MARAMA AI : AUTOMATED AND VISUAL APPROACH FOR INCONSISTENCY CHECKING OF REQUIREMENTS

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ABSTRACT

Abstract— Requirements are commonly vague and ambiguous. In this paper, we describe an automated Inconsistency Checker called MaramaAI for checking for high- level inconsistency between textual requirements, abstract interactions and Essential Use Cases. We use concepts of phrase extraction and essential interaction patterns to carry out these checks. We provide further support for checking of requirements quality attributes such as completeness and correctness using visual differencing.

MOTIVATIONS

- Natural language requirements are very often error prone, imprecise and ambiguous (Fabbrini, Fusani, Gnesi, & Lami, 2001), (Denger, Berry, & Kamsties, 2003).
- Many researches devoted to handle this issue by checking the requirement consistency ,completeness and correctness using heuristic algorithms and formal models or semiformal models (Nentwich, Emmerich, Finkelstein, & Ellmer, 2003),(Ouimet & Lundqvist, 2007), (Egyed, 2006),(Richard, Phillip, & Jonathan, 2007).
- Our previous work (Kamalrudin, Grundy, Hosking, 2010); introduced Marama AI tool —**Capture natural language requirement and transform them to semi formal representation: Essential Use Cases** & Manage the requirement inconsistency between Textual requirement, Abstract Interaction and Essential use Cases with providing inconsistency warning.
- Inconsistency warning only is **not adequate** to make sure the requirement is completely consistent.

OUR WORK

- Enhanced our tool- provides **higher level inconsistency check.**
- Each requirements that involve with modification such as Add, Delete and Change ordering is checked using Essential interaction pattern library and the inconsistency error is visualized.

➤ **Essential interaction patterns: to support interaction extraction from natural language and analysis of interaction sequence (Kamalrudin, Grundy & Hosking, 2010).**

Eg: Add new abstract interaction

- *Warning appear and prompt user to update textual requirement based on the correct interaction pattern*

Inconsistency: textual requirement and Abstract Interaction

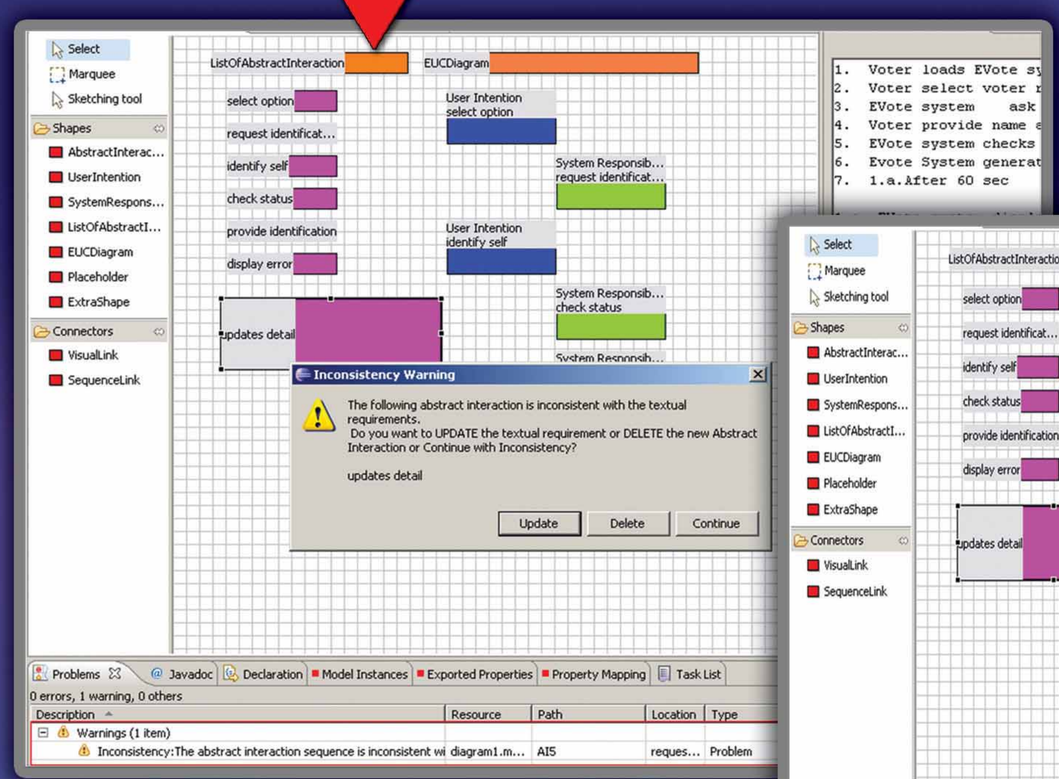
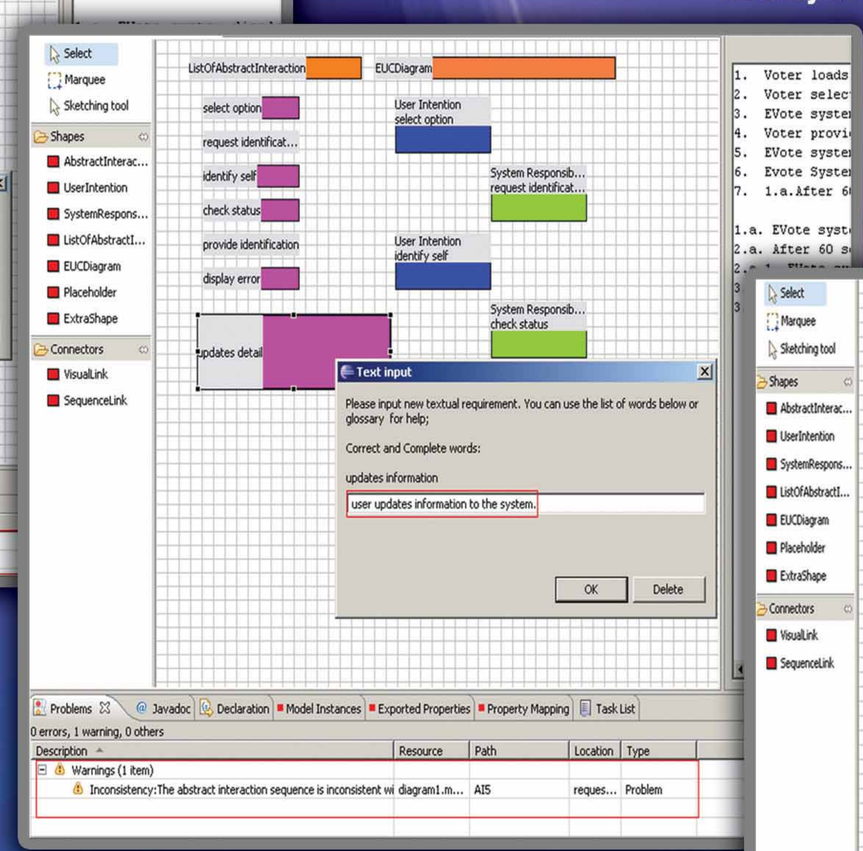


Figure 1: add new Abstract interaction



Eg: Change Ordering

- Warning appear and highlight the related components

Inconsistency: sequence of abstract interaction and textual requirement

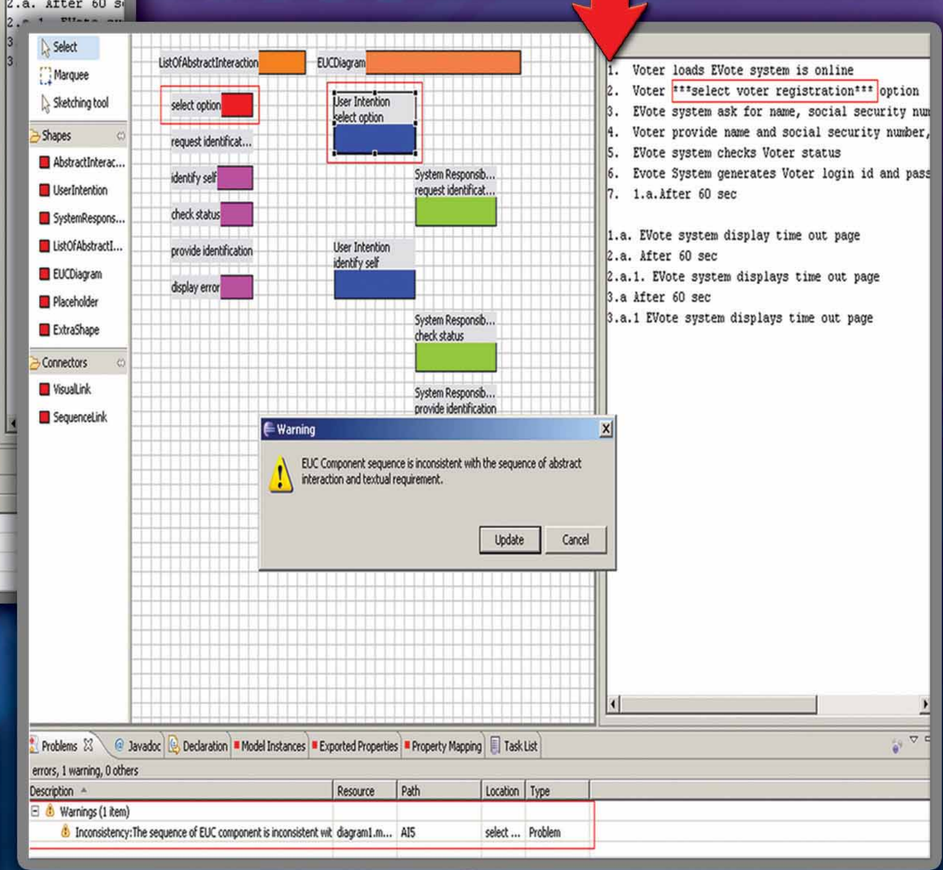


Figure 2: Change ordering

REQUIREMENTS QUALITY CHECKING

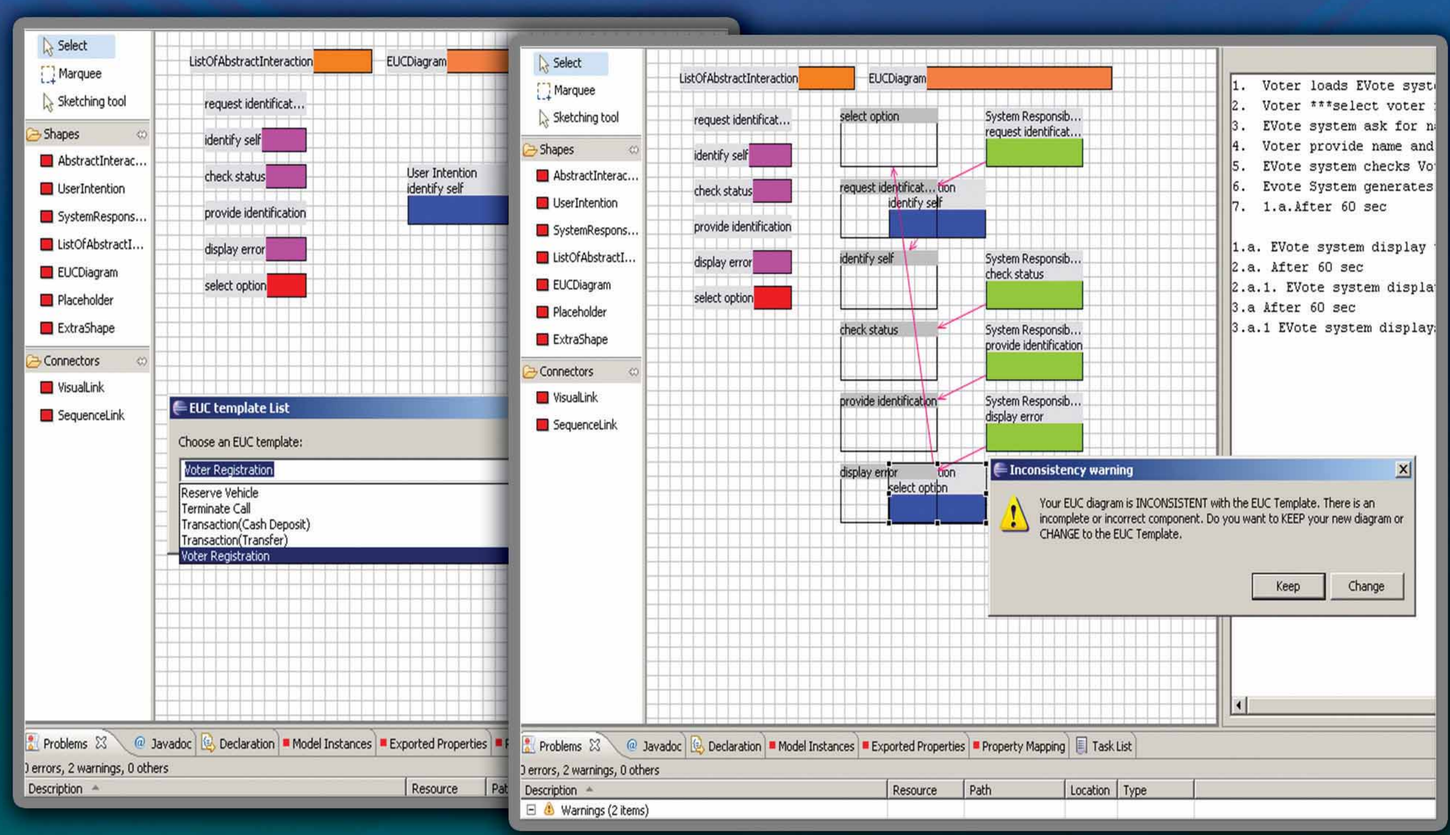


Figure 3: Visual Differencing for Completeness and Correctness Checking

- A Visual differencing is applied
- It shows the **difference** between the modelled Essential Use Cases and the templates exist in the interaction pattern library.
- If any part of the Essential Use Cases is **missing, extra or in incorrect ordering compared to the template**, the tool will visualize the incomplete and incorrect component.

CONCLUSION & FUTURE WORKS

We have developed an automated inconsistency checker- **MARAMAAI** for checking **higher level inconsistencies between the Textual Requirement, Abstract Interaction and Essential Use Cases.** The requirement quality checking such as **completeness and correctness** is also supported by Visual Differencing against an interaction pattern library. Future works: conduct further evaluation of the tool in term of cognitive dimensions and usability and support consistency management with other models.

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