Editorial: TOSEM journal in 2025 and beyond

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TOSEM is ACM's flagship journal for publishing software engineering research. TOSEM stays true to the foundations of the discipline while meaningfully engaging with the wave of disruptive innovations in the field. In this light, we discuss the plans for TOSEM in 2025. We discuss how we plan to continue to engage broadly with authors as well as the community as a whole.

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1 Disruptive Innovations

Software engineering represents a unique combination of science and engineering. Most engineering fields, including hardware design, focus on designing an entity which has an existence in the physical world. However, software engineering constructs an entity which does not have any existence in the physical world. Instead, the discipline of software engineering uses solid engineering principles to construct a "synthetic entity" which is used to drive today's society and economy in the real-world. The impact of software on our daily lives cannot be over-emphasized.

Software engineering, often unintentionally associated only with coding, actually provides a far richer set of problems than programming. A lot of the work in software engineering, for example, concerns the fact that the intent (of what the software is supposed to achieve) is never fully or formally captured. Even if the intent is captured at a high level for an entire project, the intent of the units of program is often not known. Or, even if the intent is known for some of the units of a code-base, as the software project evolves, the maintenance and evolution of the intent along with the software becomes harder. Or, for software under deployment, the reproduction (and bucketization) of bug reports reported by field users at the developers' end provides a unique challenge. Or, data in software repositories can provide powerful analytics aids to help increase trends of automation in software engineering. Or, as software development becomes increasingly automated, the interaction of developers with productivity tools change significantly, as could the job descriptions in future software industry. All of these problems, provide software engineering outlooks, focusing on the software processes and going much beyond software development or coding.

In 2025, software engineering seems to have a bit of a new hue, three years after the announcement of code completion engines, which can produce snippets of code from natural language requirements. Today, there continues to be lingering doubts that the code generated from large language models will be trusted enough to be integrated into software projects. However, despite any or all skepticism, generative artificial intelligence (AI) tools today provide a mechanism for *synthesizing* code snippets from natural language intent. The focus thus falls more on some of the core software engineering problems, such as intent extraction, using the extracted intent to drive software processes with adequate scale and trust, and so on. Innovations in generative AI thus provide significant opportunities for developing new

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software processes and capabilities. Indeed, the building of Large Language Model (LLM) agents provides one such direction. Surely, much more is to come! We welcome the submission of such research articles to TOSEM!

2 Plans ahead

Software engineering is a classical discipline in computing which remains ever-important. Software engineering in 2025, embraces the new wave of automation in coding and other software processes. It also reflects on the lessons learned over the past decades in requirements engineering, architecture, testing, developer productivity and so much more. Looking forward, the plans in TOSEM will be true to this style - deriving value from foundational research, while embracing new emerging research in newer technologies.

The software engineering community is vibrant and diverse today. Software Engineering conferences have undergone radical changes in the past 2-3 years. The ACM/IEEE International Conference on Software Engineering (ICSE) radically changed its reviewing in 2024 allowing for paper submissions in two submission cycles and major revision of each submitted paper. The ACM SIGSOFT International Conference on Foundations of Software Engineering (FSE) changed its proceedings publication mode to a new journal PACM-SE. All of these changes impact TOSEM. It is useful and even necessary for TOSEM to interact with the community today, in the fast paced development of software engineering. To interact with the community regularly, we are setting up an Information Directorate, with Aldeida Aleti and Cristian Cadar serving as Information Directors of TOSEM. The Information Directorate will engage with the software engineering community by issuing relevant blog posts in the SIGSOFT blog on a quarterly basis. One of these blog posts is scheduled to be about a TOSEM event co-located with FSE conference annually- which will be featured at that time in the blog. The annual TOSEM event was started by Mauro Pezzè in 2024 and TOSEM plans to continue it annually.

We also plan to do more to encourage the wide swathe of research represented by software engineering. TOSEM submissions currently can be either regular/ fast-track journal papers, or papers submitted to a continuous special section. The current continuous special sections are AI + SE, Security + SE, Human Centric SE, Quantum SE and Sustainabile SE, where SE is an abbreviation for software engineering. We will continue to have continuous special sections on Quantum SE and Sustainability in SE (the more recent topics), while co-opting the other topics into regular paper submissions. Moving forward, the regular / fast track papers will see the authors marking them under a primary area, drawn from (i) AI and SE (ii) Security and SE, (iii) Testing, Analysis and Verification, (iv) Maintenance and Evolution, (v) Human Centric SE, (vi) Analytics and Empirical Studies, (vii) Requirements and Architecture, and (viii) Others. This will serve to capture the view point of the authors on where they see the contributions of the paper. For example if a paper is on verification of requirements - the authors could indicate where they see the new insights- requirements or verification. The reviewers can then review the papers with the authors' perspectives in mind.

The evolving nature of our discipline means that the areas can be re-arranged over time. The areas can serve and help the authors by TOSEM appointing relevant editors as senior associate editors in the reviewing process. We welcome Aldeida Aleti, Claire Le Goues, Cristian Cadar, Denys Poshyvanyk, Dongmei Zhang, Foutse Khomh, Shing-Chi Cheung, Silvia Abrahao and Xiangyu Zhang as Senior Associate Editors (SAE) for TOSEM from January 2025. Andy Zaidman will also join as SAE from March 2025. Senior AEs will provide additional and area specific guidance for paper reviewing. I would like to thank them for stepping up to contribute to the TOSEM community.

The continuous special sections on Sustainable SE and Quantum SE will continue. The other paper categories including Registered Reports and Frontiers of SE which were started earlier, will also continue, under the leadership of section heads appointed in the past. I will announce new editors and more initiatives for TOSEM in the coming issues.