Editorial

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Watching science fiction movies from a few decades ago can be a very entertaining exercise, particularly for people interested in technology. For example, the second iteration of 'Back to the Future' from 1989 starts with a trip to the far-away year of 2015. How do the visions of the movie compare to our reality today? While we are still waiting for flying cars to hit our dealers, some of the concepts in the movie have strong similarities to current technologies; for example, video chat systems, flat panel screens or head-mounted displays. Several science fiction movies seem to have predicted the smartness of future homes (today referred to as home automation) in many different ways, from interaction through touchscreens and fingerprint authentication through all sorts of more or less useful sensor-based gimmicks. The obvious reason that these developments have been predicted is that making the physical objects we interact with 'smart' can make our lives easier.

As bridge engineers we may wonder if our bridges could be made smarter too. Who should benefit from smart bridges? Should that be the people walking or driving across the bridge, the maintenance personnel who have to assess the condition of the bridge or perhaps the bridge itself? Such smart adaptive bridges may adapt to changes in loading or environmental conditions to improve their performance. While those concepts are not new, recent advances in sensor-based monitoring, multi-criterial structural optimisation, high-power actuation devices, miniaturised high-performance computing, building information modelling and big data analytics, computer vision, and widely available access to the Internet may contribute to the advancement of such technologies. Concepts for adaptive bridges need to be based on sophisticated control algorithms, which in turn rely on accurate and robust prediction models, typically numerical simulations, in order to ensure structural safety. It is obvious that many established and newly emerging technologies need to be integrated in order to bring smart bridges from concept to reality. One could envision them becoming components of the Internet of Things just as cars, bicycles, shoes, watches and glasses will be – items that can provide information, which one can interact with or perform actions on. Such visions of course bring up questions of security and the plot for a future James Bond movie that features terrorists hacking the control systems of major bridges appears quite simple to draft.

In the end, the question becomes whether there is added value and benefit to the people in making structures such as bridges smarter. Just being able to do it should not be reason enough.

One just has to look at the many monitoring systems that have been installed on bridges and that no one is looking at the data in order to realise that the 'why' is just as important as the 'how'. Every bridge is a prototype structure that requires a tailored solution and as such bridges are quite different from products such as smartphones or coffee machines. It may pay off, however, to keep the concepts of smartness on the agenda and revisit them while we advance technology through research, development and building as best discussed in journals such as the one you are reading just now.

This issue of *Bridge Engineering* features six papers with a diverse range of subjects. This shows the wide range of topics our journal covers in order to do justice to the many different aspects of modern bridge engineering.

In the first paper, McRobbie *et al.* (2015) investigate methods of image analysis to support routine visual bridge inspection. Tharmarajah *et al.* (2015) show the potential of corrosion-resistant fibre-reinforced polymer reinforcement for use on bridge deck slabs. In the third paper, Wojnarski (2015) takes a close look at the partial collapse of the Izbor viaduct to unravel its mysteries. In their paper, Smith *et al.* (2015) present a carbon calculator design tool for bridges, while Stucchi and Luchi (2015) investigate the differences between the actual loads on Brazilian bridges and those provided by the standards. The final paper is by Nicholls *et al.* (2015) who describe the repairs to electro-slag weld defects on the M4 Boston Manor viaduct.

I would like to thank all authors for their papers and would like to remind our readers that any paper is open for discussion. If you do wish to comment, please send a response to the journal; details on the procedure can be found at the end of each paper.

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