Master's Thesis Topic Description

1. Identifying and Resolving Conflicts in GORE within Agile Methodology

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This Master's thesis topic proposes to use the notions of socio-technical systems (STS) and "agent" to understand and represent conflicts in requirements with the aim of identitying and resolving the conflicts easily [1]. STS in this context consists of diverse, active components - both human and man-made - that collaborate in designing and sustaining the STS. Remarkably, STSs are designed to meet business goals [2]. Agents pursue two kinds of goals: functional and non-functional goals. We consider a functional goal as a particular state of affairs intended by one or more active entities - agents - in the STS, and a non-functional or quality goal as a quality requirement for achieving the functional goal.

However, as stakeholders frequently pursue mismatching goals, identifying and resolving conflicts in requirements becomes an inevitable part of goal-oriented requirements engineering (GORE). In the thesis, the student will investigate the identification and resolution of conflicts in the requirements within the agile agent-oriented modeling (AAOM) method [3] for engineering STS. The main objective is to develop a strategy and its supporting tool for conflict identification and resolution in GORE for STS in the context of AAOM. AAOM is derived from agent-oriented modeling (AOM) [4].

Potential research questions include:

- RQ1: What are the requirements for describing stakeholders' goals in a given problem domain? The RQ1 is to identify the conflicts and validate the mechanism of identification. The goal is to identify the requirements for describing the stakeholder's goals.
- RQ2 – What are the suitable approach(es) to represent the requirements of the stakeholder's goals? For this, you can use ontology and determine an ontology's properties that represent the requirements of stakeholders' goals. Here, you will have to develop a systematic description of requirements. In this regard, the semantics will be very useful for consideration.
- RQ3: What enactment mechanism ensures conflict resolution? For RQ3, you will have to check/validate the ontology and goal model by implementing the colored Petri nets (CPN) model. The CPN model is what I refer to as the enactment mechanism.

References

[1] Gambo, I. and Taveter, K. (2021). A Pragmatic View on Resolving Conflicts in Goal-oriented Requirements Engineering for Socio-technical Systems. In *Proceedings of the 16th International Conference on Software Technologies*, pp. 333-341. DOI: 10.5220/0010605703330341

[2] Sommeville, I. (2010). *Software Engineering*. London, England: Pearson Education.

[3] Tenso, T.; Taveter, K. (2013). Requirements engineering with agent-oriented models. ENASE 2013 - Proceedings of the 8th International Conference on Evaluation of Novel Approaches to Software Engineering: *8th International Conference on Evaluation of Novel Approaches to Software Engineering, ENASE 2013; Angers; France; 4 July 2013 through 6 July 2013*. SciTePress, pp. 254-259.

[4] Sterling, L., and Taveter, K. (2009). *The art of agent-oriented modeling*. MIT Press.

2. Eliciting and Analysing Privacy-aware Emotional (Affective) Requirements for Smart Cities

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Research on smart cities from the perspective of requirements engineering is currently unorganized and fragmented. Recent research papers on requirements engineering for smart cities advocate defining the requirements for a smart city using the bottom-up approach. With this kind of approach, the emphasis is on the importance of requirements for a system architecture that could scale up to systems of any size and accommodate applications of any kind. This effectively means that smart cities are defined by technological needs and possibilities rather than by citizens' functional and emotional needs met with acceptable quality. Because of the considerations mentioned, the Master's thesis is concerned with continuously eliciting requirements for socio-technical systems of smart cities. The thesis deals with incorporating emotions into the applications of smart cities and describing emotions in the context of smart cities to develop privacy-aware affective systems.

In the thesis, it is possible to focus on how a smart city could improve the opportunities in a smart city, for example, older adults in a community. In this context, the thesis will explore how the satisfaction levels with smart city applications could be increased by studying how people react and behave under different circumstances and creating a method for grouping the reactions and behaviours of people within a community. This kind of grouping enables to generate a large dataset for predictive privacy modelling and analysis of people's behaviours and design and implementation based on the dataset, a learning algorithm determining if the data is safe or unsafe to share.

Recommended References

1. Khan F. and Gambo I.P. (2022). Incorporating Privacy Requirements in Smart Communities for Older Adults: A Research Vision. In Proceedings of the 17th International Conference on Software Technologies (ICSOFT 2022), 11th – 13th July, 2022, Lisbon – Portugal, 242-249.

2. Thomas, Keerthi; Bandara, Arosha K.; Price, Blaine A. and Nuseibeh, Bashar (2014). Distilling Privacy Requirements for Mobile Applications. In: 36th International Conference on Software Engineering (ICSE 2014), 31 May - 7 Jun 2014, Hyderabad, India.

2. Calikli G, Law M, Bandara AK, Russo A, Dickens L, Price BA, Stuart A, Levine M, Nuseibeh B.(2016). Privacy Dynamics: Learning Privacy Norms for Social Software. Proceedings of the 11th International Symposium on Software Engineering for Adaptive and Self-Managing Systems.

3. Omoronyia, I., Cavallaro, L., Salehie, M., Pasquale, L., & Nuseibeh, B. (2013). Engineering adaptive privacy: on the role of privacy awareness requirements. In *2013 35th International Conference on Software Engineering (ICSE)*, 18-26 May 2013, San Francisco, CA, USA (pp. 632-641). IEEE.

3. Scenarios and semantic support/description (ontologies) in requirements engineering

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Using ontologies in requirements engineering activities (RE) activities is beneficial to the industry and academia. Some of these benefits include addressing and overcoming ambiguities, inconsistencies, and incompleteness of requirements. The interest in this Master's thesis topic is on scenarios with semantic description (ontologies). The idea is to describe the text of the scenarios in a not ambiguous way, that is, with some ontology, that will provide a precise definition of the terms and the relationship between the terms. Of particular interest, the Master's thesis will develop a strategy for writing scenarios describing a given problem domain. The goal is to develop a technique to facilitate RE activities, such as elicitation, analysis, specification, validation, and management in a large collaborative design. The focus will be on a given problem domain and/or case study.