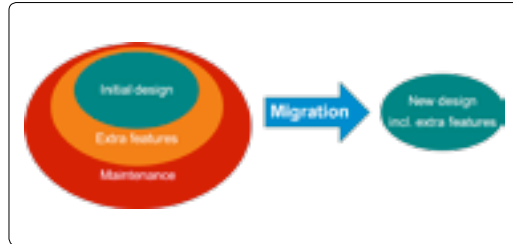# 18. A facelift for old software

Industrial software must continuously be maintained to stay in business. On the one hand this is caused by external constraints such as changes in hardware, the advice not to use the outdated Windows XP operating system anymore, or the Millennium Problem. On the other hand this is caused by technology changes within the company.

After several years of maintenance, a software redesign is needed to support further innovation. This is often postponed, because it is time consuming and it does not immediately create new product features.

Traditional software development is focused on documents, which quickly get outdated. Modern software development is focused on models that are used for code generation. We develop a facelift for old software, called 'model-based migration'. Model-based migration extracts models from the legacy software and transforms these models to a new model-based design.

ICT science question

The challenge is to obtain a cost effective solution for the huge industrial problem of maintaining legacy software. Starting from scratch is not acceptable; the domain knowledge must be maintained. As documentation is usually outdated, the legacy software itself becomes the primary information source. This information can be revealed by analyzing the source code and by learning from the observable behaviour.

Application

We have applied model-based migration to the field service procedures for the interventional X-ray machines of Philips HealthCare. The legacy software has evolved over many years into a stack of in-house frameworks, that are difficult to maintain and extend. Our own experience indicates that an eighty percent productivity gain can be obtained using model-based migration.

The company SemanticDesigns also works on migration of legacy software, but their focus is on migrations from old programming languages to modern ones. In the applications we look at, the migration requires a more fundamental redesign.

Alternative Application

In general, all companies that develop software for more than ten years have the same problem. More specifically, this work has led to the initiative for a follow-up project proposal on software rejuvenation in the European Ecsel program. Industrial partners from various countries have confirmed that they have similar problems with legacy software, and have expressed their interest to participate in such a project. This project also involves academic partners to further advance the technology.

Nice to know

The amount of embedded software in high-tech systems is continuing to increase, currently being in the order of multiple millions of Lines of Code. As a rule of thumb, every fifty thousand Lines of Code requires one full-time software developer for maintenance only.

Boost innovation by renewing crucial software components.

Reuse existing domain knowledge without suffering from large and complex legacy software.

Large effort reduction for the maintenance and migration of legacy software.

Challenge is to automate the extraction of domain knowledge from legacy software as much as possible.

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COMMIT/ project
ALLEGIO Composable Embedded Systems for Healthcare