SeGa4Biz: Model-Driven Framework for Developing Serious Games for Business Processes

Faezeh Khorram, Masoumeh Taromirad, Raman Ramsin

Department of Computer Engineering, Sharif University of Technology, Tehran, Iran
fkhorram@ce.sharif.edu, m.taromirad@staff.sharif.edu, ramsin@sharif.edu

Methodology Engineering Laboratory
http://me.ce.sharif.edu/

MSCA Marie Skłodowska-Curie Actions

Abstract

Organizations look for effective ways to teach their business processes to their employees. The application of serious games for teaching business processes is getting attraction recently.

This paper presents SeGa4Biz, a model-driven framework for serious game development for teaching business processes.

SeGa4Biz particularly provides metamodels for creating Educational Serious Games (ESG) and Game-Aware Process (GAP) models, and automates considerable parts of the modeling and development activities, via model transformation. The effectiveness and applicability of SeGa4Biz is examined through a serious game development project in a software development company.

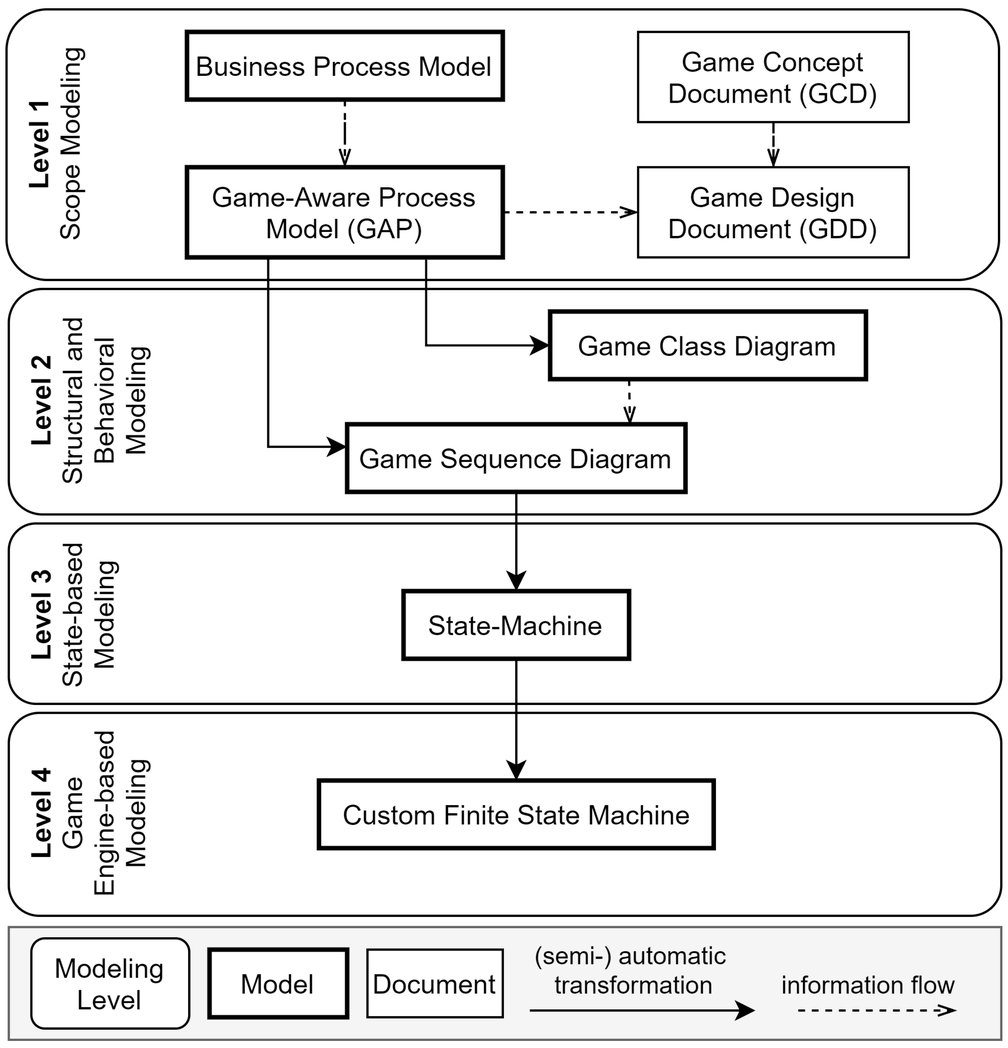
Contributions

- A novel modeling approach for developing serious games for teaching business processes
- A novel structured design method that specifies how the elements of the game and the business process domains are related.
- A prototype implementation of the framework
- A set of domain-specific evaluation criteria that assess the support for model-driven serious game development in the context of business process education.

Overview

SeGa4Biz modeling framework has four levels of abstraction

- *Level 1:* Identification and modeling of the goals and requirements
- *Level 2:* Structural and Behavioral modeling of the whole game
- *Level 3:* Behavioral modeling of the individual objects of the game
- *Level 4:* Platform-specific modeling (based on Unity game engine)



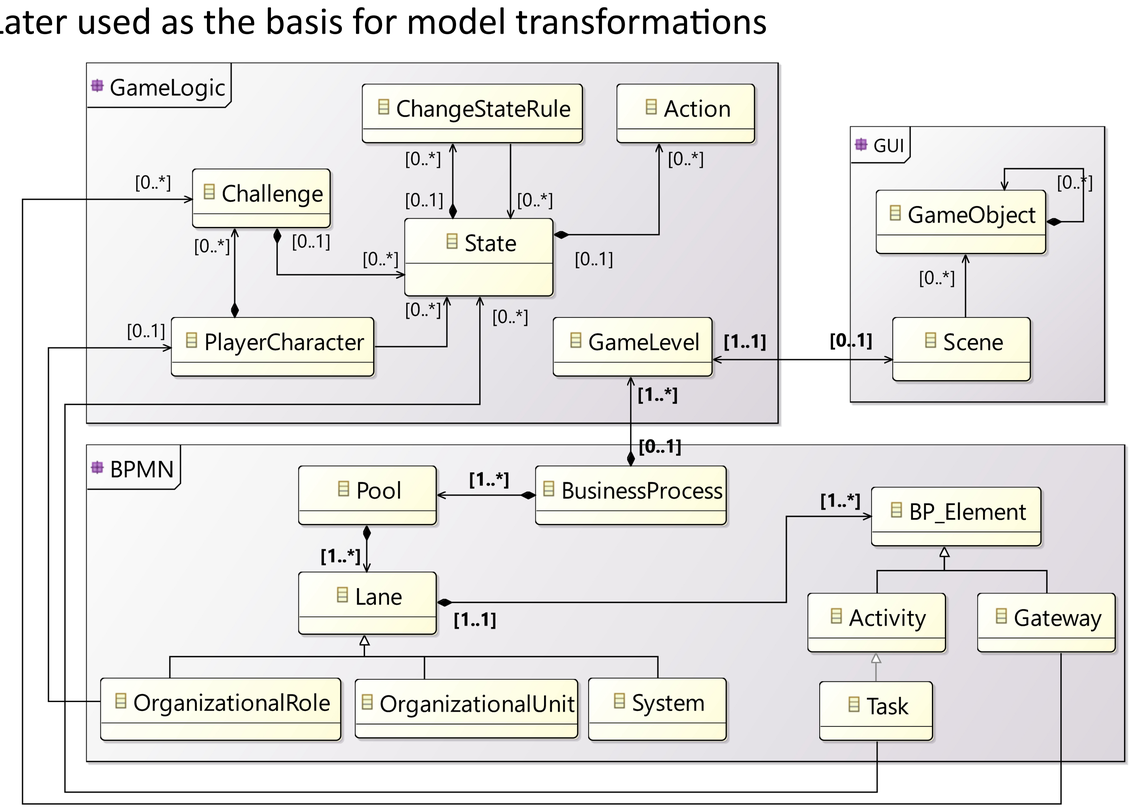
SeGa4Biz Framework

Semi-automatic transition between levels is provided by transformation rules (i.e., implemented in ATL language)

- *Level 1 to 2:*
  - GAP Model to Class Diagram
  - GAP Model to Sequence Diagram
- *Level 2 to 3:* Sequence Diagram to a set of UML-based State Machines
- *Level 3 to 4:* UML-based State Machines to Playmaker-supported FSMs

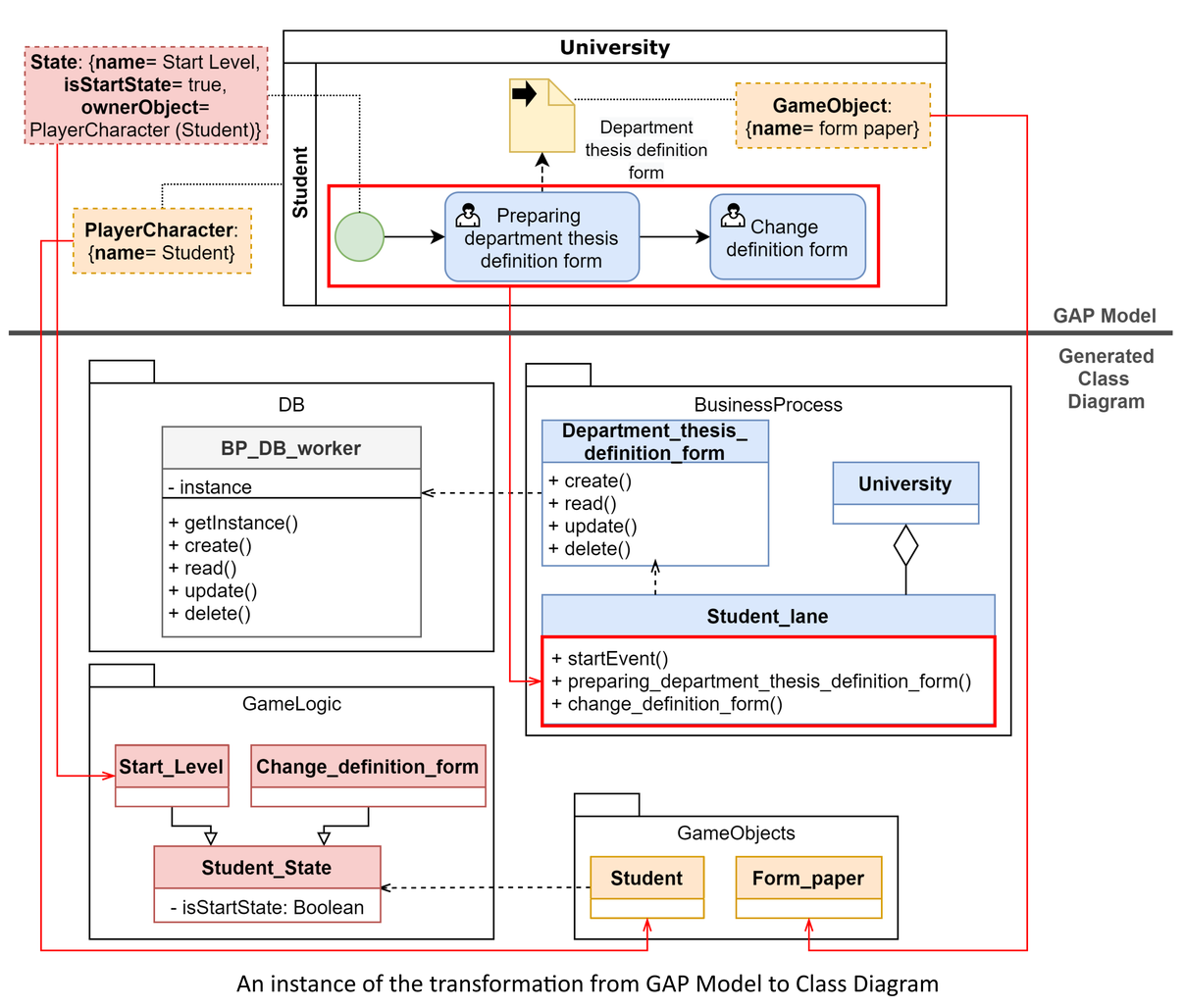
Game-Aware Process Models (GAP)

- Systematically specifies the relationships between the elements of the business process (BPMN) and the serious game
- Used for designing an educational serious game for a given business process in a (semi-)automatic and structured fashion
- Later used as the basis for model transformations



An excerpt of GAP Metamodel

An instance of the Transformation rules



An instance of the transformation from GAP Model to Class Diagram

Evaluation

Assessing the ***applicability*** and ***effectiveness*** of SeGa4Biz

<u>Evaluation Criteria</u>: two categories of metrics based on
1. Model-driven architecture
2. Support for serious game development for business process education
<u>Case study</u>: Application of SeGa4Biz in a real-world project; Development of a serious game for teaching a business process of a company

<u>Results</u>

- ***Strengths***: Accurate definition of the modeling levels, Providing all the required abstraction levels, Understandability and high quality from both the design and the modeling perspectives, Significant increase in the level of ease and automation, Well-cover of the game-related concerns
- ***Weaknesses***: Lack of support for iterative development, Low level of automation in the last modeling level, Minimal attention to artistic features