of IT. They are motivated to make strong internal contributions, but do not typically contribute directly to revenue and are often considered to be cost centers. In contrast IS professionals working in an offshore outsourcing context, such as in the Indian IT/ITeS industry, are evaluated primarily on their ability to generate revenue. This difference in orientation calls for a closer look at factors influencing attrition and how it can be managed in the offshoring context.

While some initial guidelines are available for IT firms to control their attrition rates, there is lack of a systematic econometric study that establishes whether the levers that had an impact on attrition in the context of other industries carry weight in the IT industry as well. Further, there is no evidence of the relative effectiveness and economic significance of these levers in controlling attrition in the IT industry. This paper attempts to answer both these sets of questions.



# Process Structure & Complexity Arbitrage In Offshore Outsourcing: Evidence From Field Research

Ravi Aron (University of Southern California)

Siddarth Jayanty (University of Pennsylvania)

Ying Liu (University of Hawaii)

Praveen Pathak (University of Florida)

Recent reports in the business and trade press have speculated that several ‘high-end’ service jobs could be off shored to countries such as China and India. These reports suggest that jobs requiring “high end” skills are not easy to offshore while those that require – so called - “low-end” skills can be easily executed offshore. As examples of jobs that require so called low-end skills, tasks such as customer service, tech support and tele-marketing of products and services (such as selling of credit card-based loans) and tele-collections of outstanding debt are frequently mentioned. As examples of jobs requiring “high-end” skills asset pricing, tax analysis, financial analytics and modeling, Bioinformatics are cited as examples. Many reports in the business press also take the view that the jobs requiring “high-end” skills are characterized by higher complexity and that offshore service providers in India and China are beginning to acquire the required complexity to execute these jobs.

When we spoke to managers that manage the execution of various processes in several countries we found that perceptions of which processes were complex and which were not varied greatly. In general managers in the western industrialized nations disagreed with their counterparts in the Asian countries to which they offshore processes. As we shall demonstrate in this paper, the principal reason for this divergence in assessment of complexity is that managers in the western industrialized nations and their Asian counterparts associate very different sets of factors as causes for process complexity. We interviewed several managers in these countries and sought their views on what factors contributed to process complexity. From these interviews it became clear to us that process complexity is driven by several factors of which the principal ones were the following: the nature of work (analysis vs. qualitative), codifiability of work (the extent to which the work could be codified through a set of rules) and the objectivity of metrics (the extent to which the set of metrics used to measure the quality of output could be objectively described and understood without ambiguity by the client and the provider).

Our research addresses the issue of complexity in offshore outsourcing and its impact on the output quality. Contrary to popularly held beliefs (as reflected by the business and trade press) we show that when information work is off shored, the resulting complexity of work is highly subjective. Process complexity cannot be neatly classified into work that requires “high-end” and “low-end” skills. Our research consists of on an empirical analysis of process complexity based on field research that we conducted in several countries. We disaggregate process complexity into its constituent elements and investigate the factors that contribute to process complexity in different regions.



# Mitigation of Behavioral Risks in Offshore Software Development

Saji K. Mathew (T.A. Pai Management Institute)  
Anandhi Bharadwaj (Emory University)  
Yuanyuan Chen (University of Singapore)

Firm level risks in offshore software development could be broadly classified into ex ante and ex post risks though the former would influence the latter as delayed negative outcomes. Our research focuses on the ex post risks of firms in off shoring of software development. The risks and their drivers have been identified based on established economic and social theories. We identify shirking, service provider lock-in, and loss of control over information assets as the categories of risks ex post. The drivers of shirking risk comprise of perceived effort incentive gap, limited observability and contract inadequacy. Service provider lock-in risk has two major causes: client's relationship specific investments and scarcity of service providers.

In addition to limited observability and contract inadequacy, we identify IP vulnerability and competitors in service provider's clientele as the sources of risk for loss of control over information assets. Further, we posit that relationship serves as a mitigating dimension for ex post risks. The relationship constructs risks and benefit sharing and client's experience mitigates the shirking risk, service provider's dependence mitigates the risk of service provider lock-in, and service provider's credibility and service provider's benevolence mitigates loss of control over information assets.



# **Risk Mitigation in Remote Infrastructure Management Engagements: Role of Service Level Agreements**

Prof. Madhuchhanda Das Aundhe (T.A. Pai Management Institute)

Prof. Saji K. Mathew (T.A. Pai Management Institute)

Offshore outsourcing, popularly known as *offshoring*, has become an important global strategy of most of the organizations today. The growing opportunities in offshore outsourcing do entail a cost to clients and service providers, as the failure of an outsourcing contract affects both clients and service providers. In general, outsourcing contracts carry risks owing to a limited understanding about the future. As outsourcing engagements continue to evolve and become increasingly complex, their success will largely depend on understanding the risks involved, and deploying effective mitigation strategies.

The major service lines for IT outsourcing are Infrastructure Management Services (IMS), Application Development (AD) and Application Maintenance (AM). An earlier study done by the authors (Mathew and Aundhe, 2007), has developed three categories of risks that are faced by the offshore IT service providers in Application Development and Maintenance Projects - (i) project specific risks, (ii) relationship specific risks, and (iii) macroeconomic risks.

Full outsourcing of IT infrastructure has been prevalent since the early days of computing. Challenges in 'full outsourcing' resulted in customers adopting 'selective sourcing'. This shift toward selective sourcing of infrastructure management also catalyzed the growth of offshore sourcing of Remote Infrastructure Management (RIM).

Providers could now offer a bouquet of services, adopting an 'asset-light model,' that did not require upfront large capital investment, thus reducing the cost entry barrier (Mukherjee and Singh, July 2008). As per Forrester Research, RIM is an emerging outsourcing opportunity. This has attracted quality global service providers into the domain with a very well defined set of service offerings. This study deals with identifying the key risks that a third-party offshore IT service provider faces in an infrastructure management engagement. IMS being characteristically different from Application Development and Application Maintenance, the authors attempt to understand if the categories of service provider risks in case of AD and AM, continue to hold for IMS, as well. The study also tries to understand the risk mitigation strategies adopted by the IMS service providers and the role of Service Level Agreements (SLAs) in service provider risk mitigation. A case based research approach (Yin, 1994) is used for the study. The unit of analysis is a RIM engagement. The data collection involves in-depth interviews with senior management of the service provider organizations, business development managers, project managers and other experts involved in the projects. It also involves an in-depth look at contract documents (MoUs) or any other proposal/project documents to extract sources of risk, type and contents of SLAs for various service lines.





# Business Value of IT and Software Engineering



# Globally Distributed IT Application Portfolio Analysis

N Dayasindhu ( SETLabs, Infosys Technologies Ltd. )  
Venkatakrisnan B ( SETLabs, Infosys Technologies Ltd. )

Studies on globally distributed IT services work indicate that firms typically move across four stages of maturity (Carmel and Agrawal 2002). The key differences between the most mature stage and other intermediate stages are (1) new IT application development happen offshore (2) both business function domain and technology expertise reside offshore. IT vendors who partner client firms in stage four of the Sourcing of IT Work Offshore model have developed frameworks and tools that help analyze IT applications landscape to identify opportunities to offshore development. It is interesting to note that the global distribution of work is operating at two levels. At the first level, as stated, the analysis of IT applications is used for identifying opportunities for new end to end offshore development. At the second level, this analysis in itself has a significant offshore work component – a service innovation and a move away from the traditional model where IT consulting work is entirely done at the client site.

Most prior studies on globally distributed work in IT services revolve around coordination and control in the phases of the systems development life cycle and not on IT consulting work. This typically pertains to the first level, where once identified how best can the opportunities for new offshoring development be executed.

For e.g. Hersleb and Grinter (1999) mention how modularizing software development across geographically distributed teams can help controlling such projects. While Ramasubbu et. al. (2008) examine whether structured software processes like the Capability Maturity Model are effective in mitigating the negative effects of work dispersion in offshore software development.

From a offshore decision perspective, existing studies have typically focused on which country to outsource (Rottman and Lacity 2006). The recent *MIS Quarterly* special issue on Information Systems Offshoring had only one paper on offshoring decisions among the forty three submitted (King and Torzadeh 2008). The topic of this study was on deciding which country to outsource. While the strategic choice of country to offshore is important, it is equally important to study the operational decision on how to choose an IT project to offshore.

The proposed paper examines the second level of the global distribution of work where an IT services vendor has developed a method for application portfolio analysis that follows an onsite-offshore model using pre-defined frameworks and tools. The IT application portfolio analysis is used to make the operational decision on what IT projects to offshore. The workflow of the portfolio analysis and the tool that supports the analysis and related workflow will be discussed in the context of a case study.



# TESTING THE BUSINESS VALUE OF IT: A META-ANALYSIS

Serkan Ada (State University of New York at Buffalo)  
Prasad Balkundi (State University of New York at Buffalo)  
Raj Sharman (State University of New York at Buffalo)

Information Technology (IT) has evolved over many years and this evolution seems to be constant demanding of continued and increasing investment in IT. Worldwide yearly investments in Information Technology are projected to reach \$1 trillion by the year 2012. Furthermore current projections reveal that the increase in IT spending will likely be about 9.5% (US dollars) worldwide in the year 2008. The fundamental question of whether these investments matter remains. Does IT affect firm performance? The literature is dotted with several primary research studies that seek to explore this phenomenon. The studies span a period over two decades. Every study seems to add to the ambiguity rather than provide resolution. This research paper attempts to resolve the issue of how spending as it relates to IT affects firm performance by comprehensively reviewing all of the published literature in the area.

While the overarching question about the business value of IT remains the answer seems to depend on a variety of factors that seem to influence the outcome or moderate it. The discord also arises because of the way the dependent and independent variables are conceptualized and operationalized begging the question - what performance measures should companies use in measuring the value of their IT investments? The paper also attempts to answer questions such as the impact as it relates to firms in the US and Non-US firms, firms in service industry and manufacturing industry, and the type of IT investment. Results show that IT investments are positively and moderately related to firm performance. In addition, IT investments show a greater impact in US firms and firms in manufacturing sector.



# **Investigating Suitability of Requirements Volatility Management Approaches A Bimodal Approach**

Rahul Thakurta (Indian Institute of Management , Calcutta)  
Frederik Ahlemann (European Business School, Germany)

Despite advances in software project management approaches, projects continue to be troubled because of requirements volatility. The high instance of failure under volatility indicated some level of organizational inadequacy in properly managing change, and emphasized the need of contextual change management techniques which were considered to be appropriate.

The current research structured as a combination of interviews (11) and survey (82) in two phases investigates the organizational perception regarding the problem of requirements volatility. We explore the level of awareness concerning requirements volatility, its effect on project management quadrants, the approaches available to cope with the problem and their suitability under different environments.

Results indicate a heightened perception of risk among study participants of the problem of requirements volatility. Schedule, effort and development activities were found to be most affected because of volatility, the result invariant across different industry categories.

Project specific data of 42 endangered projects revealed 15 different approaches to managing projects under volatility, among which the top two were “Involving Business Side”, and “Using Iterative/Phased Approach”. A classification of the approaches based on project type revealed “Agile Processes” to be more adopted for small scale projects, whereas “Adjustment of Human Resource” received more priority among medium scale projects. Large scale projects resorted more to “Project Scope Negotiation” and use of “Expert Knowledge”. Frameworks like “Change Control Board” were found to be frequently used in finalizing the requirements. Adoption of 3<sup>rd</sup> party tools like “Rational Rose”, “Influx”, and “Mercury” for change administration was also reported. Respondents felt that knowledge of requirements volatility patterns will assist them in asking right questions, prevent mistake reoccurrence, reduce effort, better control budget and workforce, reduce team frustration, and manage business expectation. Even though usage of iterative approaches was stressed, waterfall model emerged as the most frequently used within the study sample.





# Innovative Applications



# **An Exploratory Study of the Influence of Web services and SOA on Business Process Agility**

Dr. Ravi Seethamraju (The University of Sydney )

Responding to changes in dynamic business environment requires business processes to be agile. Service oriented architecture (SOA) and web services, an emerging technological paradigm is expected to deliver agility, by making it easier to store, share, and reuse discrete services independent of platforms and applications through ubiquitous Internet and open standards. Despite huge potential and significant benefits touted by major software vendors, consultants and practitioners, adoption of SOA and web services is still in a nascent stage and the academic research is limited. Other than some large organizations, there are no significant adopters of these emerging technologies in Australia New Zealand region. Using a multi-case research design and a questionnaire survey, this study will investigate the influence of SOA and web services on the ability of a firm to build and manage agile processes. In the first phase, semi-structured interviews are conducted with various IT managers/CIOs/Senior functional managers in 4 organizations. This paper reports on this first phase. Data collected in the first phase is being analyzed. In the second phase, a questionnaire survey will be conducted across ANZ region to empirically test the qualitative study findings.

Identification of common tasks/activities that could be used in several processes and standardizing them across the enterprise is considered a significant and challenging organizational exercise in a large enterprise considering its organizational culture, power relationships, business policies and priorities, structures and rules. Scores of vendors, differing standards and technologies to choose from, absence of any enabling tools for managing the transition into SOA, and apportioning the costs of developing and maintaining services to various business processes, ownership and accountability of these services, selection and prioritizing of the processes for this transition and governance are considered major challenges. Lack of standardization, Organizations are concerned that the loosely coupled nature of SOA may increase the number of moving parts in the system and may run the risk of ending up with a collection of point-to-point services that simply add another layer of technology.



# Strategies to Improve Information Systems Service Quality and User Satisfaction: The Role of Zone of Tolerance

Narasimhaiah Gorla  
(American University of Sharjah)

The market research by Giga Information Group Inc reveals that 50% of the IS outsourcing agreements fail, one of the reasons being inadequate service quality. Information Systems (IS) service quality is the degree of discrepancy between users' normative expectations for service and their perception of service performance. A zone of tolerance (ZOT) is the range between the desired service expectation and adequate service expectation, within which IS services will meet users' demands. In this paper, we evaluate the relationships between perceived service and user satisfaction when perceived service is below the ZOT (or unacceptable service zone), within the ZOT (or acceptable service zone), and above ZOT (or superior service zone). Secondly, the study determines the above relationships for each service dimension: tangibles, reliability, responsiveness, assurance, and empathy. These relationships help IS managers to determine the service dimensions where allocation of resources will be most effective for IS user satisfaction.

The analyzed data represents survey responses of 193 IS users from various functional departments (manufacturing, finance, human resources, and accounting) of various industries in North America. The results are presented below. First, the satisfaction coefficient (level of satisfaction per unit improvement in service performance) is highest for IS users in the unacceptable service zone. Thus, it is highly effective to allocate resources that are targeted at users in the unacceptable zone. Second, reliability dimension of service quality has the highest satisfaction coefficient for users in the acceptable zone; assurance and tangibles dimensions have higher satisfaction coefficient for users in the unacceptable zone. These represent most potential service quality dimensions for IS managers to allocate resources since these produce highest satisfaction levels among users per unit resource spent. Lastly, the sensitivity of service performance with respect to service expectations has been analyzed. Increasing desired service expectation for IS users in the acceptable and the superior zones has the higher impact on service performance. Increasing adequate service expectation for users in the unacceptable service zone has higher impact on service performance than for users in the other zones. IS managers should make use of these significant cues in order to improve the service performance of IS service providers, either in-sourced or outsourced.



# **Grid technology for data intensive risk analysis of drought prone area**

Harshalata Petkar (Dr BabaSahed Nandurkur College of Physical Education)  
Girish Kambl (Shri R R Lahoti Science College)  
Vishwas Walde (GSDA)

Managing natural resources is challenging in front of research and development team. Processing geographical information and putting it altogether to analyze the risks of drought prone area is greatly difficult as it involves the processing of images and vast databases concerning to specific geospatial information of earth science .Risk analysis can be done through geographical data integration and remote sensing .Huge data mines containing all the geological information need to be analyzed and processed in time.

Hardware and Software system at particular location are not capable of storing as well as processing of the this variety of data for the predication of risk i.e. specific area which will turn into area, with no water resources in future. In this case ,Grid computing resources ,located geographically apart from each other can be utilized and results can be visualized and discussed in real time .Grid computing and its application area is widening day by day. This paper will explore the grid technology for the risk analysis of drought prone area which characterized by promoting true scalability.





# Emerging Markets



# **Determinants of Adoption of Mobile Customer Relationship Management in India: An Empirical study from User's Perspective**

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The development of innovative mobile technologies has offered a gamut of new ways to companies to meet their customers' expectations. Emergence of mobile Customer Relationship Management (mCRM) is the outcome of one such practical applicability. This research study focuses on the investigation of the appeal of new mobile CRM services to airline customers in India. An exploratory study is conducted among privileged customers of an airline so as to find out the factors which determine the use of mCRM applications by these customers and suggest the enhancements in the application for better customer relationship.

The study firstly proposes a conceptual framework indicating the relevant aspects of mobileCRM. Then it applies the framework to get the insight in various factors facilitating the users' adoption of mCRM application and the barriers in the usability. Interviews of the loyalty program customers and respondents from the various management levels of the Airline Company are the key data sources. On the basis of these data sources the facilitating factors of the adoption, the barriers and issues related to the implementation of mCRM application are identified. The major contribution of the study indicate that while there are many uncertainties related to mCRM the mobile medium can be an effective medium to customer relationship building and maintenance in addition to traditional and electronic channels. The paper finally presents contributions, limitations and avenues for the further research of this emerging topic.



# Need –Based Economy for a Sustainable Technological Growth

Ashutosh Kasera (Rai Business School)

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The idea of this paper is to analyze the Impact of manufacturing and uses of computers. The paper studies about the rapid advancement done in the field of silicon chip technology. The process during which the natural resources are getting depleted apart from the damage done to our environment has been studied in the given paper.

The paper is not against the advancement of technology but discusses about finding a middle way, where the development can be sustainable, not the depleting one. The rate at which the technology is growing in the world will leave Earth full of ashes and toxic for our future generations.

The paper talks about sustainable growth of technology and the scientific consideration for the treatment of the e-waste created by the end of the product life cycle. It also advocates about the extension of product life cycle. One important issue is to treat and minimize the e-waste generation as a result of technological .development. Recycling and Reuse should be the focus area for the technological innovators. The paper also discusses about the social impact of the technology advancement for improving the living style and adding to the luxuries of the rich who can afford at the cost of the sufferings from the poor. Is it justified to exploit natural resources available to each and every human kind from nature by certain groups of society? It discusses about the plight of the developing countries which are deprived of even safe drinking water, where on the other hand, millions gallons of water are used per day to manufacture the silicon chips. In order to keep pace with the technological growth, the developing countries are blindly putting their efforts at the cost of Environment and Future Generations neglecting the call for sustainable technological innovations.





# IT Products & Services



# **Impact of Rank-By-Bid and Rank-By-Revenue Mechanisms on Quality Score and Revenue -By-Bid and Rank-By-Revenue Mechanisms on Quality Score and Revenue**

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Sponsored search is a form of online advertisement where advertisers (bidders) bid for certain keywords and the search engine (auctioneer) allocates available slots to the advertisers following a pre-determined ranking mechanism. In this paper, we examine two of the most widely used ranking mechanisms. The first, where bidders are ranked based on their bids (rank-by-bid, or RBB) was used by Yahoo! until recently. The other mechanism ranks bidders based on the product of their bids and quality scores of their advertisements (rank-by-revenue, or RBR), and was initiated by Google. Existing literature in this area has implicitly assumed the quality score to be exogenous. As an advertiser can usually improve the quality score of his advertisement by spending money, time, or effort, quality score should ideally under which one ranking mechanism is more profitable to the Search Engine than the other when an advertiser optimizes the quality score of his advertisement and when it does not.



# Organic and Paid Search Advertising: Complements, Substitutes or Neither

Anindya Ghose (NYU Stern School of Business)  
Sha Yang (NYU Stern School of Business)

Over the past few years, search engines like Google, Yahoo and MSN have discovered that as intermediaries between consumers and firms, they are in a unique position to sell new forms of advertisements. An important determinant of the effectiveness of sponsored search advertising for a given advertiser is the likelihood of the same advertiser appearing in the natural or organic listings of the search engine, and its position on the organic search listings for a given keyword. Organic rankings of advertisers' websites are based on a complex and proprietary indexing algorithm devised by the search engine involving the quality of the website and the website's "relative importance" with respect to other links. Thus, a consumer faces two competing offerings that may both be relevant to their search query: (i) the sponsored search listing and (ii) the organic search listing. Firms are now trying to grapple with the trade-offs in each of these two forms of referrals. On the one hand, because a firm can control the message of paid search ads, one would expect higher conversions from them. On the other side, because people value the perceived 'editorial integrity' of organic listings, one would expect higher conversions from them.

These mixed findings then motivate the question that to what extent should firms invest in sponsored search advertisements when they also appear in the organic listings for a given search query. Does a firm really benefit from sponsoring paid search advertisements when it shows up in organic search listings for the same keyword? Our key objective in this paper is to compare paid ad listings with organic listings and analyze the interdependence between these two forms of advertising. By modeling the impact of paid search ad on click-throughs in organic search listings and vice-versa, we aim to examine if these two kinds of listings complement, cannibalize, or are independent of each other. We use a unique panel dataset of several hundred keywords collected from a large nationwide retailer that advertises on Google. We use a Hierarchical Bayesian framework in which we model consumers' behavior jointly with the advertiser's and search engine's decisions. Our analysis suggests that both SEO (Search Engine Optimization) and SEM (Search Engine Marketing) have a complementary role to play in sponsored advertising.



# **An Empirical Analysis of Recommender Systems and Market Diversity**

Daniel Fleder (University of Pennsylvania)  
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Recommender systems give consumers a new means to filter content and focus on their interests. Many researchers have predicted that such filtering will undesirably fragment consumers. Others have argued that recommenders have homogenizing effects because they share information among users. This paper investigates how recommender systems contribute to the diversity in online markets. Specifically, do recommender systems create fragmentation among users? We use a novel dataset that records pre and post recommender purchase behavior to study the problem. Our analysis reveals that users have more purchases in common and appear closer to one another in a consumer purchase network. The study helps reconcile the opposing conjectures in the literature on the impact of recommenders on market diversity.



# Maintaining Knowledge based Systems in the presence of Drift and Sudden Shocks

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Knowledge-based systems (e.g., intrusion detection systems) are widely used to support critical business functions. Over time, the effectiveness of such a system often decreases and requires necessary modifications to the knowledge-base. Furthermore, the performance could also drop abruptly, e.g., a new vulnerability identified in an operating system could lead to a sudden drop in the ability of the intrusion detection system to discriminate between normal and malicious users. We study the problem of determining the optimal amount of effort (often by a human expert) that needs to be expended to continuously maintain the system in the presence of performance drift and sudden shocks.

Using the ROC curve to derive a measure for system performance, we minimize total costs by balancing error costs on the one hand against the cost of human effort to maintain the system. The problem is cast as an optimal control model in which the optimal effort intensity is calculated as a function of time. We compare optimal structures with and without the presence of shocks and find that the steady-state system discrimination ability decreases in the presence of shocks.



# Versioning of Information Goods under Usage and Capacity Constraints

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Research in economics has studied quality-differentiated product line and pricing decisions through vertical differentiation models, albeit largely for physical goods (Mussa and Rosen 1978). Such quality differentiation for information goods is also called versioning, where a vendor provides different qualities or versions of a good which sell at different prices (Varian 1997). While a recent research has suggested that the shape of consumer utilities and marginal costs affect a vendor's versioning decisions (Bhargava and Choudhary 2008), others have demonstrated the need for unique price schedules that are different from those of physical goods (Sundararajan 2004). An important assumption built into utility functions in extant models is that consumers enjoy "free disposal," i.e., more of a good cannot make a consumer worse off (Mas-Colell, et al. 1995). However, for many information goods and services, consumers' utility in product features is not strictly increasing as they suffer from usage related constraints, e.g., software consumption is intrinsically associated with memory usage. For example, even for the *same price*, a consumer may prefer a smaller bundle of Word and Excel, rather than the entire MS Office package as installing and using greater number of features may put a strain on his resources.

Similarly, iPod users are restricted in the number of songs that they can store from both a storage-size and searchability point of view. Consideration of this usage constraint becomes increasingly important for mobile devices where both storage and memory come into play. This assumption of free disposal, usually represented by a monotonic utility function (even if concave in many cases), is increasingly being questioned in the case of information goods. While, a recent research in IS has examined goods with no-free-disposal (NFD) through contracts for personalization services under privacy constraints (Chellappa and Shivendu 2007), there is generally little or no research in this area where a realistic abstraction of information goods consumption has been proposed. Our research addresses these gaps through a comprehensive analysis of an information goods vendor's product-line (versioning) and pricing decisions under multiple scenarios including when there is no free disposal.

**Keywords:** mechanism design, versioning, information goods, pricing, no free disposal .



# Tariff Structures for Pricing grid and Computing Resources

Hemant Bhargava (University of California)

This paper examines pricing mechanisms for selling on-demand computing over a grid. Potential buyers of computing resources are uncertain about their demand but have private information regarding the likely distribution of demand. Price structures can play two roles - revenue generation and signaling of demand. We compare the performance of different price discrimination mechanisms along these two dimensions, and show that mechanisms that give the buyer greater flexibility in designing the contract can reduce revenue but lead to better demand information, thereby reducing capacity costs.



# Categorizing User Interests in Recommender Systems

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Recommender systems are valuable components of e-commerce websites as they help in providing personalized recommendations to users, which is beneficial to both the user and the website owner. Personalized recommendations are generated by analyzing each user's interests which are identified by analyzing the attribute or content descriptor of items associated with his transactions. While generating recommendations for a user, opinions of other similar users are also taken into consideration. Existing popular recommendation systems assume user interests to be static. As a result, there is a time lag before existing systems can detect a shift in a user's interests, which in turn can result in missed business opportunities. Changes in user preferences occur when a user develops a new interest or loses an interest he once had. Some common examples of this kind of change are a movie viewer acquiring a recent liking for western movies, a book reader developing a new interest for books by a particular author or books on a particular subject.

Examples of users changing their interests are prevalent in most domains where recommender systems are extensively used like books, movies, music, research papers, television etc. In this paper, we propose a method to categorize a user's preferences that takes into account the normal situation of changing tastes. According to the user's transactions and the items' characteristics, those characteristics are inserted into different dynamic sets to describe the user's preference: characteristics that are part of his current regular preferences, those that reflect a new interest and those that reflect a sporadic interest, i.e. one that is unlikely to reoccur. We also describe procedures that are needed to make sure those three sets always represent the user's current preferences. Our approach of categorizing user interests has been proposed with an intention of it being used as a critical component of any context based, collaborative filtering based, or hybrid based recommender system to make better recommendations.





# IT Organization



# ITSM And IT Intelligence

**Rajesh RadhaKrishnan (IBM Global Services)**

Information Technology Service Management (ITSM) programs have gained significant traction in the U.S. and around the world, in the last few years. ITIL based (IT Infrastructure Library), COBIT based (Control Objectives for Information Technology), and vendor based (such as IBM PRMIT - Process Reference Model for IT) process frameworks are commonly used for these programs. One significant benefit of these ITSM programs is in the form of better IT Intelligence & IT decision making.

This paper/presentation introduces a framework for IT Intelligence (as opposed to Business Intelligence) and discusses relationships between.

1. IT Management and IT Intelligence
2. IT Management and IT Intelligence for Global Enterprises
3. ITSM Program and IT Intelligence framework
4. IT Intelligence & IT Service Metrics



# **Do Formal Sanctions Ensure Compliance with Organizational Internet Use Policy**

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Internet security risks are becoming the leading security threats confronting today's organizations. These threats are typically the result of employees' non-compliance with the Internet use policy. Current studies on non-compliance have largely ignored the impact of moral factors and the organizational context on employees' compliance intention. This paper draws upon rational choice theory and proposes a theoretical model that examines employees' compliance intention of Internet use policy as a cost-benefit calculus. This paper contributes to the literature on information security by theorizing and empirically testing how the intent to comply with the Internet use policy is driven by a cost-benefit calculus bounded by personal moral norms and organizational contextual factors.

The results of this study indicate that employees' compliance intention of Internet use policy is the result of competing influences of perceived benefits of Internet abuses, formal sanction risks, personal moral norms and organizational facilitating conditions. In addition, the effect of formal sanctions is found to be moderated by, or is dependent upon, personal moral norms against Internet abuses. Formal sanctions have no effect on policy compliance when employees hold strong personal norms against Internet abuses at the workplace, and could enhance compliance intention under weak personal norms against Internet abuses.



# **Interdependence between Employee Education and R&D Investment in Impacting IT Firm Performance**

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Education and research and development (R&D) investments are critical for enabling IT firms to remain at the forefront on innovation. Surprisingly, there is very little research on how education contributes to the profitability of IT firms and how this relationship is moderated by the firms' investments in R&D. Using theories from human capital literature, we propose a model to measure how education and R&D investments impact firm performance. Our results suggest that both education and R&D investments are associated with a positive firm performance in IT industries. We also show that the interaction effects between R&D and education is positive, suggesting that IT firms which invest in highly skilled employees are in a better position to take advantage of R&D investments. Our results also suggest that higher levels of education such as masters are associated with higher returns to R&D investments than bachelors'. This paper adds several new insights to the literature on human capital and firm performance.



# Interactive versus Independent Alignment: IT Impacts on Response Capabilities in Manufacturing Firms

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Alignment of a firm's information technology resources with its business initiatives is a crucial organizational dynamic influencing the nature and extent of IT impact (Sabherwal and Chan 2001; Kearns and Lederer 2001). Specifically, theorists studying value impacts of information systems propose that fit of information technology with the organizational processes, strategies, and structures is sine-qua-non for realizing IT impacts (Barua and Mukhopadhyay 2000). In the absence of a good fit with these organizational factors, IT resources may not have any substantial impacts on firm performance. IS researchers have found stronger results by applying the alignment (or contingency) perspective as compared with results from the application of a resource based perspective that considers value to be inherent in the IT resources (Oh and Pinsonneault 2007). The alignment processes synchronizes IT resources with organizational systems (to create a good fit between them) and is getting greater attention in both research and practice.

While the topic of alignment has attracted wide attention, the research in this area is still in its nascent stages, and the impacts of alignment are still not clear. For example, Parthasarthy and Sethi (1992) did not found the impact using the contingency approach on the return on investment (ROI); though the impacts on sales growth were significant .

Similarly, others have found that the impacts of alignment are pertinent for certain organizations and not others. For example, Sabherwal and Chan (2001) find positive impacts of alignment for firms that follow an analyzer or prospector strategy, and Croteau and Bergeron (2001) find positive impacts on sales growth and profitability only for the prospectors. These results indicate that the alignment impacts may not be linear. While these previous studies have assessed the strategy type differences as the source of non-linearity in the impacts of alignment, we extend this literature and study the mutual interdependence between the alignments as a source of non-linearity.

Following a non-linear approach we test interdependence between alignments i.e. we assess whether the alignment of IT in one function critically impacts the performance of IT alignment in another domain with the organization. This non-linear approach to assess the interactive alignment is in line with the existing research emphasis on going beyond the assessment of mere linear impacts (Oh and Pinnsonneault 2007). While the linear impacts are easily tractable, the need to examine non-linear impacts has been emphasized as they more realistically capture the dynamics within an organization (Anderson et al. 1999, p. 233).



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## About CITNE

The Centre for Information Technology and the Networked Economy (CITNE), launched in July 2006 is the youngest of the ISB's centres of excellence.

CITNE's mission is to encourage innovative thinking in maximizing the benefit of Information and Communication Technologies (ICT) to business and society. It fosters ICT centric inter-disciplinary research, education and outreach that:

- ◇ Shows firms how to get business value and competitive advantage out of IT investments.
- ◇ Develops global best practices and enhances the competitiveness of the Indian IT/ITes industry.
- ◇ Focuses on how ICT can help towards economic development.

CITNE promotes analytical, empirical and field experiment oriented partnerships between researchers and industry. We provide a platform for meaningful collaboration between the global Information Systems (IS) research community and the burgeoning, global scoped Indian IT/ITes industry.

CITNE is working on developing specific educational programmes that are designed to bridge the expected talent gap in creating a pool of globally competent knowledge workers to meet the projected demand.

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