

Systems Analysis & Design

-- Trends, Directions & Others

Keng Siau

E. J. Faulkner Professor of MIS

Director, UNL-IBM Global Innovation Hub

Editor-in-Chief, Journal of Database Management

Co-Editor-in-Chief, Advances in Database Research

Presentation Agenda

- Brief Introduction of SIGSAND and SIGSAND-Europe
- Brief Introduction of Self
 - Knowing me better to understand what I am saying
- Research in Systems Analysis and Design (SAND)
 - SAND in 30 years
 - Idealistic view
 - Pragmatic view
 - Past, Present, and Immediate Future of SAND
 - Current “Hot” Topics
- Publishing SAND Research
- Building a Successful Research Career
- Questions & Answers



SIGSAND and SIGSAND-Europe

***** knowing why you are here***

SIGSAND

- SIGSAND
 - Special Interest Group on Systems Analysis and Design
 - Part of the Association on Information Systems (AIS)
- History of SIGSAND
 - Idea of having SIGSAND proposed by Keng Siau in Interlaken, Switzerland in 2001
 - SIGSAND was formed in 2003
 - First SIGSAND Symposium held in Florida in 2003
 - Fifth SIGSAND Symposium held in Oklahoma in 2007
- Goals and objectives of SIGSAND
 - Promote research in Systems Analysis and Design (SAND)
 - Facilitate collaboration and cooperation among SAND researchers
 - Help PhD students and junior faculty working in SAND area

SIGSAND-Europe

- SIGSAND-Europe Initiative was formed in 2005
- History of SIGSAND-Europe
 - Keng Siau led the initiative from 2005-2006
 - Michael Lang is the current coordinator of the initiative
- Goal is to involve more Europeans in SIGSAND
- First SIGSAND-Europe Symposium in Ireland in 2006
- Second SIGSAND-Europe Symposium in Poland in 2007



Who and What is Keng Siau?

***** knowing me better to understand what I am saying***

Evolution of Keng Siau

- **B.S. Honors** (Information & Computer Sciences)
 - National University of Singapore
- **M.S.** (Computer Science)
 - National University of Singapore
- **Ph.D.** (Business Administration)
 - University of British Columbia
 - Major (Management Information Systems)
 - Minor (Cognitive Psychology)

Brief Bio

- Research publications
 - Over 200 publications
 - 90+ journal papers and 100+ conference papers (published or forthcoming)
 - 15 books, 9 proceedings, 20+ book chapters
- Research Awards and Honors
 - Ranked as one of the top e-commerce researchers worldwide (Arithmetic Rank of 7, Geometric Rank of 3) in 2006
 - Research Award, University of Nebraska-Lincoln, 2005
 - Best Paper Award – The Second Annual Workshop on HCI Research in MIS, 2003
- Teaching Awards
 - 2000/2001 University of Nebraska-Lincoln Distinguished Teaching Award
 - 2000/2001 College of Business Administration Distinguished Teaching Award
- Service Awards
 - Organizational Leadership Award, Information Resource Management Association (IRMA), 2000
 - Outstanding Leader Award, Information Resources Management Association, 2004
 - IFIP Outstanding Service Award, 2006

Research Interests

- Information Systems Analysis and Design
 - Information modeling methods and methodologies
 - Empirical evaluation of modeling methods
 - Cognitive mapping
- Mobile and Ubiquitous Commerce
 - Trust and privacy issues
 - Personalization and user interfaces for mobile devices
 - Mobile computing and architecture
 - E-government, E-healthcare, E-Service
- Database Management
 - Visual query languages
 - User-database interaction



Systems Analysis and Design -- 30 years from now

***** to predict where SAND is heading in order to plan for
near term research ideas and directions***

SAND in the Future

- Need to define SAND broadly
 - Activities and processes that are directly or indirectly related to systems development
 - Multi-disciplinary perspectives
 - Computer Science, Engineering, Information Sciences, Philosophy, Mathematics, Psychology, Communication, Management, Business, etc.
 - Cross fertilization of ideas
- SAND in 30 years
 - Idealistic View
 - Pragmatic View

Idealistic View

- Major revolutions and earth-shattering breakthrough
- SAND will be automated to a large extent
 - Information systems engineers will do the high-level conceptual design
 - Automated software engineering systems or software agents will fill in the details to ensure that security, privacy, constraints, etc. are taken care of and the systems are internally consistent and externally aligned with organizations' goals and missions
 - Information systems engineers will be focusing more on fine-tuning and perfecting these automated software engineering systems and software agents
 - Most business systems requirements analysis and design can be carried out by end-users, with information systems engineers serving as consultants and advisors

Idealistic View – Con't

- For this view to materialize
 - Breakthrough and major advancement in artificial intelligence
 - Breakthrough in common sense reasoning
 - Breakthrough in forward engineering (i.e. converting from visual models to program codes)
- My prediction
 - This scenario is possible but quite unlikely

Pragmatic View

- SAND will continue to evolve for the next thirty years with no earth-shaking revolution or breakthrough
 - ER diagram was introduced in 1976 and many of us are still teaching and using ER diagram in 2007 (more than 30 years later)
- Component engineering and commercial-off-the-shelf will be important
 - We will not be designing everything from scratch every time
- Forward engineering will be more advanced and powerful
 - Programming will be done using diagrams
 - e.g. similar but more powerful than Unified Modeling Language (UML) and Object Constraint Language (OCL)

Pragmatic View – Con't

- Requirements analysis will incorporate strategic planning at the highest level of organizations and take into account the organization's values, politics, and culture
- Security, privacy, and ethics will be as important as (if not more important than) functionality and features of systems
- Corporate and IT governance issues
 - e.g. Sarbanes-Oxley Act in the US
- Architectural concepts such as descendants of Model Driven Architecture (MDA) and Service Oriented Architecture (SOA) will be even more important
- Methodologies such as descendants of Unified Process (UP) will be more developed, potent, and refined



Past, Present, and Immediate Future of SAND

***** what can I do now for research?***

Evolution of IS Projects - 1

	First Generation	Second Generation	Third Generation
Scope	Single company	Single company	Multiple companies
Number of Sites	Single	One or a few sites	Multiple sites Multiple countries
Organizational Focus	Department level	Seamless integration within an enterprise	Seamless integration across multiple organizations
Technology Focus	Automate business processes Business process efficiency	Enterprise-wide closed loop	Integration of supply and value chain E-Commerce & E-Market
ISD Methodology Focus	Design and development focus (e.g. flowchart)	Support analysis, design, and development (e.g. ER, DFD)	Integration of modeling techniques and methodologies (e.g. UML and UP)

Evolution of SAND Projects - 2

- First generation SAND projects
 - Operational level focus
- Second generation SAND projects
 - Support managerial process and decision making
- Third generation SAND projects
 - Support strategic decision making at the top management level

Evolution of SAND Projects - 3

- First generation SAND projects
 - Automate structured processes
- Second generation SAND projects
 - Support semi-structured decision processes
- Third generation SAND projects
 - Support unstructured decision processes
 - Data mining and knowledge discovery

Current “Hot” Topics

***** topics that you can work on for your PhD and for the next 3-5 years***

Current “Hot” Topics

- Service Oriented Architecture (SOA)
- Model Driven Architecture (MDA)
- Unified Process (UP)
- Unified Modeling Language (UML)
 - Core of UML
 - UML specialization (e.g. Real-time UML, Enterprise UML, etc.)
- Empirical Software Engineering
 - Output of software engineering needs to be evaluated
 - Simulation, Experiment, Survey, Case Study, Action Research, etc.
- Agile Modeling
- Extreme Programming

Current “Hot” Topics

- Methodologies, Methods, Techniques, and Tools to develop/integrate
 - Inter-organizational Systems
 - Cross-cultural Systems
 - Cross-border Systems (i.e. Global Systems)
 - Virtual Communities
 - Electronic, Mobile, and Ubiquitous Commerce Systems
 - E-government, E-education, E-healthcare, and E-service Systems
 - Web-based Systems
- Open Source Software Development
- Data Mining and Knowledge Discovery
- Concept Mapping and Cognitive Mapping to Capture Organization’s Values, Cultures, Politics, etc. in Requirements Analysis



Publishing SAND Research

***** doing research is a means to an end***

Publishing SAND Research

- Top five reasons a SAND paper is rejected
 - Poor motivation and justification
 - Why are you working on this research and not lying on a beach?
 - Why should the reviewer be reading your paper and not lying on a beach?
 - Lack empirical/evaluation component
 - Show that your model/algorithm/approach/technique is better than others in a rigorous and scientific way
 - Poor related work section (i.e. literature review)
 - “Frog in a well” syndrome
 - At least 20-30 references
 - Lack of cumulative tradition
 - Little or no contribution
 - Much ado about nothing
 - Contribution to academic?
 - Contribution to practice?
 - Solving the wrong problem
 - Type III error

Publishing SAND Research

- A suggested format for SAND research papers
 - Introduction
 - Provide a clear motivation and justify the importance of your research
 - Make readers excited about your work
 - Related Research/Literature Review
 - How does your research fit in with prior research?
 - What are the gaps in the literature that your research is addressing?
 - Clearly state your research questions at the end of this section
 - Your Proposed Model/Approach/Technique/Tool
 - Clearly present and discuss your work
 - Empirical or Evaluation Component
 - Why and how is your model/approach/technique/tool better than others?
 - Contributions
 - Present the academic and practical contributions of your work
 - Conclusions and Future Research
 - Highlight the findings and strengths of your research
 - Present future research directions



Building a Successful Research Career

***** for those that are in***

Building a Successful Research Career

- Publish, publish, publish
- Have 2-3 clear research streams
- Research stream I (Main research stream)
 - Similar research stream as your dissertation
 - Familiar with literature
 - Literature review can be adopted and adapted
 - Save time on acquiring domain knowledge
- Research stream II
 - Same research method as your dissertation
 - Familiarity with research method
 - Know how to apply methodology and present results in acceptable ways
 - Preferably not too dissimilar research areas (see Research stream I)

Building a Successful Research Career

- Keys
 - Reuse and Recycle
 - Extend and expand
 - Term papers from your course work in PhD program
 - Work in your comfort zone
 - Capitalize on your strengths and knowledge
- Places for inspiration
 - Future research sections of your dissertation
 - Future research sections of related works
- Be a recognized expert in your field(s)
 - Nationally and internationally

Building a Successful Research Career

- Be viewed as an independent researcher
 - Continue to work with your advisor but work with other researchers too
 - Long term good relationship with your advisor can be a great asset
 - Lead author on some papers
 - Some single-authored papers
- Collaborate with good researchers
 - Capitalize on the strengths of others
 - Learn from others
- Be visible
 - Be known in the research community
 - E.g., organizing workshops, chairing minitracks/tracks at conferences, serving on program committees
- Do your share of review service
 - Keng Siau's rule of thumb: Review three papers for every paper that you submitted



Questions ?