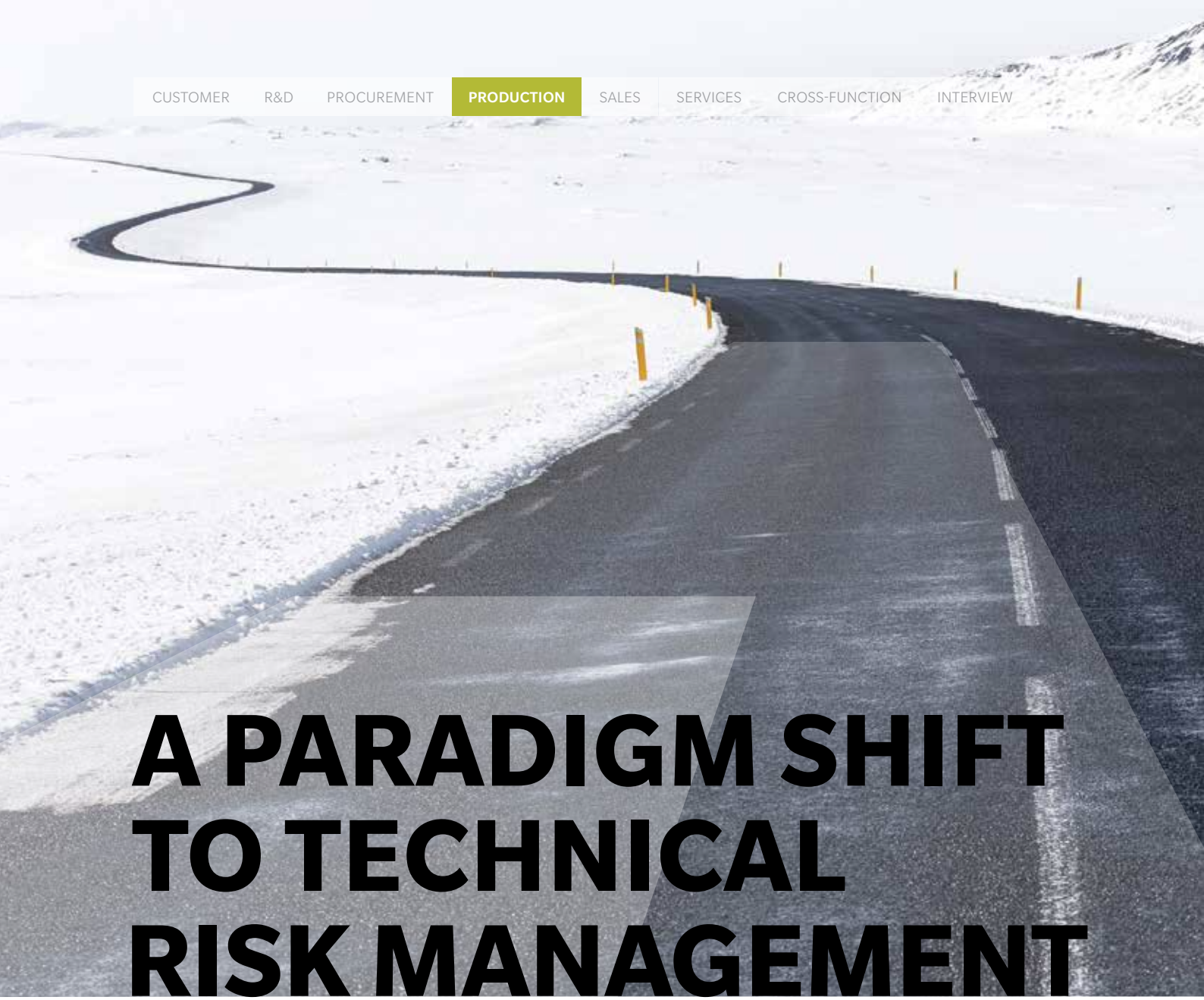
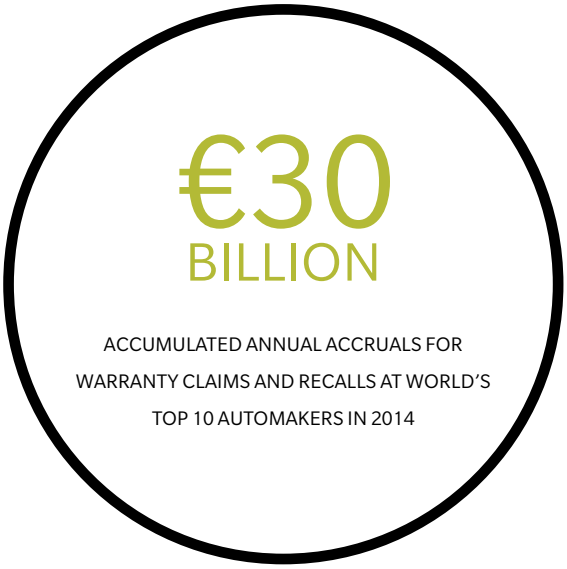


A PARADIGM SHIFT TO TECHNICAL RISK MANAGEMENT

The constant trend in the automotive industry to equip next-generation vehicles with more sophisticated technology has caused a huge increase in complexity, raising the risk that the new systems will fail and increasing concerns over reliability. This trend affects warranty costs and customer complaints, and has pushed the industry's key players to rethink their strategies for technical risk management and problem solving.

RICHARD HELL



Consumer demand for new models that offer high-powered, fuel-efficient small-displacement turbocharged engines, intelligent driver assistance systems, as well as autonomous driving features, is forcing automakers to rapidly deploy new technologies. Although the industry is doing its best to master the technological challenges that have accompanied this push, automakers increased their warranty accruals by more than 20 percent, to 2.9 percent of revenue, from 2011 to 2014. At the same time, the recall quota has almost tripled, damaging the reputations of affected automakers, which in turn may hinder their ability to retain customers.

Historically, the billions of dollars invested in continuous improvement training and structured problem-solving programs were mainly geared toward reacting to production and quality issues that already occurred. Very little cash was spent trying to find ways to prevent problems from happening in the first place, but that is about to change, as more attention is focused on pre-empting technical risks. To succeed, automakers must employ a more preventive and agile way of dealing with quality and reliability challenges, including leveraging advanced analytics and big data.

AGILITY AND SPEED

Agility has become a crucial organizational component. Companies have been integrating their problem solvers in their line functions to ensure a closer proximity to the daily issues. While this setup successfully fosters a continuous improvement mindset, it does not allow for a fast response to complex, multidisciplinary problems. Traditional problem-solving and process-improvement methods have become overburdened with structural and bureaucratic elements over the years.

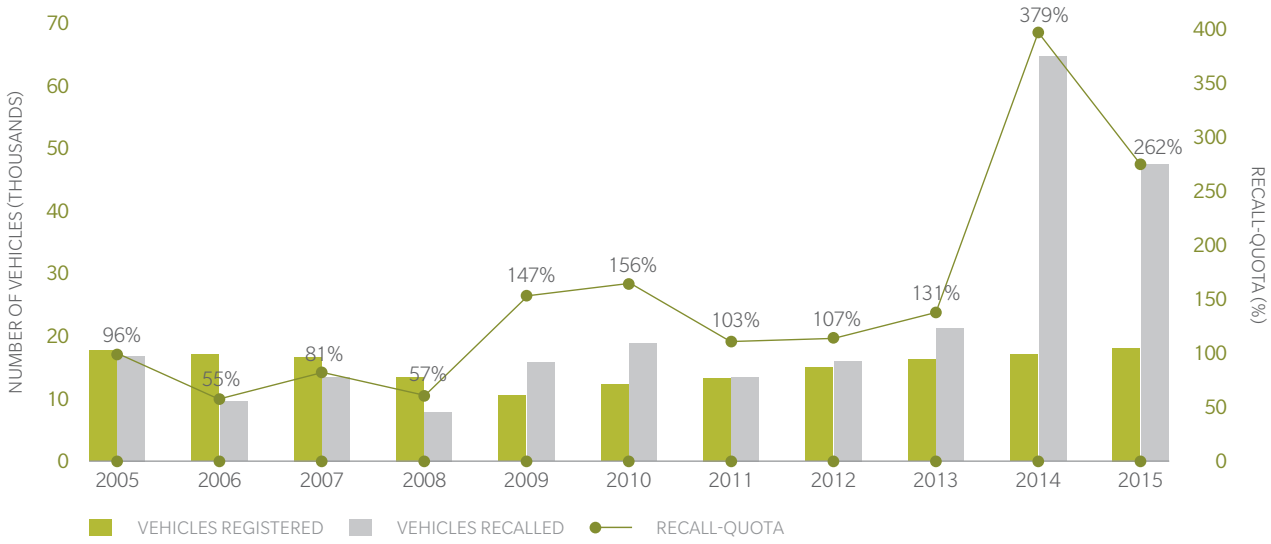
Today, automakers are under pressure to try to match the speedy development cycles of software and electronics providers. This is causing them to rethink their problem-solving methods. The trend now is to undertake a more flexible, multidisciplinary methodical approach. Instead of emphasizing a few tried-and-tested methodologies, market leaders have developed the proper situational awareness to pick the methods and tools that best match the nature and complexity of a given problem. Furthermore, they are tapping the power of big data and advanced analytics much more effectively, resulting in faster and more agile decision making. A key change here is fostering a company culture that enables the problem-solving team to approach a problem in a different way. Sometimes this requires assigning the problem to a team that is not too closely associated with the existing establishment. This team also needs management support to abandon the approach of the past and replace it with a more rigorous, fact-based structure of today.

PREVENT PROBLEMS BEFORE THEY HAPPEN

This new way to manage technical risk is focused on preventing problems before they happen by establishing a fact-based, structured qualification and quantification of high-risk areas based on the probability of failures in design, manufacturing, or in operations prior to the launch of a vehicle. Experience shows that many potential problems are not easy to identify during the prototype phase, giving a false sense of security that the design meets all required specifications. However, the failures and deviations are occurring as the vehicle or subcomponents progressing through the different launch stages, from development

RISING RECALL QUOTA IS PUTTING AUTOMAKERS` REPUTATIONS AT RISK

Since 2011, the recall quota has almost tripled in the U.S.



Source: Center of automotive management, LMC automotive, Oliver Wyman

to small series up to series production. Examples include problems with NVH (noise, vibration, and harshness) components and electrical/electronic (E/E) malfunctions. In both cases, part variability or process sequence can have a major effect on the end performance of the component. To properly apply a preventive risk reduction approach, the entire product life cycle needs to be taken into account, not just the development stage of a system.

A validation of a product or process design needs to be done with the right load spectra and under serial production conditions from a tooling, application, and manufacturing process-maturity perspective. Conventional techniques such as Design and Process, Failure Mode Effect Analysis are not geared toward such a holistic approach. The new paradigm of preventive risk management follows an integrative approach on product, process, and supplier facets, which substantially enhances the traditional technique. Furthermore, the new approach is centered on a functional orientation instead of a component- or parts-based orientation to determine possible cause-effect relationships a system will experience in the field.

This paradigm will be very helpful as automakers integrate more and more software, electronics, and new materials into their products, where evidence-based methods are losing their effectiveness. One approach being used is Oliver Wyman's Function Modeling, which helps reveal all variables of a given cause-effect relationship and provides support to build a conclusive mathematical equation reflecting the failure physics. Weak links, improvement areas, and hidden interrelationships are uncovered, preventing them from becoming bigger problems later, which improves the performance and quality of a system. If applied across all high-risk areas, this new methodology can help encourage a step change that results in more robust, reliable product and process designs for complex systems by explaining a potential technical problem using the laws of physics.

DIGITALIZATION AND ADVANCED ANALYTICS

In the near future, big data and advanced analytics will become key contributors to further enhancing preventive and agile risk management and problem solving. An enormous amount of product- and process-related data already is being collected today. This information can be used to identify new correlations and patterns, which will help push preventive risk management to a new level. More and more advanced analytics will be used to deliver facts that explain complex cause-effect relationships in today's systems.

There is even more potential with new machine-learning based algorithms developed to detect abnormalities, allowing fast and intelligent pattern recognition for unknown, hidden relationships beyond the existing conventional failure specifications. This enables engineers to reveal additional peculiar parameters directly related to the performance of the part or system. Furthermore, simulation and modeling tools are providing additional insights by generating clues that help confirm root causes.

Although it will take years before a fully computerized root-cause analysis or preventive risk management approach is a reality, the trend toward increased digitalization is a solid foundation on which to build a more agile paradigm for preventive risk management. ●