

## From scientific instrument to industrial machine: coping with architectural stress in embedded systems

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### Abstrak

Architectural stress is the inability of a system design to respond to new market demands. It is an important yet often concealed issue in high tech systems. In *From scientific instrument to industrial machine*, we look at the phenomenon of architectural stress in embedded systems in the context of a transmission electron microscope system built by FEI Company. Traditionally, transmission electron microscopes are manually operated scientific instruments, but they also have enormous potential for use in industrial applications. However, this new market has quite different characteristics. There are strong demands for cost-effective analysis, accurate and precise measurements, and ease-of-use. These demands can be translated into new system qualities, e.g. reliability, predictability and high throughput, as well as new functions, e.g. automation of electron microscopic analyses, automated focusing and positioning functions. *From scientific instrument to industrial machine* takes a pragmatic approach to the problem of architectural stress. In particular, it describes the outcomes of the Condor project, a joint endeavour by a consortium of industrial and academic partners. In this collaboration an integrated approach was essential to successfully combine various scientific results and show the first steps towards a new direction. System modelling and prototyping were the key techniques to develop better understanding and innovative solutions to the problems associated with architectural stress.