

EXAMINING THE STATE OF REQUIREMENTS ENGINEERING: NEW IDEAS, TECHNIQUES AND APPROACHES

Software requirements engineering (RE) is considered to be one of the most crucial activities in the systems development lifecycle. Its importance and inherent complexity are widely recognized. Requirements engineering includes establishing the detailed technical requirements for interfaces to people, machines and other software. Inaccurate or incomplete requirements engineering can negatively impact the resulting system in terms of functionality, schedule and budget, and it is widely acknowledged that a significant portion of failed projects are due to inadequacies in performing this task. Consequently Information Systems students, who will soon be industrial practitioners will benefit from developing an in-depth understanding of RE.

The aim of this course is to ingrain students with an understanding of key facets of requirements engineering, through extensive topic based reading from the literature. Such readings would provide students with state of the art knowledge about a) diverse theoretical and epistemological perspectives in RE research, b) new techniques and tools. In addition the eclectic nature of modern day RE research which encompasses qualitative, quantitative and design science based approaches would inform students about the criticality of pluralism in research approaches, and also acquaint them these different approaches to conducting quality research. The students are expected to choose a topic area from a given list, assimilate such reading and develop a conference quality research paper by the end of the academic term. The students have the option of choosing from a list of seed questions or develop one of their own in consultation with the instructor

A preliminary list of topic areas and research questions are provided below

- a) Requirements Elicitation, Analysis, documentation, verification and validation (Topic 1)
 - What is the state of the art of Elicitation/Analysis/Documentation/Validation/verification Techniques?
 - How well do such tasks and techniques associated with them extend to distributed ISD environments?
 - Do these procedural task demarcation makes sense in modern methodologies such as agile, product line engineering?
 - How can sense-making and traceability be improved in requirements elicitation and analysis techniques?
- b) Modeling of requirements, goals and wider system considerations (Topic 2)
 - What is the state of the art of modeling requirements, goals?
 - What are the different epistemological and ontological perspectives underlying requirements modeling approaches?
 - What is the state of art of modeling domain complexity in current research?

- What is the state of non-functional requirements modeling in current research?
 - How effective are such modern non-functional requirements modeling approaches?
- c) Social, cultural, global, personal and cognitive factors in RE (Topic 3)
- What are the different social/cultural/global/personal/cognitive factors that affect the outcome of RE?
 - What are the implications of distributed development environments for such factors?
 - What are state of the art approaches in RE that attempt to assimilate such factors into RE methodologies?
 - How can behavioral process models of RE be used to inform the design of innovative procedural approaches/methodologies?
 - What are the state of the art approaches that attempt to model such factors within specification models?
 - How influential have agile methodologies been in evolving and advancing the ideas of stakeholder participation in RE?
 - What are soft/behavioral skills critical for the key RE stakeholders (e.g. Analysts)?
 - How can such skills be inculcated/sharpened through compute-mediated training?

Teaching Format

- 1) Students will be provided with the above topic areas and reading list for each area by April 5.
- d) Students will participate in research-seminar like discussion sessions for each topic area (based on assigned reading) to develop an understanding about the topic. These sessions will also be used to help students develop research questions for their individual research paper.
- e) These will be Skype based sessions to be held from April 19 to April 25. April 19: Requirements Elicitation, Analysis, documentation, verification and validation; April 22: Modeling of requirements, goals and wider system considerations; April 25: Social, cultural, global, personal and cognitive factors in RE.
- 2) After these sessions, students are expected to choose a topic and a research question from the above list, or develop a new one in consultation with the instructor.
- 3) Students are expected to finalize on a research question and develop a short one page research proposal and submit by May 6. They will receive approval and preliminary feedback by May 9.
- 4) The students will work on their individual writing from May 9 to June 3 (four weeks). Deadline for submission of preliminary draft of individual work is from June 4

- 5) From June 6 – June 10, students will formally present their work in front of the group. Students will work on the feedback for a week. June 6,7: Topic 1; June 7, 8: Topic 2; June 8,9: Topic 3; June 10: Overflow day.
- 6) The class will reconvene again from June 20 to June 24 for wrap up discussion sessions. June 20: Topic 1; June 22: Topic 2; June 24: Topic 3.

Evaluation:

- 1) Written: Individual research paper on a specific topic on RE
- 2) Oral: Individual presentation of work, participation in discussion

Expected student time commitment

- 1) 10 – 15 hours of preparation between April 5 – April 19
- 2) 6h personal presence and participation between April 19 – April 25
- 3) 160 hours of individual work from May 6 – June 3
- 4) 6 – 12 hour (depending on number of students) in two sessions between June 6 – June 24

Experience of professor:

- 1) Teaching: Requirements Engineering at Towson University, Dept of Computer and Information Sciences from 2010
- 2) Research: Various completed and ongoing research projects on RE and information systems development processes
- 3) Exemplary paper illustrating knowledge and expertise in this area :
Chakraborty, S., Rosenkranz, C., and Dehlinger, J. (2015) Getting to the Shalls: Facilitating Sensemaking in Requirements Engineering [*ACM Transactions on Management Information Systems \(TMIS\)*](#), 5(3), Article 14, 1-30.