The car made me do it!
Nancy Lesinski 2017

The impending age of autonomous driving is predicted to virtually eliminate human error from driving, currently responsible for 90% of traffic incidents. Visualizing roadways devoid of accidents due to drunkenness, sleepiness, texting or simple human daydreaming presents a utopian view of mobility. But, with self-driving vehicles where the driver can sit back, relax, check their email, does this mean that should an incident occur that drivers can say, "Hey, I didn't do it; it was my car's fault!"

Shifting Responsibility
If we believe that cars can be programmed to avoid a crash, or never to crash, this would be an incredible boost to safer mobility. Drivers would become passengers needing only to choose their destination, gaining the freedom to do what they please in a vehicle. The disabled, elderly and visually impaired would become empowered to expand their boundaries.

But, it's crucial to understand that autonomous vehicles will not eliminate human error, rather just shift it from the driver to the programmers and the designers, which translates into putting more responsibility on the OEMs. Within the insurance industry, there is already much discussion of new business models that shift the current focus of insuring millions of private consumers to one that involves a few OEMs and infrastructure operators, similar to the insurance model for cruise lines and shipping companies.

Cars as Computers
For quite a few years now, it has become common to think of a car as a computer on wheels. According to Boston Consulting Group, a typical premium-class car has as many as 100 microprocessors and operates on more than 100 million lines of software code addressing 30,000+ functional requirements. There is an urban legend that says Bill Gates once compared computers to automobiles, allegedly stating that "If GM had kept up with the technology like the computer industry, we would be driving $25 cars that got 1,000 miles to the gallon."

Some of the mythical responses to this legend include:
If auto manufacturers had developed technology like the computer companies, vehicles would have the following characteristics:
1. Automobiles would frequently crash for no apparent reason. This would be so common that motorists would simply accept it, restart their car and continue driving.
2. Occasionally, for no reason, all doors would lock and motorists could only enter their vehicle by simultaneously lifting the door handle, turning the key, and holding the radio antenna.
3. Vehicles would occasionally shut down completely and refuse to restart, requiring motorists to reinstall their engine.

And, so on….

Obviously, these answers were developed to be humorous, but behind all good humor there is a kernel of truth. My computers do regularly act 'glitchy', requiring me to close programs or shut down and restart for no apparent reason, as do my cell phone and tablet. In my experience, none of these issues has ever caused more than frustration, tardy attendance at a webex or a lost document.

Obviously, a malfunctioning car -- 3500 lbs. of moving steel -- can result in more serious consequences. And, it's not just about a malfunction; it also now becomes the responsibility of the programmers and designers to visualize every potential scenario in order to create the ability to avoid disaster. This includes predicting human behavior, which we all know is unpredictable. This then leads to the logical idea that even if systems can operate without human intervention, there is still the possibility of human error at other phases in the lifecycle.

So, to improve the process of safety requires focusing on the behaviors and methodologies regarding how work is performed throughout the product development lifecycle.

Improving Standards and Systems Engineering

Systems for autonomous driving require more software than any other advanced driver assistance systems to date. According to various reports, electronics and software currently represent anywhere from 40 to 90% of vehicle innovation. To help tame this growth, leading automotive industry players have worked together to develop the Automotive Open System Architecture (AUTOSAR) standard. Additionally, automakers are tasked with meeting the new ISO26262 Electric/Electronic functional safety standard, which requires complete process documentation, analysis and verification.

Obviously, vehicles are also made up of numerous hardware platforms and mechanical systems that must interact with the software in a manner so that the performance of all systems can be optimized collectively. Despite huge advances, the issue still exists today that engineers in different disciplines often don't collaborate – or even communicate – as much as they should. This can result in numerous individual optimized parts that don't necessary perform efficiently as a whole. Systems engineering was developed to manage the trade-offs among the dozens of competing subsystems to create a product with optimum overall performance.

A development tool or environment to support a development process in the safety domain should provide a strong link between safety engineering, system engineering and implementation. To help connect these domains and provide a unified model, Dassault Systèmes offers its "Smart, Safe & Connected" (SSC) industry solution experience, which provides a strong foundation for Systems Engineering.

This solution provides a proactive, automated approach to safety compliance (ISO26262) as well as management of end-to-end electrical engineering processes with accurate 3D simulation and automated manufacturing documentation. The SSC 3DEXPERIENCE provides a systems platform to architect, define, simulate and validate various E/E components (including embedded software, mechatronic and electrical). With this solution, automakers can successfully manage vehicle complexity by uniting various disconnected domain specific tools on a single platform, thus enabling dynamic testing of multiple systems engineering disciplines.

As responsibility is put on the engineers and designers to address every potential safety issue that might occur through self-driving vehicles, it is crucial that automakers have a development platform that ensures safety for the consumer as well as traceable development processes that prove due diligence across the entire product development platform. OEMs need to prepare themselves for the consumer transition from driver to passenger with the ability to say "The car made me do it!"

Information on all the Dassault Systèmes' Transportation & Mobility solutions can be found here.