

The RationalGRL Toolset for Goal Models and Argument Diagrams

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Problem Statement. The Goal-oriented Requirements Language (GRL) aims at modeling high-level business and system goals, subgoals and tasks and analyzing the alternative ways of achieving these goals and subgoals. However, GRL models are only the end product of a modeling process, and they do not provide any insight on how the models were created. For instance, they do not show what reasons were used to choose certain elements in the model and to reject the others and what evidence was given as the basis of this reasoning. There are, thus, several questions that are not answered in GRL: Why is a goal created? Why are some goals evaluated positively and some negatively? Do we have any evidence for the fact that performing a certain task contributes to a goal?

Overview of the Framework The main components of the RationalGRL framework are shown in Figure 1. The four main parts of the framework, Argumentation, Translation, Goal Modeling, and Update, are numbered and depicted in **bold**. For each component, the technology used to implement it is marked in a filled rectangle.

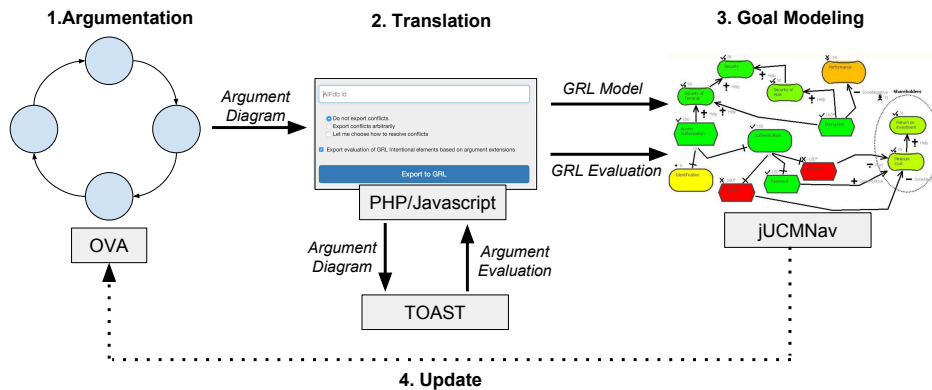


Figure 1. Overview of the RationalGRL Framework

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In *Step 1 - Argumentation*, stakeholders discuss the requirements of their organization. In this process, stakeholders put forward arguments for or against certain elements of the model (e.g. goals, tasks,..). Arguments about why certain tasks can contribute to the fulfillment of goals and an evidence to support a claim are also part of this process. Furthermore, stakeholders can challenge claims by forming counterarguments. The complete set of claims, arguments and counterarguments can be represented in an argument diagram. We have implemented a formal argumentation theory for goal-based reasoning about evidence [4,3] into the browser-based argument diagramming tool OVA² [1].

In *Step 2 - Translation*, the argument diagram is translated to a goal model, in our case GRL. The process consists of two translations/mappings: the first generates the GRL elements and relationships, and the second mapping generates the satisfaction values of the GRL elements from the acceptability status of underlying arguments. We implemented the translation tool in PHP³. The tool requests an argument from the Argument Web, and then generates a GRL model using mapping rules. This is exported in XML format, which can be imported in jUCMNav, an Eclipse based tool for GRL modeling⁴. The tool then requests argument evaluations from TOAST, a tool for evaluating the Dung semantics⁵, and uses this to set the evaluation of the GRL elements.

In *Step 3 - Goal Modeling*, the goal model that is generated by the Translation process is evaluated by the stakeholders. These models can be used as a discussion means to investigate whether the goals in the model are in line with the original requirements of the stakeholders. This allows a better rationalization of the goal modeling process, with a clear traceability from the goals of the organization to the arguments and evidence that were used in the discussions.

Step 4 - Update involves translating GRL models with its analysis back into an argument diagram. This falls outside the scope of the current paper.

Future work. It would be interesting to explore the effect of different argumentation semantics on goal models. Moreover, we would like to add the *Update* step of our framework in order to automatically translate goal models to argument diagrams. For this, we see the recent proposal by Mirel and Villata as a useful starting point [2].

References

- [1] Floris Bex, John Lawrence, Mark Snaith, and Chris Reed. Implementing the argument web. *Communications of the ACM*, 56(10):66–73, 2013.
- [2] Isabelle Mirbel and Serena Villata. An Argumentation-based Support System for Requirements Reconciliation. In *Proceedings of COMMA 2014*, pages 467–468, 2014.
- [3] Marc van Zee, Floris Bex, and Sepideh Ghanavati. Rationalization of Goal Models in GRL using Formal Argumentation. In *Proceedings of RE:Next! track at RE 2015*, 2015.
- [4] Marc van Zee and Sepideh Ghanavati. Capturing Evidence and Rationales with Requirements Engineering and Argumentation-Based Techniques. In *Proc. of the 26th Benelux Conf. on Artificial Intelligence (BNAIC)*, 2014.

²<http://ova.arg-tech.org/>

³<http://www.marcvanze.nl/RationalGRL>

⁴<http://jucmnav.softwareengineering.ca/ucm/bin/view/ProjetSEG/WebHome>

⁵<http://toast.arg-tech.org>