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Industry 4.0 and the rise of QPaaS

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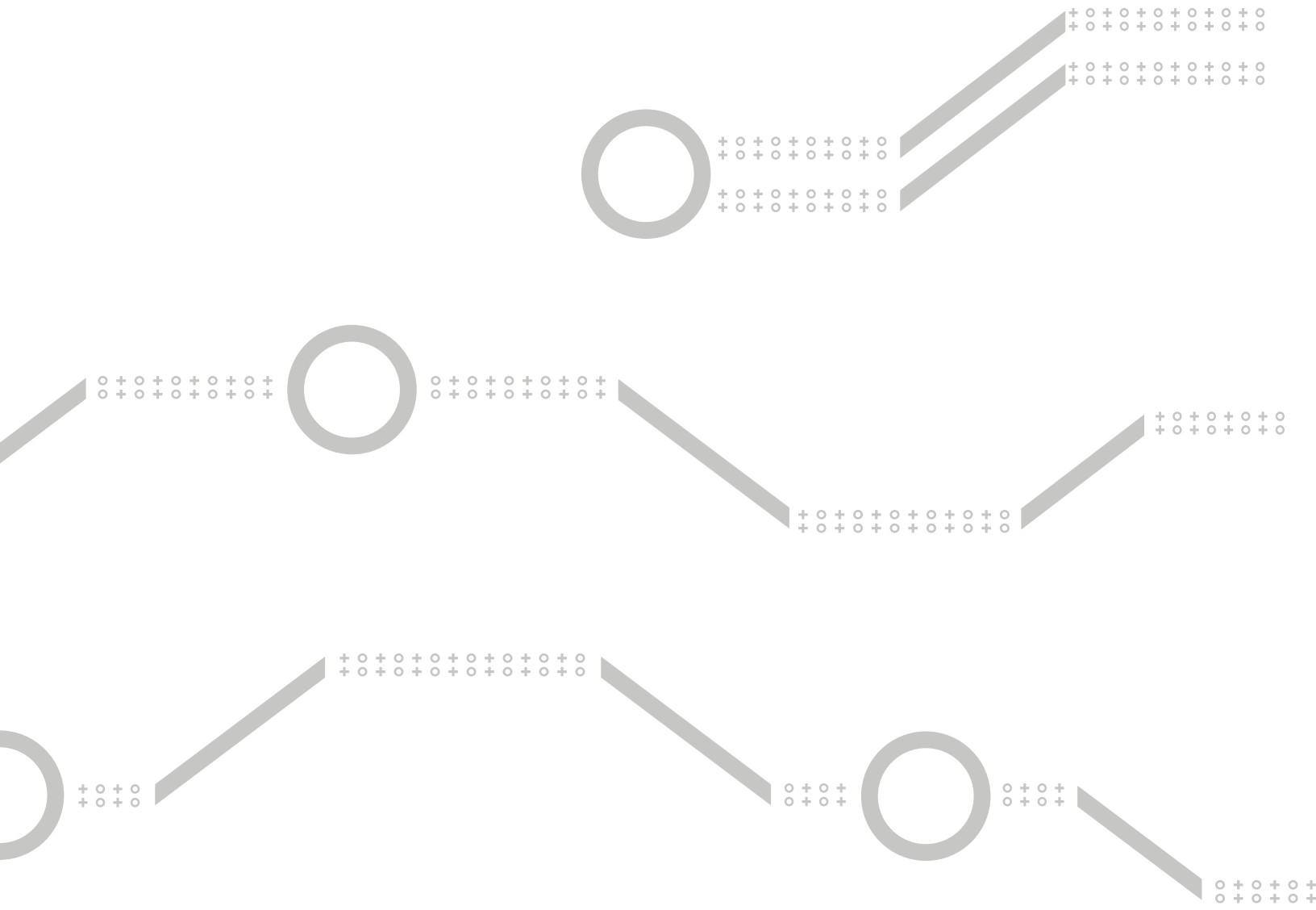


It's become an industry cliché to dub modern cars "computers on wheels" – and with 90 percent of automotive innovation now focused on electronics and software, it's a cliché that happens to be true, and it brings with it the complications that all electronics bring.

The sheer number of electronics-driven features – advanced driver assistance systems (ADAS), telematics, navigation and entertainment systems, and many more – has not only made today's cars more sophisticated, but it has also heightened vehicles' vulnerability to electronics-related failures. Look no further than the nearly 30 percent annual increase in electronics-related recalls each year since 2013.

In response, OEMs are waging a concerted effort to ensure that suppliers at every stage along the automotive supply chain drive down failure rates. The stakes are high: OEMs now demand near-zero failures because any failing component can cause an entire car to fail. With virtually zero margin for error – and with the spurring continuous innovation in autonomous and connected car technologies, leading to the introduction of more and more new electronic components – automotive stakeholders need to embrace a paradigm shift.

McKinsey & Company frames this shift as a matter of moving the industry from its current approach of "firefighting" – responding to failures and vulnerabilities after they're brought to OEMs' attention – toward proactively preventing such episodes in the first place. How can the industry achieve this objective? By embracing quality protection as a service (QPaaS) – an approach that relies on advanced analytics and machine learning to continuously monitor components' functionality with unparalleled accuracy, relying on integrated data sources from relevant suppliers in the supply chain. In enabling the industry to be more proactive and to nip potential problems in the bud, QPaaS will pave the path for continued automotive innovation – benefiting OEMs and consumers alike.

High tech, high failure rates

The case for QPaaS begins with the failure of current approaches to ensure the quality and reliability of cars' electronic components.

Component manufacturers first work to ensure quality and performance through the design process, and then via various screening and statistical methods. Longer-term reliability is more difficult to test, given that data needs to be collected after the part leaves the factory and is in use.

So how do product engineers gauge the real-world reliability of their products? They employ two key methods: stress testing designed to simulate long-term usage, and failure analysis of parts that broke down in the field (typically within a system) and have been returned by customers for further investigation.

But many component manufacturers nevertheless report that a high share of ostensibly faulty components – up to 50 percent of those returned by customers – are investigated and then categorized as "No Trouble Found" (NTF). This does not mean that there's an epidemic of over-reporting errors: In such cases, the failures likely stem how the components interact with both other system components and external factors like temperature and humidity. Should be noted that this kind of failures cant be detected with standart SPC /process control techniqes as the product "stand alone are meeting all process spec criterias and rightfuly classified as "good" products.

Making matters worse, OEMs generally lack the data necessary to derive actionable insights about components' performance.

For example, manufacturers of electric vehicle drive trains use electrical converters to control the power. These converters contain semiconductor devices which provide key functionality to the converter. Only by connecting the manufacturing and test data of the semiconductor device with the data of the converter itself, is it possible to determine whether the root-cause of failures is the converter or perhaps one of its embedded components. Yet today, the company assembling the converter does not have access to the quality data of the components manufactured by a supplier.

Data crunch

While one failure can cause an entire car to fail, such a failure rate is too low to generate enough data for suppliers to analyze. Moreover, customers tend to provide data about their systems only when their part fails – meaning that many errors go undetected and unanalyzed.

If one were to design an ideal supply chain, every player along the chain would have access to all data on a car and its systems – including data generated while the car is in use. This would provide OEMs the insight necessary to understand the dynamics of component failures – and to prevent recurrences. Automakers like Audi are working to make this vision a reality, forming strategic partnerships with OEMs spanning the supply chain as part of its planned transformation into a "digital premium car company."

But a variety of impediments have prevented stakeholders from sharing the data necessary to effectively analyze system components and optimize performance. These roadblocks largely fall into three major categories: intellectual property and commercial concerns surrounding data-sharing; technical challenges to data security, flow, and traceability; and a shortage of the cross-domain expertise needed to successfully perform analytics and spot relevant patterns in cars' data.

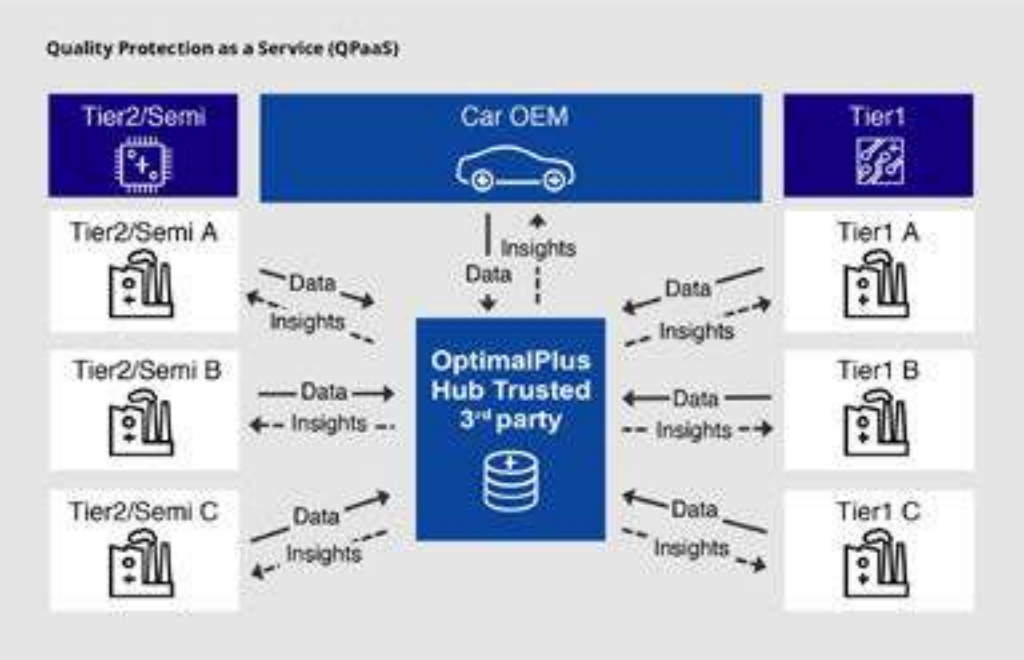
A new framework

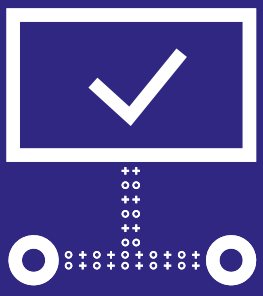
The solution to the industry's core data-related challenges lies in the outsourcing of quality assurance to a trusted third party that combines robust capabilities in fields like data analytics and machine learning with in-depth expertise across the automotive supply chain.

By breaking down data silos, a centralized QPaaS hub can enable the computation and analysis necessary to drive failure rates down to zero. QPaaS providers can achieve IP protection by ensuring that suppliers' aggregated data is never exposed to other parties. Additionally, a QPaaS hub can act as the owner of data security and traceability issues. The Hub will get data from the various suppliers, analyze relevant correlations and provide the parties with "insights" derived from the data, but without exposing the data itself. OptimalPlus, as the leading lifecycle analytics solution provider for the semi and automotive market, is promoting this service concept in recent years, with growing acceptance by the market.

Once seen as an unattainable goal, near-zero failures and defects will be possible when the industry embraces this new paradigm. OEMs will reap big benefits – avoiding costly recalls and reputational damage while mitigating the often-exorbitant costs associated with responding to component failures.

Amid a new wave of Autotech investments and technological breakthroughs, our computers on wheels require rigorous protection and uncompromised performance to achieve their full potential – and the answer lies in QPaaS.





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