Modelling the Software Prototyping Process in a Research Context

Mika Saari, Jari Soini, **Jere Grönman**, Petri Rantanen, Timo Mäkinen and Pekka Sillberg

EJC 2020, 30th International Conference on Information Modelling and Knowledge Bases, June 8-9, 2020

Goals

- Examine the Third Mission of universities and company collaboration in prototype development process

- Model the university-enterprise collaboration based on experiences gained from real-life use cases

- Describe the process of creating the model

Research Methodology – an 8-step process modelling approach
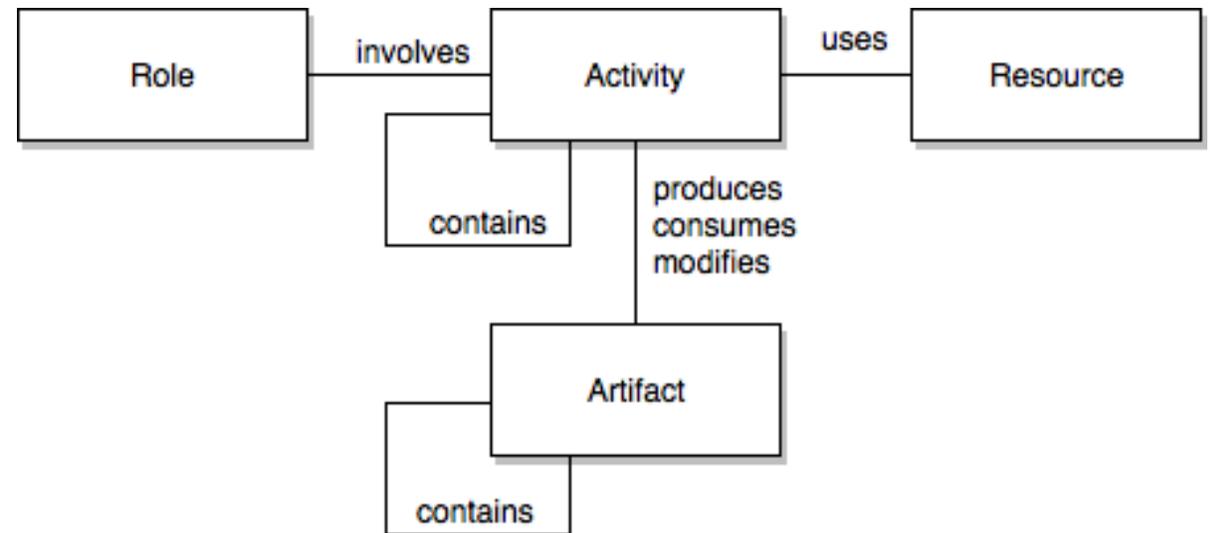
- Set-up Phase
    1. Objectives and Scope
    2. Define Schema
    3. Select Language
    4. Select and Tailor Tools
    5. Elicitation

- Execution Phase
    6. Create Model
    7. Check Model
    8. Check Process

U. Becker, D. Hamann, D and M. Verlage, "Descriptive Modeling of Software Process". Research Report ESE-Report, 045.97/E, Fraunhofer IESE, Kaiserslautern, Germany, 1997.

Applying the model – steps 2-4

- Data for the model was collected through interviews with the developers involved in the processes

- A schema definition was used to guide the data collection process, and to produce the roles, activities, resources and artifacts for the model

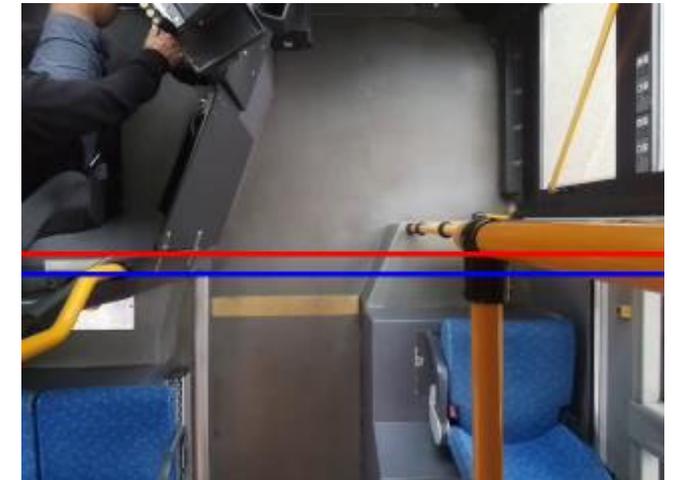- Graphical representations of the model were created by a free online digram software (draw.io)

Applying the model – step 5 (1/2)

- Information were collected from four cases by means of developer interviews:
  - Verification of customer complaints related to bus routes (PDP1)
  - Verification of customer complaints related to garbage collection (PDP2)
  - Data collection in a public indoor swimming pool (PDP3)
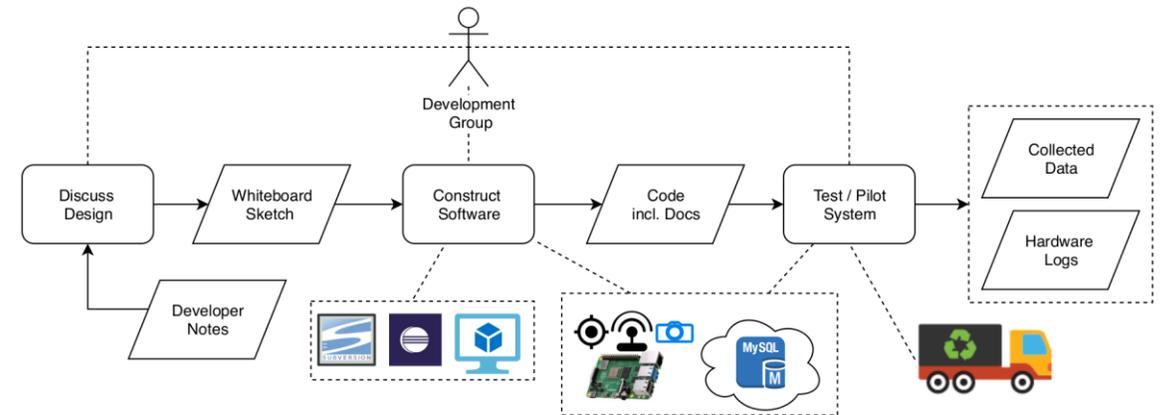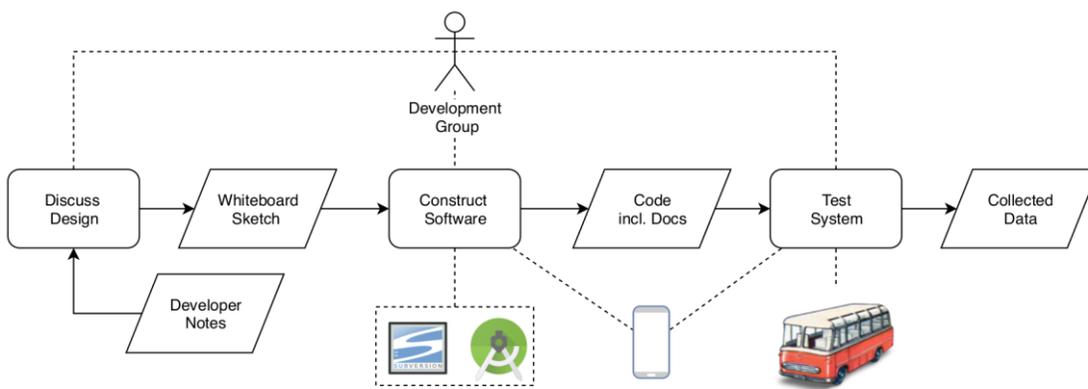 - Passenger counting in a free-to-ride bus (PDP4)

Applying the model – step 5 (2/2)

- Based on the developer interviews, whiteboard diagrams were constructed using Post-It notes (stickers-on-the-wall technique)

- The goal was to highlight the development process practices, and ultimately, to find the common elements in the all four cases

- The approach allowed to quickly arrange and re-arrange the discovered roles, activities, resources, artifacts and improvement ideas

Applying the model – step 6 (1/2)

- Based on the whiteboard diagrams, models were created for each use case.

Applying the model – step 6 (2/2)

- Finally, the individual models were used to create a combined model.
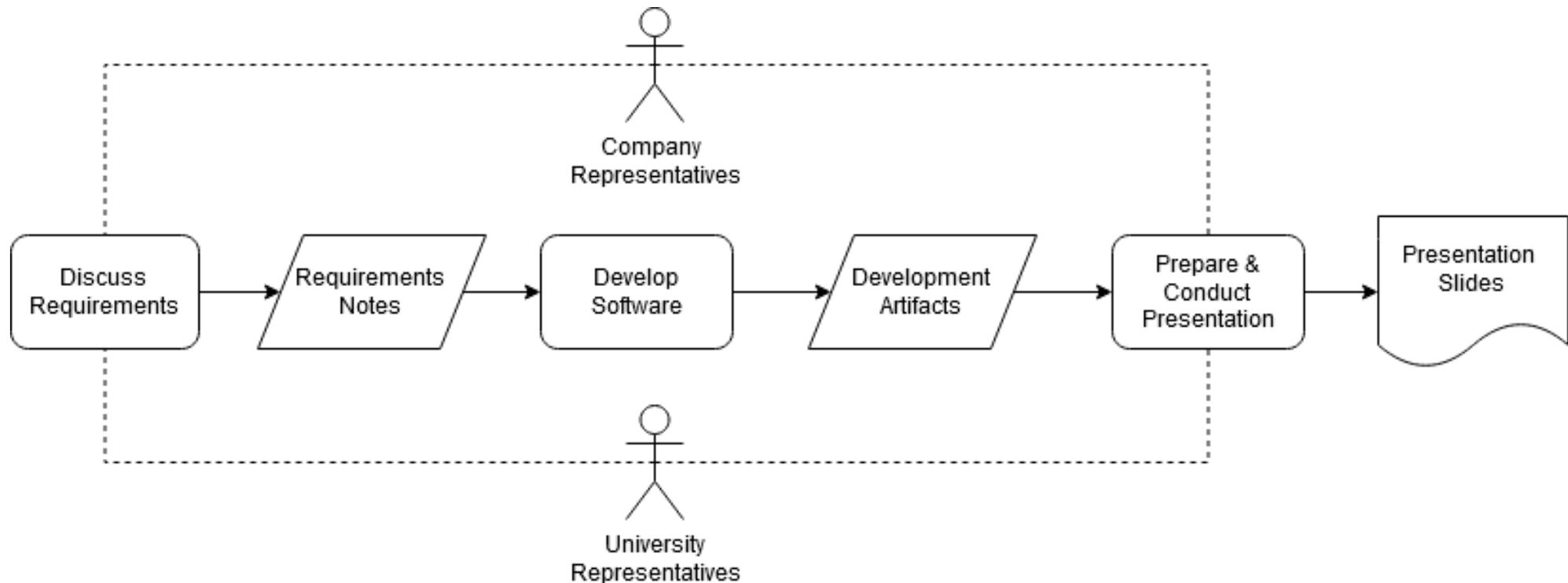
Findings – steps 7-8 (1/3)

- The process of documenting intermediate specifications was less than systematic
  - Sometimes specifications were documented, sometimes not.
  - The project funding or goals seldom required to document anything but the end results
  - In practice whiteboards were extensively used in the design process and for example, taking photographs of the boards would a simple way of improving the documentation.
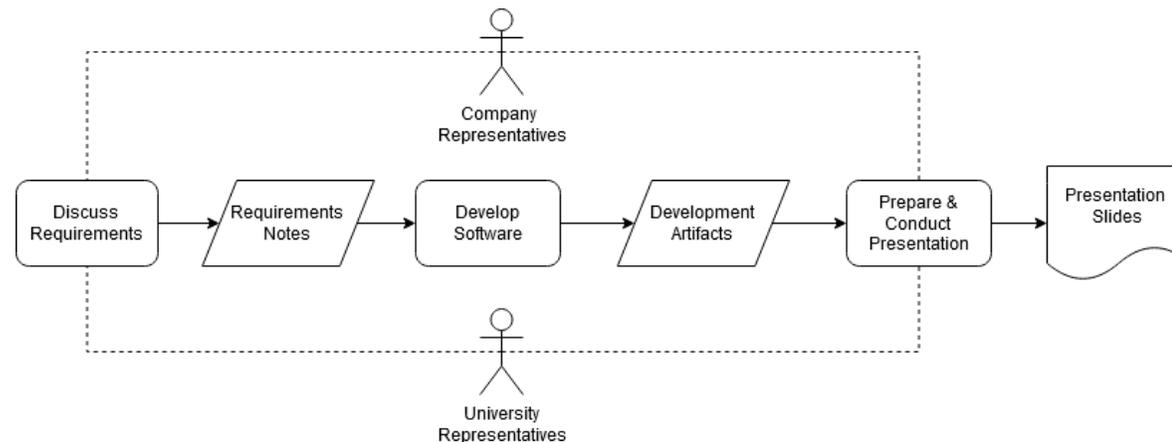
Findings – steps 7-8 (2/3)

- The interaction with the customers (e.g. companies)
  - Feedback and evaluation of the "final" prototypes were provided by the companies
  - Companies never indicated that they desired more in-depth involvement in the actual development process...
  - ...though no studies have been performed to find out the reasons for the lower interest in interaction during the development phase.

Findings – steps 7-8 (3/3)

- The uncertainity in the usability of the project results
  - No bug fixes, improvement or maintenance is provided after the project funding has ended
  - Results (documentation, codes, etc.) are published as open source, but are they actually used by third parties?
  - Are the results published in a way that allows easy discovery by third parties?
- Deeper involvement of students in the development process?

Summary

- Presented a model for for university-enterprise collaboration in the context of prototype development
- Based on the results in creating usable prototypes, the model can be seen to be successful
- Regardless, the process of creating the model helped us in finding certain shortcomings in our existing practices

Thank you!