Ph.D. Position
Consistency Checking in a Collaborative Engineering Environment
Institute of Software Systems Engineering
Johannes Kepler University, Linz, Austria

The big picture:

Engineering is a collaborative effort involving many stakeholders. Yet its day-to-day operations cater to the needs of individuals. Complex and multi-disciplinary problems are broken down to tasks that individual engineers are able to solve with the tools and methods available to them. Thereby, it is common for companies to use a variety of tools – for example, software engineers use tools for requirements capture, specification, design/architecture, programming, or testing; tools that are often fundamentally different from those used by mechanical, electrical, aeronautical or systems engineers. But not only the tools differ, also the knowledge that developers capture and maintain within these tools. We speak of artifacts. Examples of such artifacts are requirements, model elements, code classes/methods, hardware components, computations, use cases, and many more. Yet, while artifacts captured in tools are syntactically and semantically diverse, they are dependent. Together, these artifacts describe the engineering problem, process, and solution; and inconsistencies may arise if engineers manipulate these artifacts separately.

The goal:

The main goal of this Ph.D. is to develop a novel methodology for detecting multi-view, cross-tool inconsistencies, even if different engineers work on these artifacts at the same time or at different times, even if engineers are willing to share these artifacts with selected other engineers as opposed to publishing them for all to see. We propose to investigate a number of possible views that may arise during engineering and how these views influence consistency checking. These views may include individual tools (tool views), which engineers may combine to cover all tools a single engineer is using (engineer views) or any arbitrary grouping of tools that a team of engineers is using (group views). The methodology aims to provide scalable, up-to-date inconsistency feedback for these views concurrently while engineers are continuously creating, modifying, and deleting artifacts in their respective tools. Empirical evaluations and case studies will demonstrate the scalability and usefulness of the proposed work. Ultimately, the primary goal of this work is to give engineers more freedom as to whether, when, how, and how much inconsistency feedback they want to receive.

Required expertise:

- A Master's degree in computer science or a closely related discipline
- Strong programming skills (for example in Java, C++, or C#)
- Ability to work on own initiative and also as a part of a team
- English language proficiency, written and spoken

Application Instructions:

Applications should include a cover letter, CV, preferably also letters of reference, and a brief statement describing the applicant's research motivation in relationship to this topic. Electronic submissions are required. Review of applications will begin immediately and continue until suitable candidates are appointed.

Contact:
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About the Institution:
The JKU Institute for Software Systems Engineering is a 30+ people strong research institute that is ranked among the best in the world (e.g., recently Microsoft ranked JKU 16th in the world in software engineering). Research at the institute covers a wide area of software engineering from requirements to capture software, systems architecture, design and testing, to maintenance. Engineering is an inherently creative process that requires rigorous attention to details. However, engineering is also a collaborative, human centric process with adhoc activities. Engineering automations are few and rare – not just during programming but also during modeling, testing or maintenance.

About the Advisor:
Prof. Dr. Egyed received his Doctorate from the University of Southern California, USA and previously worked at Teknowledge Corporation, USA and the University College London, UK. He is most recognized for his work on software and systems design – particularly on variability, consistency, and traceability. Dr. Egyed has published over 200 refereed scientific books, journals, and conferences with over 6000 citations to date. He was recognized a Top 1% scholar in software engineering in Communications of the ACM, Springer Scientometrics, and Microsoft Academic Search. He was also named an IBM Research Faculty Fellow in recognition to his contributions to consistency checking.

Location: Linz, Austria
Website: http://isse.jku.at/