

Foreword

by Stephan Jubin

Dear Reader,

It is my pleasure to welcome you to the introduction of this book. Selecting this book as your current lecture shows that we have a common interest: safety of railway systems.

Indeed railway systems are facing huge challenges in the last years. We are observing some significant trends: one is towards higher operational speeds; another one is towards highly or even fully automated systems. Both trends include the need for an increased usage of programmable electronic systems to support the Operators in their duty; or in case of fully automated systems even to replace some staff. But also the conventional railway, metro and tram systems make more and more use of electronic systems, especially with the expectation to increase operational effectiveness and customer satisfaction – and thus to optimise revenue success.

And indeed the introduction of electronic systems seems to provide a lot of advantages: computers appear as less error prone than human operators, they provide additional and more flexible functionality, passenger information and comfort is improved, and also the operational performance benefits in terms of (shorter) headways and improved punctuality.

Unfortunately, as nearly always, there is the little word “but” – also in this case. It is related to the fact that computer systems just tend to appear less error prone, but in fact this assumption only holds if some very specific care is applied. This needs to start already in the beginning of the design in order to come to a careful decision which functions to automate and which not. In this context not only the electronic system alone can be considered; the whole function needs to be in the focus including all the sensors to obtain the necessary information and all the actuators to control/perform the function. Of course it is an excellent idea to avoid human errors in the operation of a railway system. But transfer of operational responsibility from humans to technical equipment is not always the best solution since humans also have their advantages. In particular the human sensory organs, which are able to recognize various different situations within very short time and the high intellectual flexibility to react on the scenarios can be reflected by technical solutions only to a limited degree. However, if an appropriate technical representation is possible, then the technical solution in most cases shows the more reliable performance.

But how to perform such safety analyses?

How to determine the safety relevance of the product you are going to design?

Which means can be applied to ensure that this product will perform sufficiently safe?

How to demonstrate the safety capabilities of your product towards other parties such as clients or Safety Authorities?

This is now the point where this book enters the scene. Here several renowned experts from leading railway suppliers, universities and research institutes have shown-up to share their experience. You will

find helpful ideas and guidance on how specific safety matters can be addressed. This covers safety and risk analyses, the consideration of human factors, and several detailed reports about how the safety of an electronic product can be demonstrated. Included are approaches which are already well-proven from past projects as well as new ideas to deal with future challenges. Due to their special safety relevance there is by nature a focus on signalling and train protection systems. However the described concepts might be applicable also for other safety relevant systems or components, too.

I would like to warmly invite you to the lecture of the following sections, to benefit from the experience and ideas of the various experts, and based on the gained impressions I wish you many good ideas for the further development and improvement of your own products and railway systems.

Yours sincerely

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