

# Preface

It has become a tradition that each Embedded Systems Institute's 5 year Industry-as-Laboratory project is concluded with a book, bringing together the main achievements of the research. This is now the fifth book in this series. In a way it is also the first book, as this book is published by the international publisher, Springer, as opposed to our earlier books, which were published 'in house'.

This book describes the Darwin project which addressed the challenges of designing and maintaining large embedded software-based systems. The industrial vehicle chosen for the research was the MRI scanner family made by Philips Healthcare. MRI scanners are complex, high-value, high-end machines offering a unique detailed view of the inside of the human body. In this specialized field Philips is a renowned world leader. The project team was made up of researchers and architects from the Embedded Systems Institute, Philips Healthcare, Philips Research, TU Delft, TU Eindhoven, the University of Twente, the University Groningen and the VU University of Amsterdam. Darwin started in October 2005 and ran until the end of September 2010.

The Darwin project focused specifically on system evolvability, that is, a system's ability to handle changes to its requirements, environment and implementation technologies. The need to improve system evolvability is becoming increasingly recognized, especially in the engineering of computer based systems, where the development, commissioning and replacement of large systems can be extremely costly. Despite this clear industrial need, there are no formal means for evaluating the evolvability of systems; hence, no means of proving that one system is more evolvable than another. The Darwin project recognized this and aimed to provide methods and tools that would lead to the design of highly evolvable systems. MRI scanners, apart from the complexity of their mechanical and physical components, contain close to 10 million lines of code. Time to market pressures, customer demands, system openness and strict certification procedures all increase a system's complexity making evolvability an important system quality. The Industry-as-Laboratory paradigm, pioneered by ESI, brings together researchers from academia and industry to focus on concrete industrial cases and has been instrumental in this project. Without this approach, university researchers would not have been able to validate their work, nor would they have had access to a real system's code base.

Conversely, the approach has allowed industrial system designers to see the merits of advanced new software and system development techniques being developed in academia.

I would like to thank all participants in this project for their commitment and contributions; as a team, they have made Darwin into a success! The support of Philips Healthcare and the Dutch Ministry of Economic Affairs (Agentschap NL), who provided the financial support, via the BSIK funding, for Darwin, are gratefully acknowledged. We also thank Springer for their willingness to publish this book. With this book, the Embedded Systems Institute hopes to share the most important results and insights of the Darwin project with a wider audience, both in industry and academia.



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