

RAIL SAFETY: BACK IN THE SPOTLIGHT

What's the most effective way of making train travel safe? Dominique Heynard, head of strategy and markets for Alstom's signalling system, says it already exists. That solution is the European Train Control System, or ETCS, introduced by the European Union and designed by a coalition of leading rail industry partners. "We've had a safe and reliable train traffic control system in Europe since the late 1990s," says Heynard.

The ETCS uses a cab computer to communicate with electronic beacons on the tracks known as "balises" to compare actual train speed with the maximum allowable. The system brakes automatically if a train exceeds that limit. So why do accidents still occur? "Because ETCS is not installed everywhere," says Heynard.

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After the accident in Santiago de Compostela, a Spanish judge lamented the absence of a control system in the curve that the driver took at excessive speed. "Most high-speed lines now comply with European standards, but 10% of the network still operates on national standards," explains Heynard. The problem is that, historically, each European country designed its own signalling methods and standards, totalling about 20 across the continent. Interoperability and

Trains are particularly safe. But IT bugs and problems with the signalling systems represent a constant security threat. The solution might be a common European control system.

BY JEAN-CHRISTOPHE PIOT



Anne Haxthausen of the Technical University of Denmark: "Safety problems can have various causes, including IT bugs."

international traffic issues have only worsened over time. A Thalys that leaves Cologne for Amsterdam must be equipped with seven different control systems. On some lines, the locomotive even has to be changed at the border.

HIGH COSTS

Switching from a national system to ETCS is not cheap: both the infrastructure and the trains have to be fitted with the proper equipment. Deutsche Bahn, for example, will spend €8 billion over 15 to 20 years to guarantee maximum safety. Switzerland has equipped its network extensively. Denmark and Belgium's are fully up to ETCS standard, and Norway will soon follow. Germany and France, which have denser networks, are lagging.

Even as ETCS continues to be deployed, the system will continue developing technically. To trim costs and standardise radio-signalling technologies, the railways hope to move away from trackside equipment. ETCS Levels 1 and 2 use trackside devices to detect the position of trains. With Level 3, which is currently being tested in Sweden, trains transmit their position themselves.

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In billions, the amount Deutsche Bahn plans to invest in rail safety over the next 20 years

AVOIDING BUGS

But there's more to safety than speed control. Robust information technology systems are also essential. "Safety problems can have various causes, including IT bugs," says Anne Haxthausen, who leads one of the teams in a vast interdisciplinary research project, RobustRailS, at the Technical University of Denmark. "Reducing them means lowering the risk of error of traffic control software," adds David Pisinger, the researcher in charge of the RobustRailS project. "A major part of our work involves developing interlocking systems that define safe routes to prevent trains from derailing or colliding." That's quite a feat, considering the challenges of building systems capable of controlling networks on a national scale. The model designed by Haxthausen was successfully tested for Rail Net Denmark, the organisation that manages Denmark's railway system, along the 55-km Roskilde-Næstved line.

Another key issue is disruption management. Smooth traffic is both safer and more reliable. That is the focus of the research led by Luuk Veelenturf of the Eindhoven University of Technology. He is working with the Dutch railway company to develop systems that can manage the impact of disruptions in real time, instantly replanning all affected train routes.

These solutions, integrated into ETCS, could boost the capacity of European trains to run more closely, side by side, without compromising their safety. ■

RAIL NETWORK LENGTH

