

# A Rewriting Framework for Activities Subject to Regulations

(Talk)

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Activities such as clinical investigations or financial processes are subject to regulations to ensure quality of results and avoid negative consequences. Regulations may be imposed by multiple governmental agencies as well as by institutional policies and protocols. Due to the complexity of both regulations and activities there is great potential for violation due to human error, misunderstanding, or even intent. Executable formal models of regulations, protocols, and activities can form the foundation for automated assistants to aid planning, monitoring, and compliance checking. We propose a model based on multiset rewriting where time is discrete and is specified by timestamps attached to facts. Actions, goal and critical states may be constrained by means of relative time constraints. Moreover, actions may have non-deterministic effects, i.e. they may have different outcomes whenever applied. We demonstrate how specifications in our model can be straightforwardly mapped to the rewriting logic language Maude, and how one can use existing techniques to improve performance. Finally, we also determine the complexity of the plan compliance problem, that is, finding a plan that leads from an initial state to a desired goal state without reaching any undesired critical state. We consider all actions to be balanced, i.e. their pre and post-conditions have the same number of facts. Under this assumption on actions, we show that the plan compliance problem is PSPACE-complete when all actions have only deterministic effects and is EXPTIME-complete when actions may have non-deterministic effects.

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