Research Questions

1. Is it possible to create a framework that can generate software modelling learning games for a broad range of visual modelling languages?
   Evaluation:
   The degree of different games of different modelling languages that is supported by the framework. Different games for several modelling languages will be created. The number of lines of shared code, generated code, and extension code (written code) of each game will be measured and compared. A small average number of lines of extension code means little effort needed to create different games. Also, the various games produced by respondents to answer the third research questions can be used as data to address this question as well.

2. Can the generated games help students in learning software modelling?
   Evaluation:
   Learner's subjective feedback on the benefit using the games. Learners will be asked to use the generated games to support their learning while undertaking software modelling-related modules (e.g. software engineering, software analysis and design). The games and their contents will be designed specifically to support the learning process of the modules. The results will be learner's subjective feedback, to what extend the games help them (in Likert scale) and their reasons behind the feedback. At first, the games will be demonstrated to them. Each learner then can choose voluntarily whether he/she will use the games or not. They will be asked for their consent that the games are part of a research and their interaction with games will be recorded. The engagement effect of the games will also be measured using *User Engagement Scale*.

3. Can the generated games facilitate tutors to create software modelling games?
   Evaluation:
   Tutor's subjective feedback on the benefit using the framework. The subjects will be from non-experience developers (e.g. computer science students, hackathon or workshop participants), since getting developers that have a reasonable background in developing games and sufficient knowledge on software modelling as respondents are difficult. Training will be given to the non-experience developers. First, they will get a tutorial how to use the framework. Next, they will do exercise building one or two different games with different modelling languages. After that, every responded will be asked to use her/his creativity to create her/his own modelling language and its game. In the end, they will be asked for their subjective feedback about the framework—to what extend the framework facilitates them (in Likert scale) to create software modelling games as well as their reasons that underlie their feedback. Holding the training as a workshop at game or software engineering conferences facilitates this research to get respondents with adequate background on developing games and software modelling. Holding the training as a competition with proper

incentives will motivate respondents to create games with quality in mind. Also, the respondents will be asked for their consent that the training is part of a research and their interaction with the framework will be recorded.