

ACoRe: Automated Goal-Conflict Resolution

Luiz Carvalho¹, Renzo Degiovanni¹, Matías Brizzio^{2,3}, Maxime Cordy¹,
Nazareno Aguirre⁴, Yves Le Traon¹, Mike Papadakis¹

¹ SnT, University of Luxembourg, Luxembourg
{firstname.surname}@uni.lu

² IMDEA Software Institute, Spain; ³ Universidad Politécnica de Madrid, Spain
matias.brizzio@imdea.org

⁴ Universidad Nacional de Río Cuarto and CONICET, Argentina
naguirre@dc.exa.unrc.edu.ar

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System goals are the statements that, in the context of software requirements specification, capture how the software should behave. Many times, the understanding of stakeholders on what the system should do, as captured in the goals, can lead to different problems, from clearly contradicting goals, to more subtle situations in which the satisfaction of some goals inhibits the satisfaction of others. These latter issues, called *goal divergences*, are the subject of *goal conflict analysis*, which consists of identifying, assessing, and resolving divergences, as part of a more general activity known as goal refinement.

While there exist techniques that, when requirements are expressed formally, can automatically identify and assess goal conflicts, there is currently no automated approach to support engineers in *resolving* identified divergences. In this paper, we present ACORE, the first approach that automatically proposes potential resolutions to goal conflicts, in requirements specifications formally captured using linear-time temporal logic. ACORE systematically explores syntactic modifications of the conflicting specifications, aiming at obtaining resolutions that disable previously identified conflicts, while preserving specification consistency. ACORE integrates modern multi-objective search algorithms (in particular, NSGA-III, WBGA, and AMOSA) to produce resolutions that maintain coherence with the original conflicting specification, by searching for specifications that are either *syntactically* or *semantically* similar to the original specification.

We assess ACORE on 25 requirements specifications taken from the literature. We show that ACORE can successfully produce various conflict resolutions for each of the analyzed case studies, including resolutions that resemble specification repairs manually provided as part of conflict analyses.