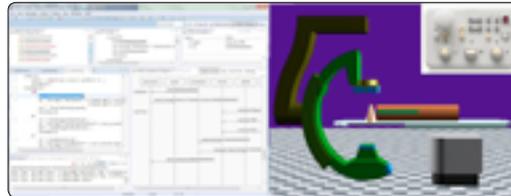


# 22. Early validation of software designs

**M**any ICT-projects suffer from long delays because of an unpredictably long test and integration phase. The problem is that during this phase many bugs in the computer code have to be corrected.

Some bugs might lead to a costly redesign.

To detect faults much earlier during the development process, we propose a modelling approach based on the Parallel Object-Oriented Specification Language (POOSL). The new POOSL interface supports light-weight modelling and fast simulation. In addition, the new interface contains validation checks to detect modelling faults early. New designs can be validated by simulating POOSL-models in combination with a visualization of the user-perceived behaviour.



### ICT science question

The main challenge is to develop a system modelling environment which allows for fast and light-weight modelling early in the development process. In this early stage requirements might not yet be very clear and many decisions have to be taken about the structure of the system, the responsibilities and behaviour of the components, and their interaction.

The modelling environment should also allow industrially scalable simulations. On the other hand, the desire for model validation and analysis requires a proper formal semantics, i.e. a precise language to describe the model. Finally, support for model debugging and visualization of simulations results is required.

### Application

We have applied our method to parts of an interventional X-ray system of Philips Healthcare. The current way of working is rather document driven. Our proposed new method makes it possible to simulate and visualize the requirements and high-level designs very early in the development phase. The modelling tool that will be developed fills a gap between expensive commercial modelling tools



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(like Matlab and Rhapsody) that require detailed modelling, often close to the level of code, and drawing tools (such as Visio and UML drawing tools) that do not allow simulation.

### Alternative Application

Our approach can be used in all sectors of the high-tech industry, especially for systems where high-level supervisory control is important. Examples are the command and control systems of Thales and the lithography machines of ASML.

POOSL has been used already in cooperation with Thales, where performance aspects have been analyzed. At ASML, engineers are experimenting with a new interface of our modelling tool.

### Nice to know

If a problem in the requirements is found only after the product release, it would cost ten to hundred times more to fix than if it had already been found during the design phase.

### Quote

“Modelling the power control protocol of an interventional X-ray system in POOSL revealed a few design errors that could now be corrected early in the development process. Since POOSL models can be easily changed, they are very useful to explore the design space quickly. The simulation possibilities of the POOSL-tool also support the communication with internal stakeholders.”



Increase the rate of innovation of the Dutch high-tech industry.



Fast product development by a shorter test and integration phase.



Avoid costly redesigns by detecting faults much earlier in the development process.



Develop industrially scalable modelling techniques that are maintainable and semantically consistent.

