

An Ontological-Based Approach to Support Knowledge Integration and Exploration in Software Engineering Processes

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Nowadays, software maintenance is a highly distributed process which involves a multitude of supporting tools and resources. Knowledge relevant for a particular software maintenance task is typically dispersed over a wide range of artifacts in different representational formats and at different abstraction levels, resulting in isolated “information silos”. Also, historical knowledge about successfully performed modifications is lost, as only the result is recorded in versioning systems, but not how a developer arrived at the solution. Furthermore, existing software maintenance process models, such as the IEEE Std 14764-2006 [1], do not specify how any available supporting resources should be integrated within the process in a given maintenance context. This combination of factors results in maintainers being typically left with no guidance on how to use the available information resources to complete a specific maintenance task. In this presentation, an ontological model is introduced to support the IEEE Std 14764-2006 software maintenance process. Information resources relevant to the process such as source code, version management, and bug tracking repositories have also been modelled as ontologies and can be automatically populated. These ontologies support the use of reasoning services across the different modelled knowledge resources. This allows the inference of explicit and explicit relations among them to establish traceability between the supporting resources and the process model, therefore providing maintainers with guidance that is context sensitive to their particular task. These ontologies are supported by an environment implemented as Eclipse [2] plug-ins. This presentation also illustrates the potential of using this approach to provide guidance for other software engineering processes, such as the software configuration management process of RTCA DO-178B [3]. Furthermore, it will be demonstrated how it can be applied to specific software engineering tasks, such as the automated evaluation of bug reports quality properties. This project is part of a larger research project entitled “Software Exploration” currently being conducted at Defence R&D Canada - Valcartier and that was sponsored by the Directorate of Technical Airworthiness and Engineering Support (DTAES 6).

References

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- [2] Eclipse, “Eclipse.org home,” May 2010; www.eclipse.org.
- [3] *RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification*, RTCA, 1992.