



The 2020 Automotive Software Survey, brought to you by Aurora Labs and Strategy Analytics

Powertrain Body Chassis & Safety

2020 AUTOMOTIVE SOFTWARE SURVEY



AURORALABS

STRATEGY ANALYTICS



The 2020 Automotive Software Survey reveals an industry in transition. The direction of travel is clear: more centralized vehicle architectures and more OEM software development in-house. However, serious questions remain over how fast the industry is moving and whether carmakers currently possess the skills required. One key challenge is the role of OTA updates. Managing the costs and complexity will be vital to ensure that consumers remain delighted with their vehicles throughout their lifecycle.



Automotive

October 2020

Author: Ian Riches, **Tel:** Tel +44 1908 423 645

Email: iriches@strategyanalytics.com

Co-Author: Roger Ordman

Email: rogero@auroralabs.com

Contents

1.	Executive Summary	3
2.	Introduction	5
3.	COVID and Electric Vehicle Delays	6
4.	COVID and Autonomous Vehicle Delays	7
5.	Automakers In-House Software Development Skills	8
6.	Percentage of Vehicle Software Developed In-house	10
7.	In-House Software Trend Over time	12
8.	Use of Open-Source Software	13
9.	Number of Software Suppliers to a Vehicle	15
10.	Domain Controller-based E/E Architectures	16
11.	Debugging Software Errors Post-Factory	18
12.	Insight Into Software Behavior During Development	20
13.	Impact of Changing Code in One ECU on Another	21
14.	Predicting Software Anomalies	22
15.	OTA as a Driver of Innovation During Vehicle Lifecycle	23
16.	OTA Update Frequency	25
17.	Impact of Vehicle State During OTA Update on UX	26
18.	Importance of OTA “Safety-Net” for Roll-Back	27
19.	Cost Acceptability of Redundant Systems for OTA	28
20.	Automaker Importance Hierarchy for OTA	29
21.	UNECE WP.29 Impact on OTA	30
22.	Type Approval Process Suitability	31
23.	Find Out More	32

1. Executive Summary

The 2020 Automotive Software Survey reveals an industry in transition. The direction of travel is clear: more centralized vehicle architectures and more OEM software development in-house. However, serious questions remain over how fast the industry is moving and whether carmakers currently possess the skills required. One key challenge is the role of OTA updates. Managing the costs and complexity will be vital to ensure that consumers remain delighted with their vehicles throughout their lifecycle.

The key findings of the 2020 Automotive Software Survey are:

COVID 19 is bringing delays to both electrified and automated vehicle launches – but the delays were seen by respondents as being longer for automated models.

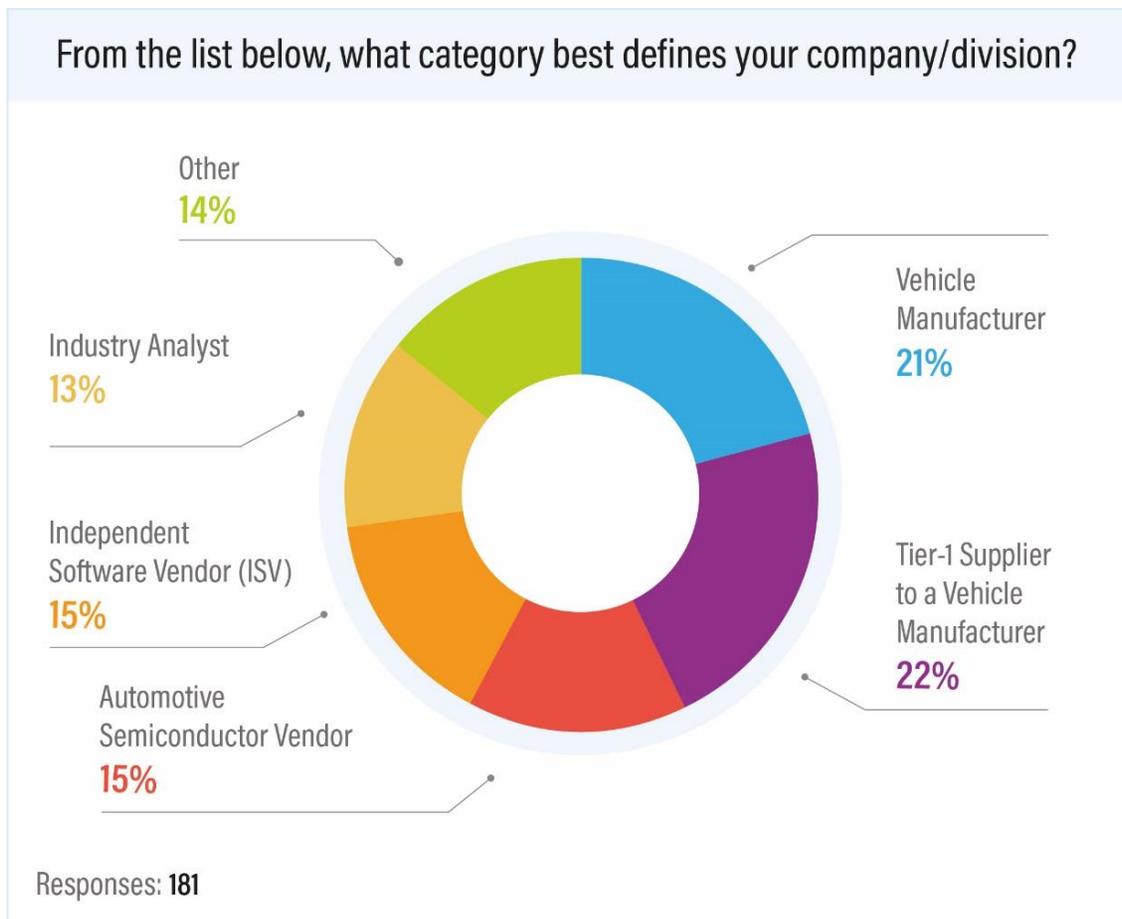
- There was wide agreement that OEMs will develop more software in-house, but only a lukewarm affirmation that they possessed the required skills to do so.
 - Over 50% of respondents said that they were only “somewhat” confident that the necessary skills would be in place in-house at vehicle manufacturers.
- This widely agreed trend is at odds with the current *status quo*, with the most popular answer to how many software suppliers there are to a current vehicle being “Over 50”.
- Domain-based architectures are coming – but most saw volume deployment in MY2027 or later.
 - Respondents from Vehicle Manufacturers who were the most polarized in their responses. They were the group that responded the highest for both the “2024” and “Later than 2027” timeframe.
 - Strategy Analytics believes this to be indicative of a polarization amongst automakers. Those who are keen on this approach are making strong moves already. Those who are not still have no firm plans.
- Multiple aspects of ensuring software quality are seen as difficult and/or getting more difficult, with a strong expressed preference for the ability to have insight into the behavior of the software functions during the development process as well as to be able to predict software anomalies.
- There was overwhelming agreement that OTA updates bring far more than just the ability to roll-out bug fixes. This opinion was strengthened by the fact that 83% of respondents envisaged at least 2 OTA updates per vehicle per year, with 1-in-six (17%) predicted more than 24 updates a year – and so were clearly looking to see more than bug fixes implemented.
 - There were clear expressed preferences for an OTA update process that allowed roll-back to a known state, but which did not require the use of doubled-up hardware to achieve this.

- A user experience that requires the vehicle to be parked for all OTA updates was seen as acceptable by just over half of respondents, potentially putting the automotive industry at odds with UX best practices elsewhere as well as threatening to stem revenue flows from feature upgrades behind a process that is not as user-friendly as it could be.
 - The safety and security of the OTA update process were ranked as more important than the cost or user experience.
 - For those who expressed an opinion, the newly adopted regulation on Software Update Management Systems (UNECE WP.29) was seen by a factor of over 2:1 as helping to accelerate the deployment of OTA updates.
- It is clear that the OTA business will be on a very steep growth curve in the coming years. Market needs (a vehicle which continues to improve post-factory), OEM requirements (controlling the spiraling cost of physical recalls) and legislation frameworks are all now aligning.
 - The onus is now on the carmakers and their partners to find a way of implementing all of this whilst avoiding the “doubling-up” costs that were rejected by survey respondents.
- Those who expressed an opinion stated that they saw the current vehicle type approval process as not being fit for purpose by a ratio of almost 3:1.

2. Introduction

The 2020 Automotive Software Survey was run from July 21st to August 10th 2020. Participants were invited to participate via direct mailings to existing contacts of Strategy Analytics and Aurora Labs, as well as via invites posted on LinkedIn. All respondents were invited to offer their personal opinions to the questions posed.

In total, 252 responses were received – although not every respondent answered every question. The breakdown of the respondents by the nature of their employer’s business looked as follows:



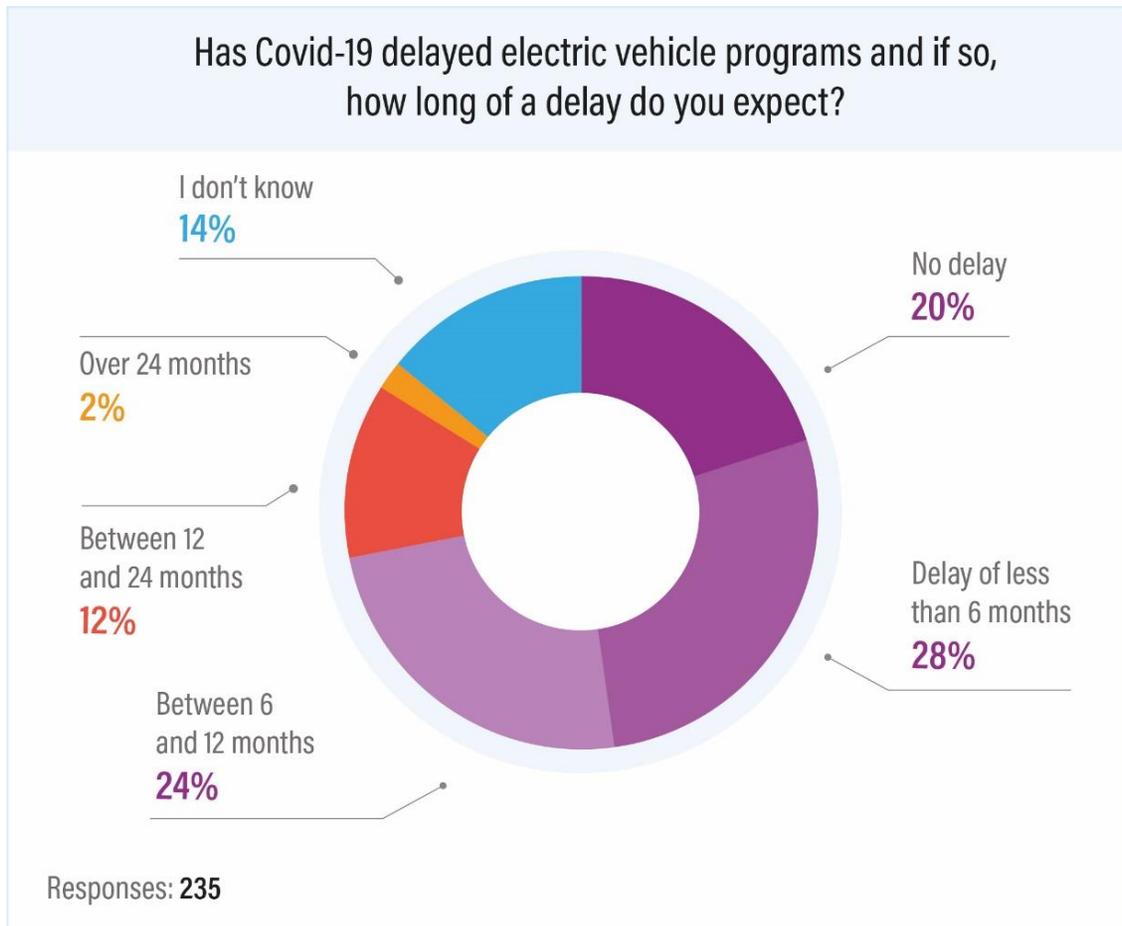
The survey thus reached a broad range of respondents across the auto industry, receiving good levels of response from automakers, T1s, semiconductor vendors and independent software vendors. The survey also got good responses across the globe, with those working for American, European, Chinese, Japanese and Korean organizations all well represented amongst the respondents.

This report has been jointly written by Strategy Analytics and Aurora Labs to present the results of the survey and their interpretation of the implications.

3. COVID and Electric Vehicle Delays

Q1 - Has COVID-19 delayed electric vehicle programs and if so, how long of a delay do you expect?

Electrified and automated vehicle platforms are the areas that Strategy Analytics is seeing the most innovation and change when it comes to vehicle architectures. As the introduction of these new architectures is typically highly correlated with new working practices and business models for automotive software, it was decided to open the survey with some questions to see how COVID-19 may have impacted timelines.



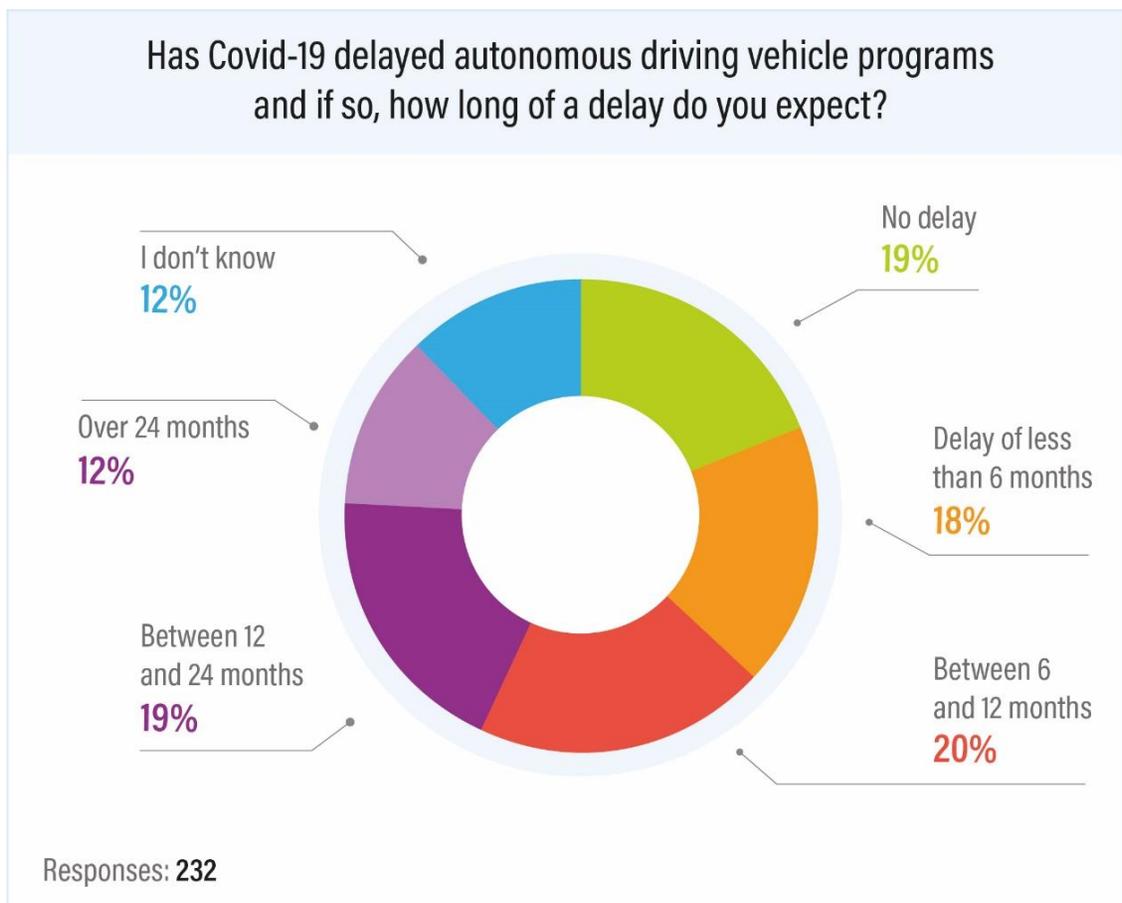
As can be seen from the chart above, only 20% saw no delays in EV programs. On the other hand it was only a tiny 2% that saw delays of over 24 months. Almost half of respondents (48%) put the delays at less than 6 months, with well over two-thirds (71%) seeing delays of 12 months or less.

In the context of a likely 20% decline in global auto production and sales in 2020, this is perhaps a ray of hope that COVID-19 will not have a long-lasting impact on the introduction of cleaner vehicle technologies. Neither will it cause a huge delay in the advanced architectures that underpin many of these new models.

4. COVID and Autonomous Vehicle Delays

Q2 - Has COVID-19 delayed autonomous driving vehicle programs and if so, how long of a delay do you expect?

If the impact of COVID-19 on electrified models can be seen as modest, then unfortunately the same cannot be said for autonomous vehicles, as can be seen in the chart below.



Although the percentage seeing no delay in autonomous was very similar to those seeing no delay in electric vehicles (19% vs. 20%), the percentage seeing a delay of over 12 months in autonomous was over twice as large as for electrified (32% vs. 14%).

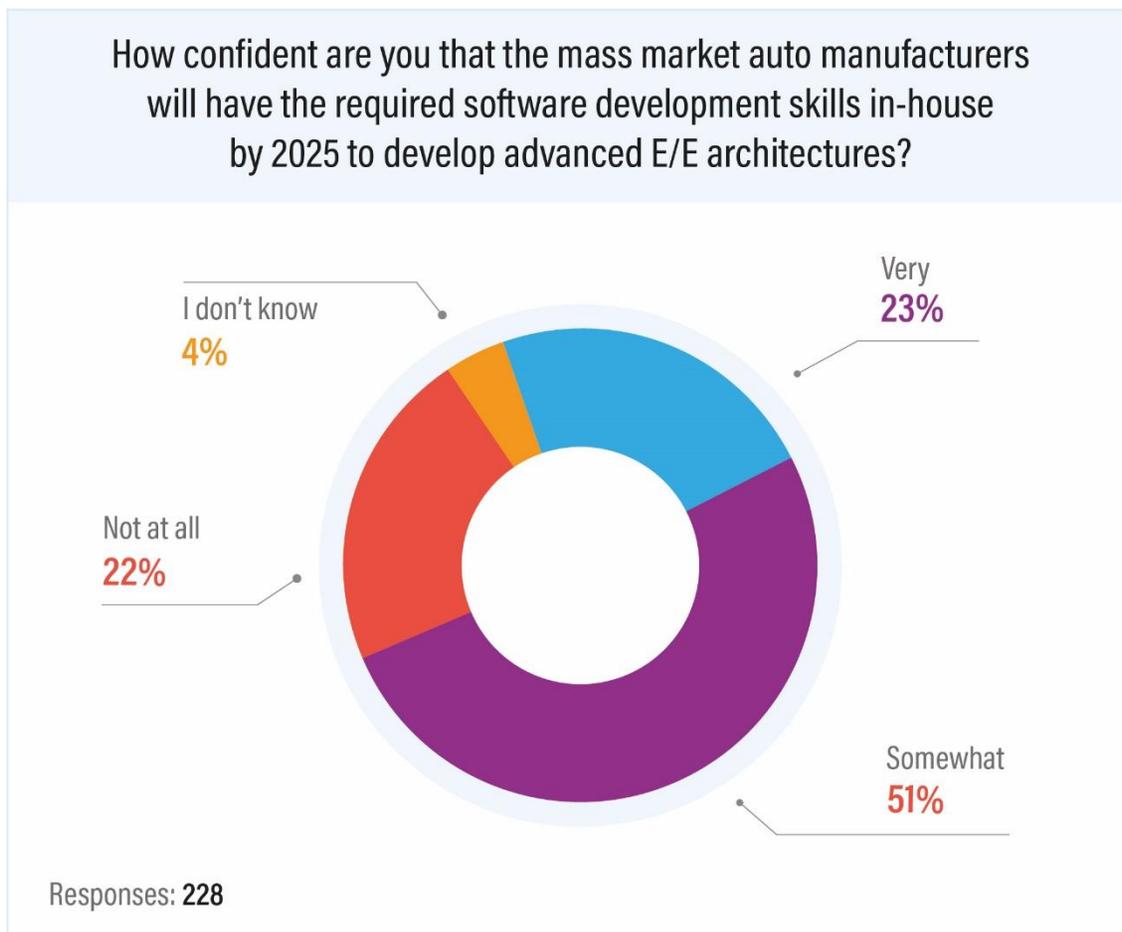
This result fits with general industry feedback that Strategy Analytics is receiving. Some are pushing ahead regardless with their autonomous plans – especially those outside of the traditional automotive ecosystem who are well-tuned from activities elsewhere. Others are having to make difficult choices on dramatically-reduced R&D budgets. Automakers face significant challenges in meeting forthcoming emissions requirements, and delays here could have costly consequences.

5. Automakers In-House Software Development Skills

Q3 - How confident are you that the mass market auto manufacturers will have the required software development skills in-house by 2025 to develop advanced E/E architectures?

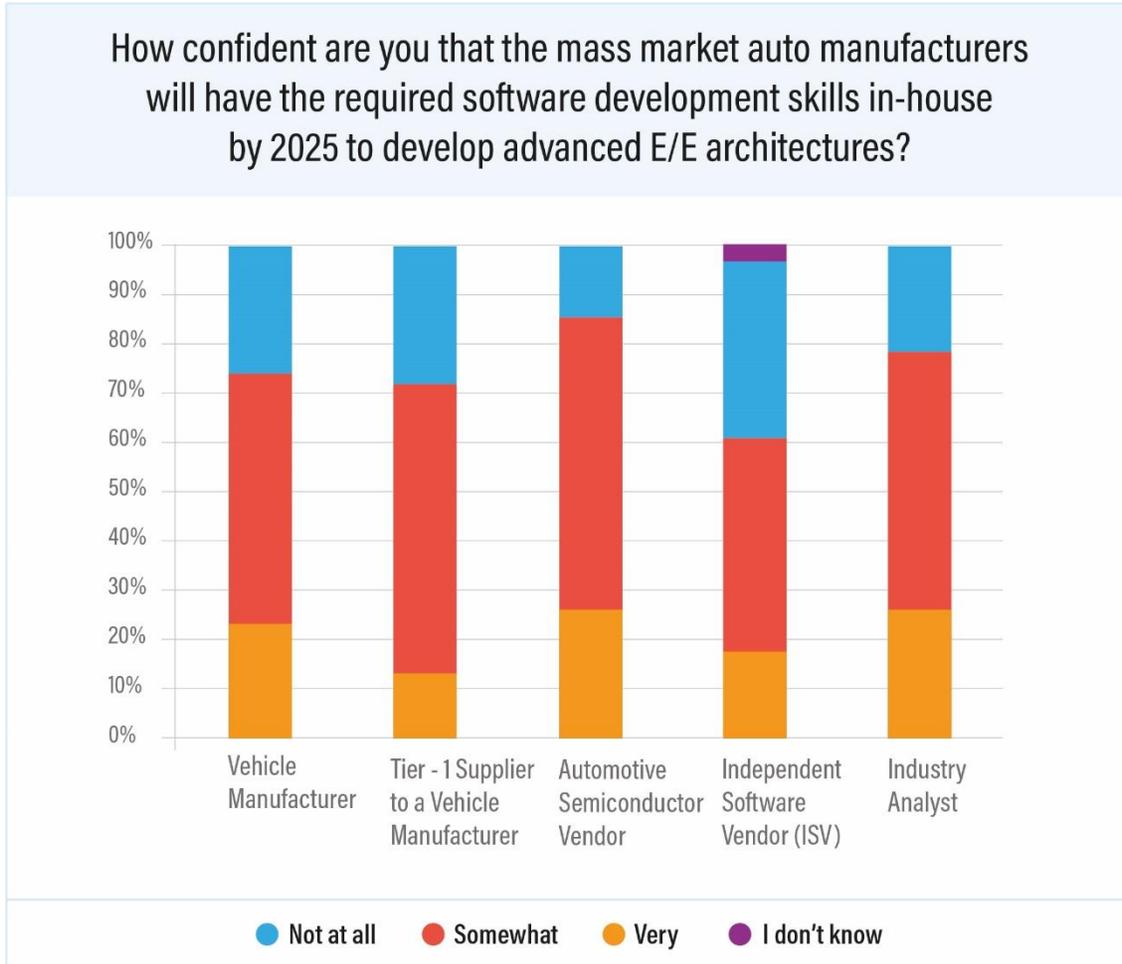
The new, more centralized architectures that many automakers are looking to introduce will require higher levels of software development skills in order to integrate software from multiple vendors into a domain controller. The aim of this question was to ascertain what level of confidence the industry itself has that mass market automakers will have the required skills for tis in-house by 2025.

As can be seen from the chart below, the result was arguably an overwhelming “maybe” – with over 50% of respondents saying that they were only “somewhat” confident that the necessary skills would be in place in-house.



There were then almost equally sized groups at either end of the scale, with 23% being “very confident” and 22% “Not at all confident” that he required skills would be in place by 2025.

Due to the range of different respondents who answered the survey, it's possible to get a glimpse of what may lay behind this top-level trend. As can be seen from the chart below, respondents from automakers and semiconductor vendors were the most confident in the required skills being in place. Those from T1s or Independent Software Vendors had the least confidence.



Strategy Analytics reads this variance in response as follows. The T1s are often more deeply-involved with those OEMs who are furthest away from developing in-house skills, or have the least-developed plans to do so. If a carmaker is well on the path to getting all the required talent in-house, then it's perhaps likely that they will be interacting more with semiconductor vendors directly on their architecture projects, thus leading to the relatively high degree of confidence stated by the semi suppliers. A less charitable view is that the development of software in-house conflicts deeply with the long-established business models of many T1 suppliers, and their reaction is being influenced by this.

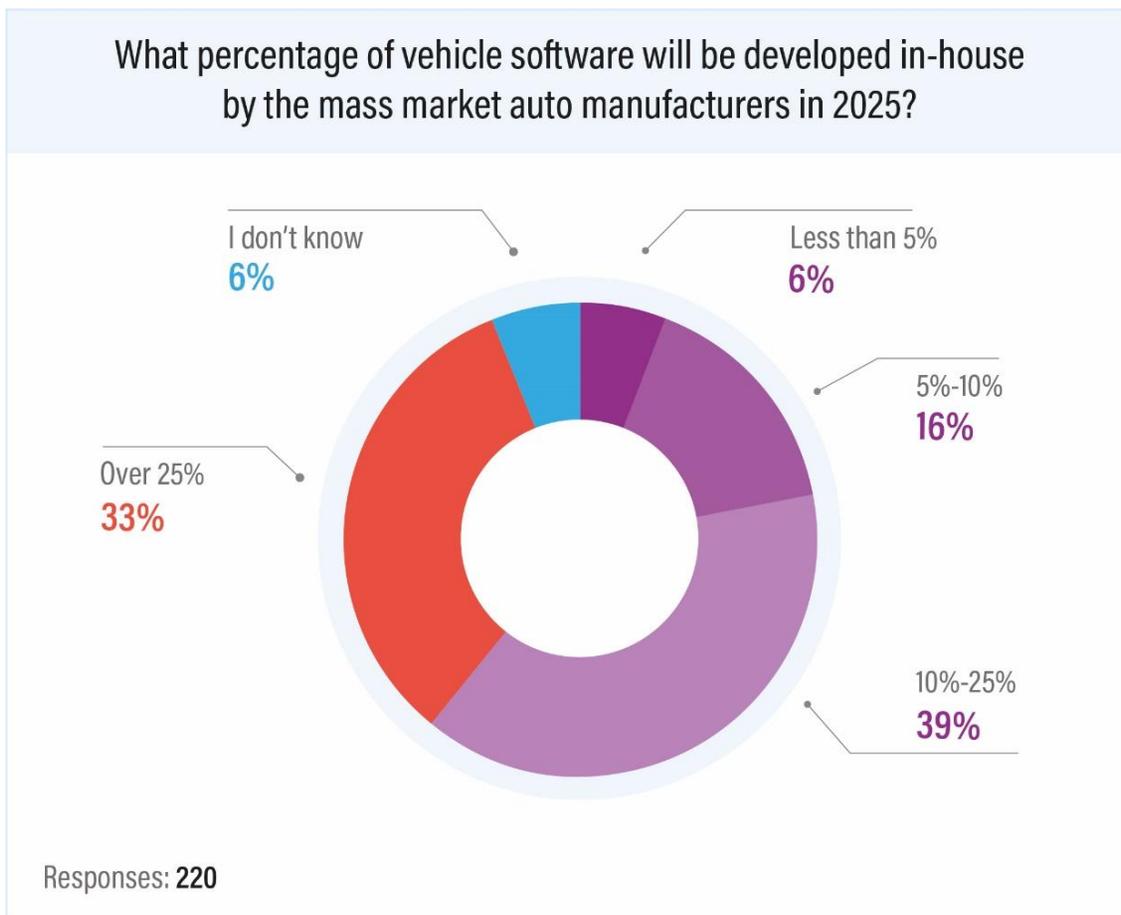
Another factor that Strategy Analytics considers may be contributing to the overall lukewarm expression of confidence is the fact that recruiting and retaining skilled software engineers is a global challenge for the industry.

6. Percentage of Vehicle Software Developed In-house

Q4 - What percentage of vehicle software will be developed in-house by the mass market auto manufacturers in 2025?

In recent years, many automakers have been vocal about their desire to develop more software in-house. Tesla is obviously an outlier here, but VW has stated its target is 60% in-house by 2025 with its Car.Software division.

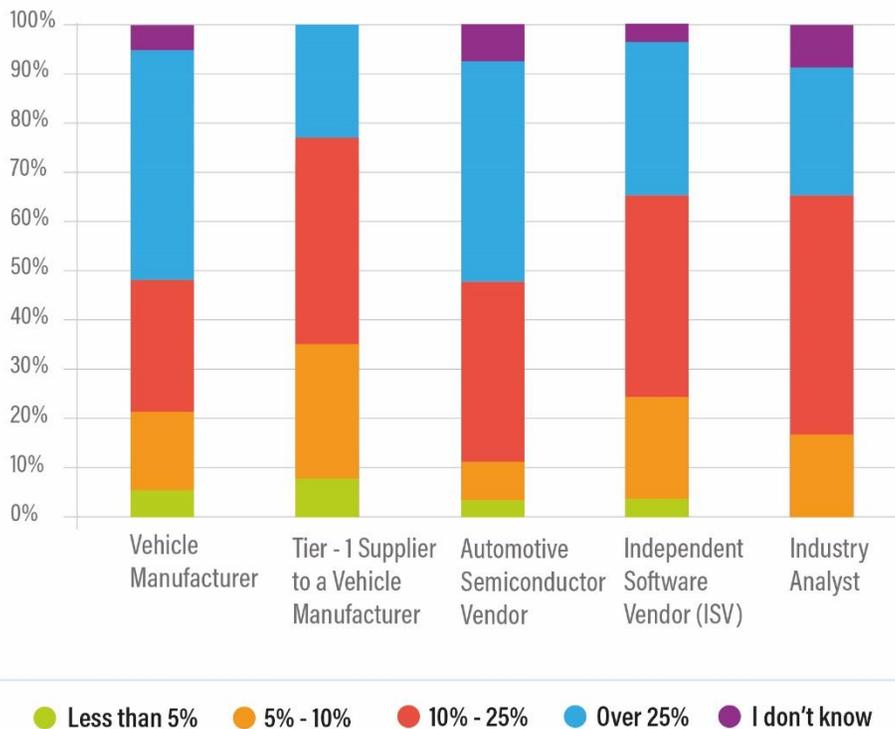
As can be seen from the chart below, OEMs such as these are very much at the vanguard of this trend. The majority of respondents to this question (60%) saw less than 25% of software being developed in-house by the mass market automakers, with over a fifth (21%) putting it at less than 10%.



However, Strategy Analytics believes that focusing on these responses would be a mistake. What is more interesting, and of more importance is the one-third (33%) percent of respondents who saw over 25% of software being written in-house by **mass market** carmakers in 2025. In terms of usual automotive timescales and rates of change, this puts the in-house development of software as a very hot topic indeed.

As with the previous question, there was a two-way split in how respondents answered this question. Those employed by carmakers and semiconductor vendors saw the most development of in-house software. Those working for T1 suppliers and Independent Software Vendors saw the least.

What percentage of vehicle software will be developed in-house by the mass market auto manufacturers in 2025?

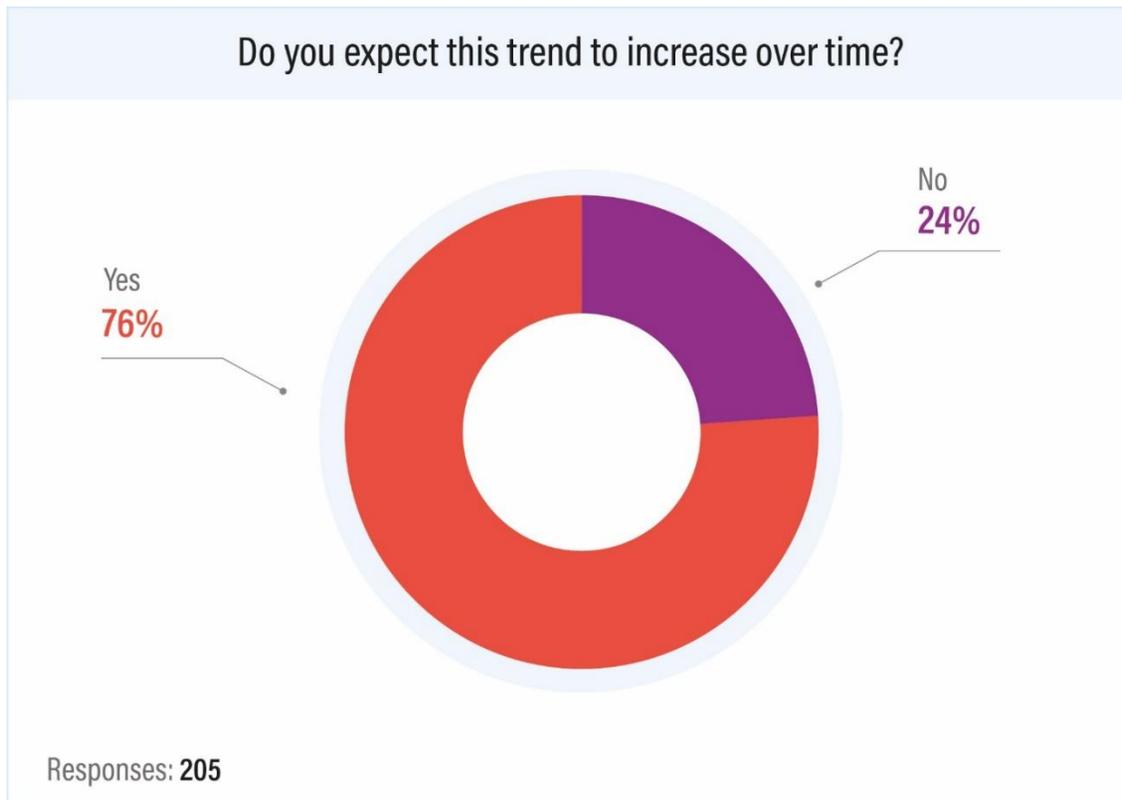


It was T1 suppliers that were the least likely to state that “Over 25%” of software would be developed in-house by mass-market automakers in 2025. It is just possible that there is a degree of self-deception going on here, as automakers developing software in-house is a challenge to the traditional T1 model.

7. In-House Software Trend Over time

Q5 – Do you expect this trend to increase over time?

The clear expectation of survey respondents, as can be seen below, is that the amount of software developed in-house by mass-market automakers will increase over time.



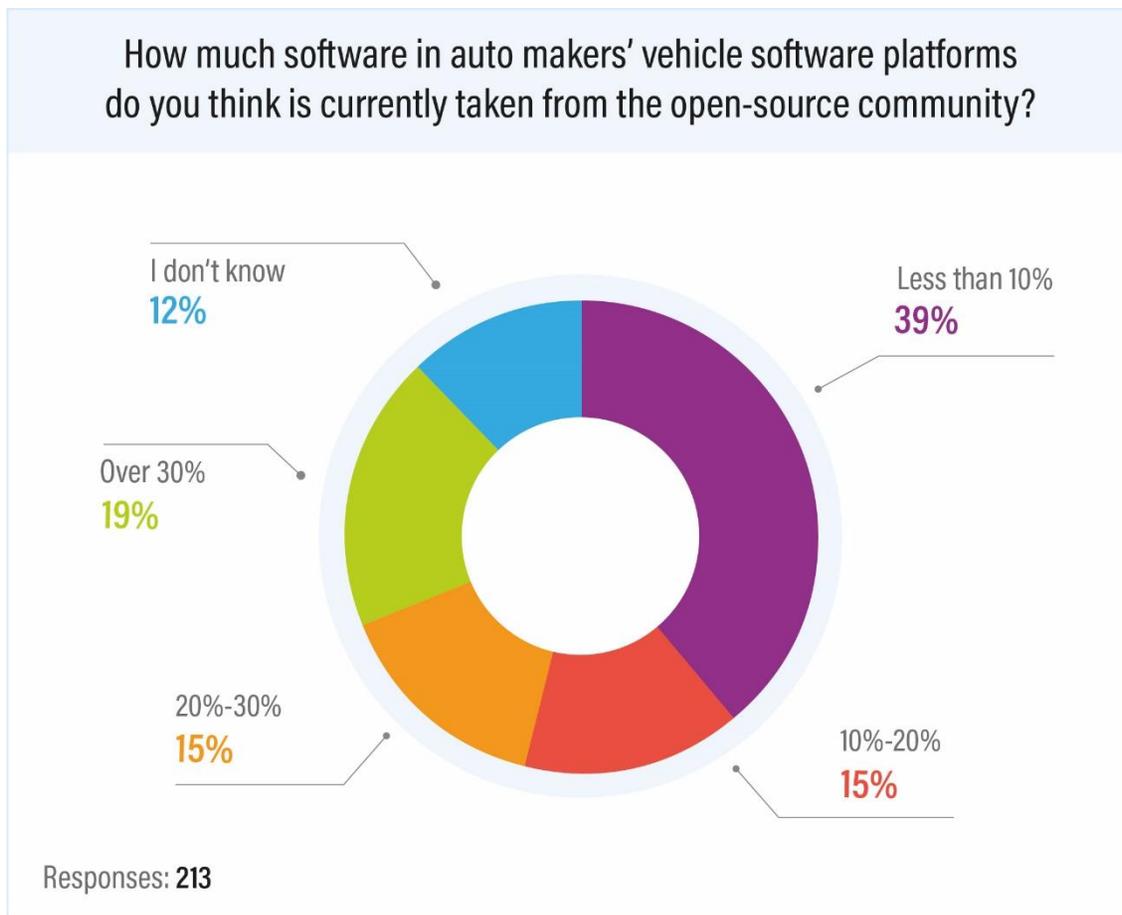
Of perhaps more interest than the 76% who saw a trend towards more software authored by carmakers were the 24% who did not. Looking at those respondents, the (admittedly small) number who stated that they had worked in the industry for over 30 years were by far the most likely to reply "No" to this question. Is this a group of "out-of-touch" dinosaurs who are blind to the on-rushing comet of in-house software? Or is it a group of incredibly experienced industry professionals sounding a warning bell that simply stating that you desire to move in a certain direction is very far from the same thing as actually successfully making that move.

As market researchers love to say, more research is required on this one...

8. Use of Open-Source Software

Q6 - How much software in auto makers' vehicle software platforms do you think is currently taken from the open-source community?

The question was deliberately formulated in a general, non-specific way, as we wanted to capture people's "gut feel" for the level of open source in the vehicle rather than have them think about a specific application area (e.g. infotainment) or metric (e.g. lines of code). It thus, perhaps understandably, saw a wide range of responses.



Only 12% of respondents chose the "don't know" option, with the remaining 88% spread out over the other responses. The most popular answer was "Less than 10%" – but then the second most popular was "Over 30%". What is noteworthy is the undoubted importance of open-source (with almost half of respondents seeing 10%+ of the on-board software being open source) – but also its relatively low usage compared with proprietary solutions.

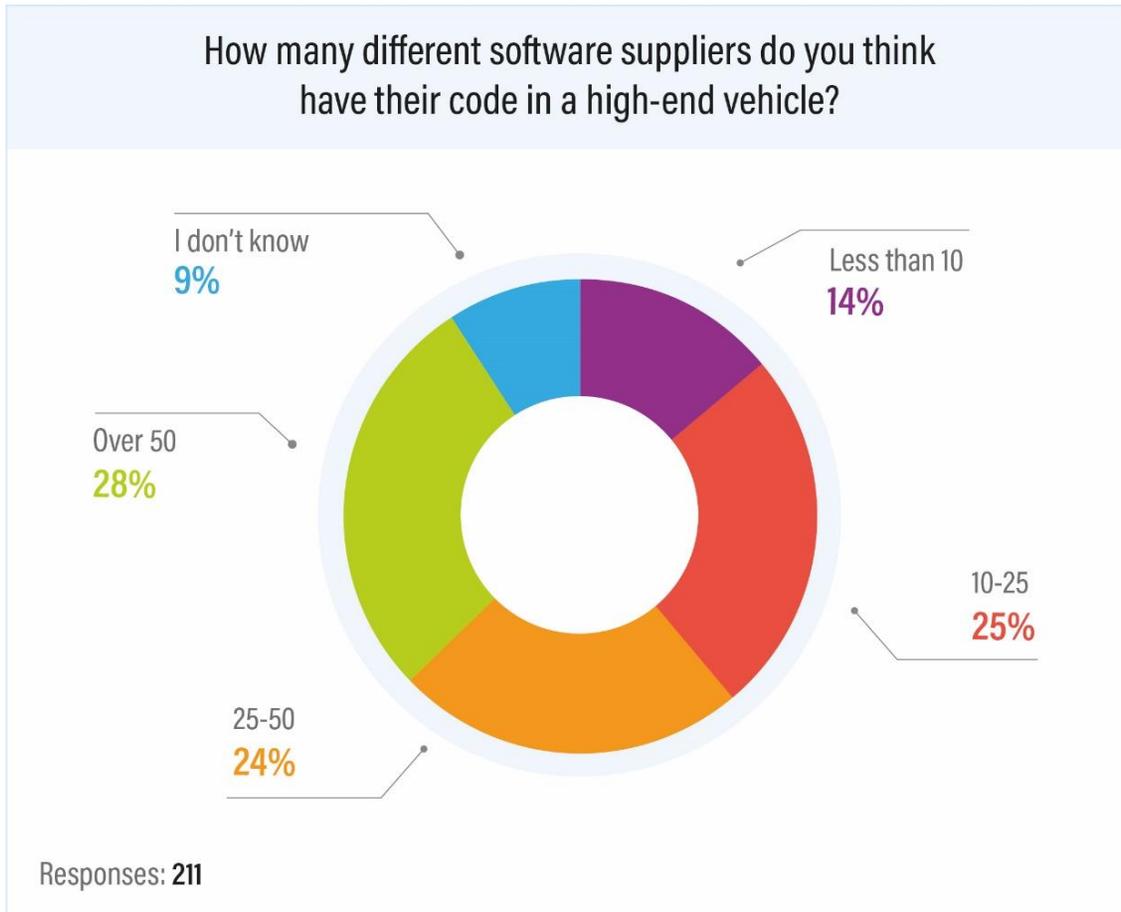
The wide range of responses perhaps reflects the wide range of domain expertise amongst respondents, as well as different attitudes to the risks/rewards of open source. Cost and time savings can be made, but the debate over security is still raging. Open source proponents claim that the approach inherently provides security through

transparency. For that to work, a healthy and active developer community – comprised of those actively working with and understanding the code rather than just compiling and running it – is required. Strategy Analytics thinks that it is far from certain that such a community is in place for all the open source code used today in automotive applications.

9. Number of Software Suppliers to a Vehicle

Q7 - How many different software suppliers do you think have their code in a high-end vehicle?

This was another question which drew a wide range of answers. The most popular answer was “Over 50”, with only 14% choosing “Less than 10”.



Strategy Analytics sees this as an interesting snapshot into the current state of the industry. Although all the talk is about OEMs writing more software, and the vertical integration of companies like Tesla and many of the EV/AV start-ups, the reality is that at present the code on a vehicle still comes from a very wide range of sources.

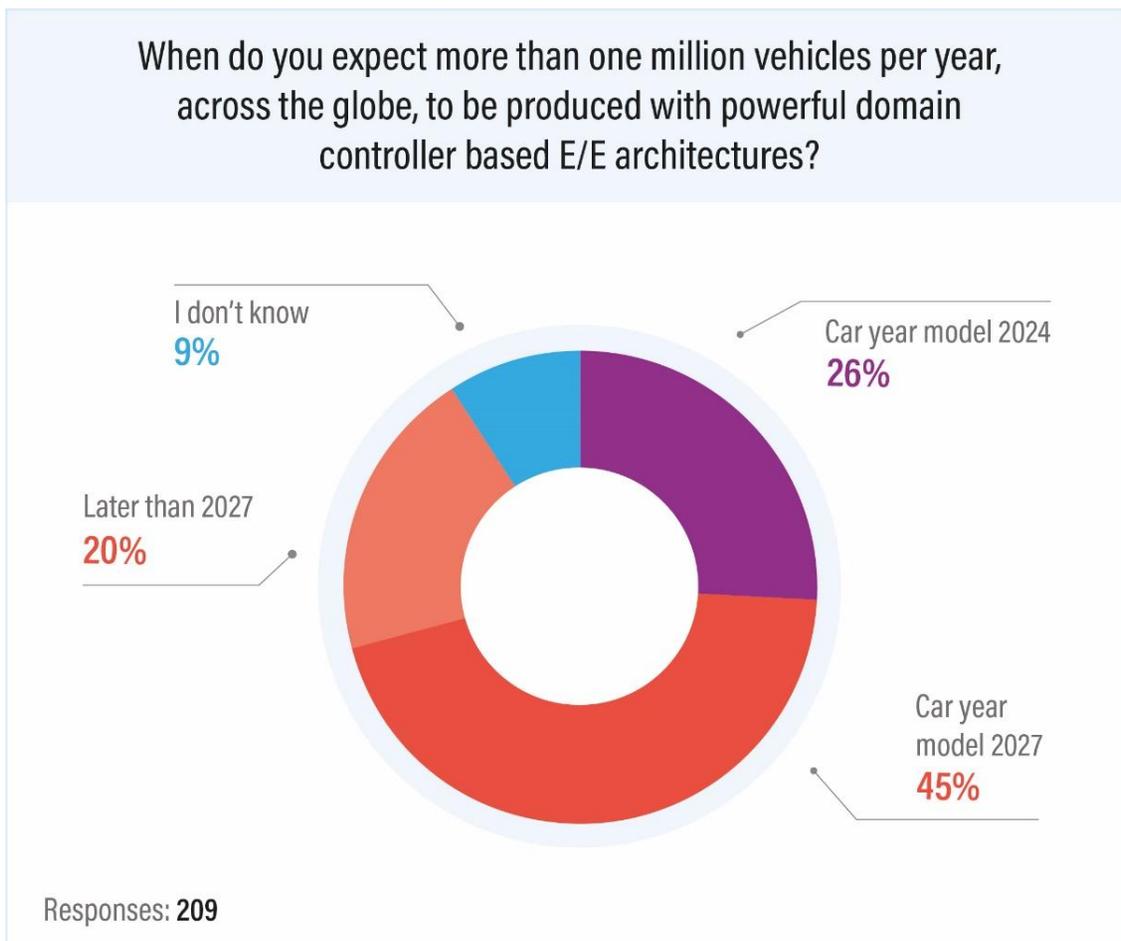
It may be that one of the reasons the industry wants to move more software in-house is to have more control over it for safety and security reasons, and also to help speed up development.

10. Domain Controller-based E/E Architectures

Q8 – When do you expect more than one million vehicles per year, across the globe, to be produced with powerful domain controller based E/E architectures?

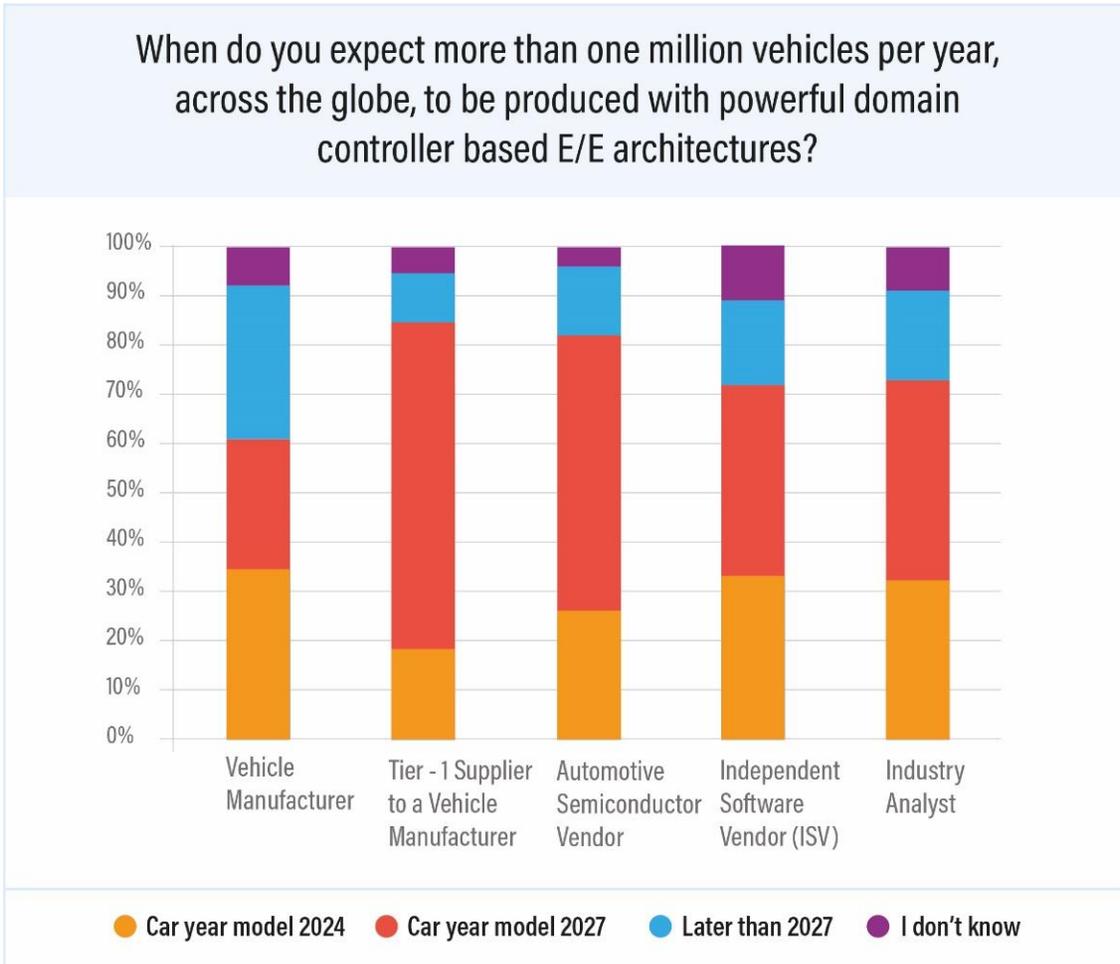
There has been significant talk for years now in the automotive industry about the need for a new generation of more centralized vehicle architectures. These are widely seen as necessary to manage the complexity that has emerged from the one function = one ECU paradigm that has ruled for many years.

However, as can be seen from the chart below, almost two-thirds of respondents (65%) saw any volume deployment of these solutions as only happening in MY 2027 or later.



This is significant as MY 2027 is still far enough away that decisions have yet to be locked-in for these models. There may be an intention or plan – but we're still a long way from the design-freeze point.

Interestingly, as can be seen from the chart below, it was those respondents from Vehicle Manufacturers who were the most polarized in their responses. They were the group that responded the highest for both the “2024” and “Later than 2027” timeframe.

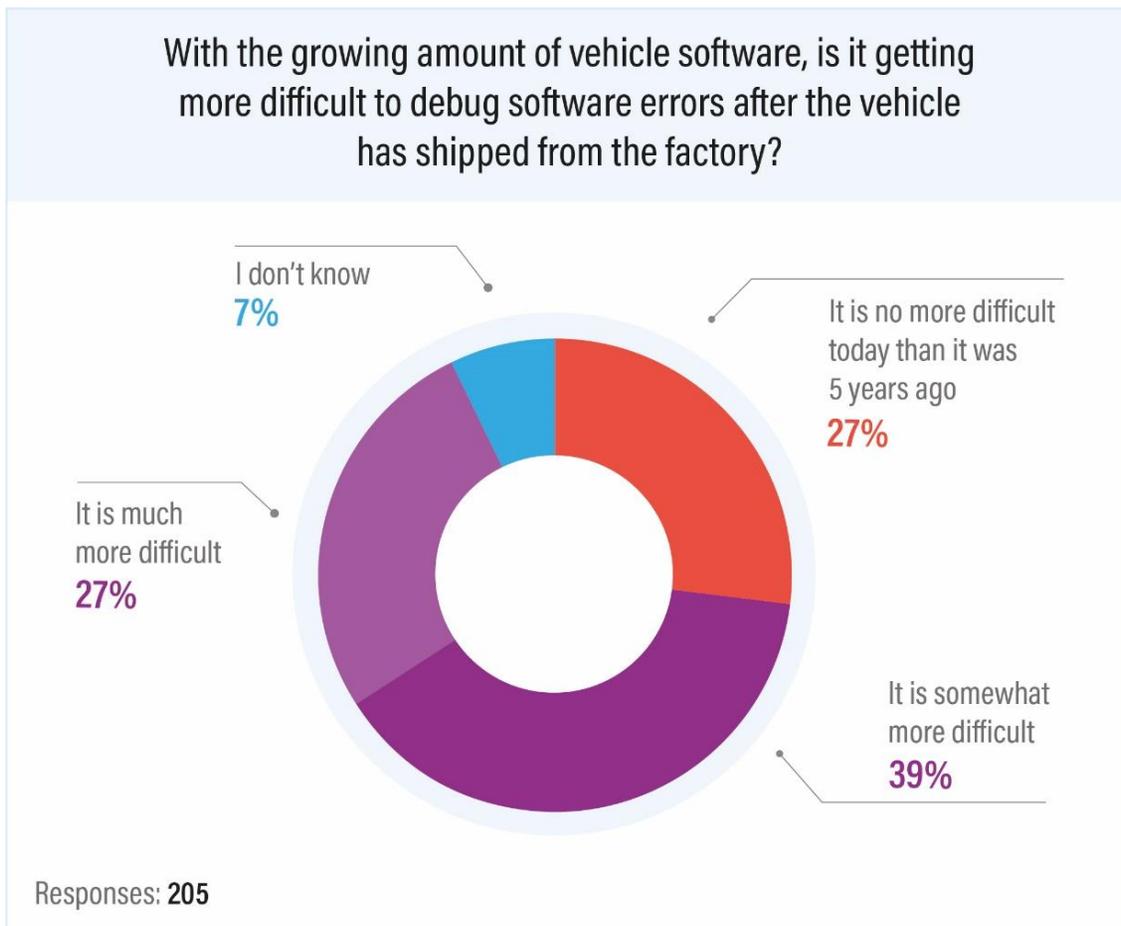


Strategy Analytics believes this to be indicative of a polarization amongst automakers. Those who are keen on this approach are making strong moves already. Those who are not still have no firm plans.

11. Debugging Software Errors Post-Factory

Q9 - With the growing amount of vehicle software, is it getting more difficult to debug software errors after the vehicle has shipped from the factory?

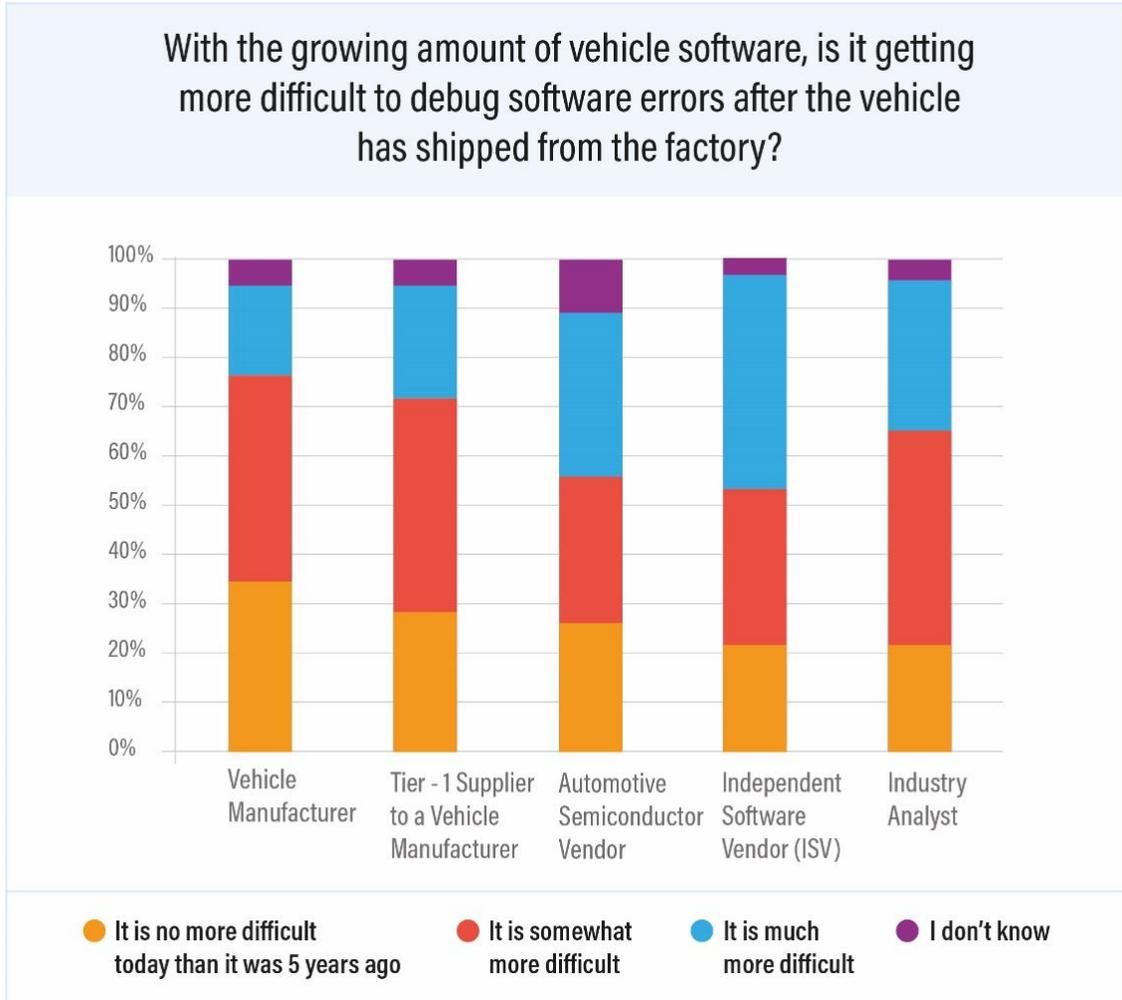
Two thirds of respondents (66%) thought that debugging after the vehicle has shipped was either “somewhat” or “much” more difficult than it was five years ago.



This comes as no surprise to Strategy Analytics. Across the globe, the “average” car shipped in 2015 contained 21 electronically-controlled features, as measured by our “System Demand Forecast” reports. In 2020, this has risen to 31 such features.

Much of the growth has been in areas of high software complexity, such as ADAS. Even in areas of low unit growth, such as headunits, software complexity has grown markedly with the rise of large touchscreens and smartphone projection systems. As just one measure of this increasing complexity, the combined total of Android Auto and Apple Car Play systems shipped in OEM headunits annually will rise over 16-fold from 2015 to 2020.

Interestingly, as can be seen from the chart below, the proportion of respondents who answered that debugging was now “much more” difficult (the blue bar) rose as you move down the traditional value chain, from Vehicle Manufacturer through to Independent Software Vendor. At the same time, the proportion who responded that it was “no more difficult” (orange bar) fell.

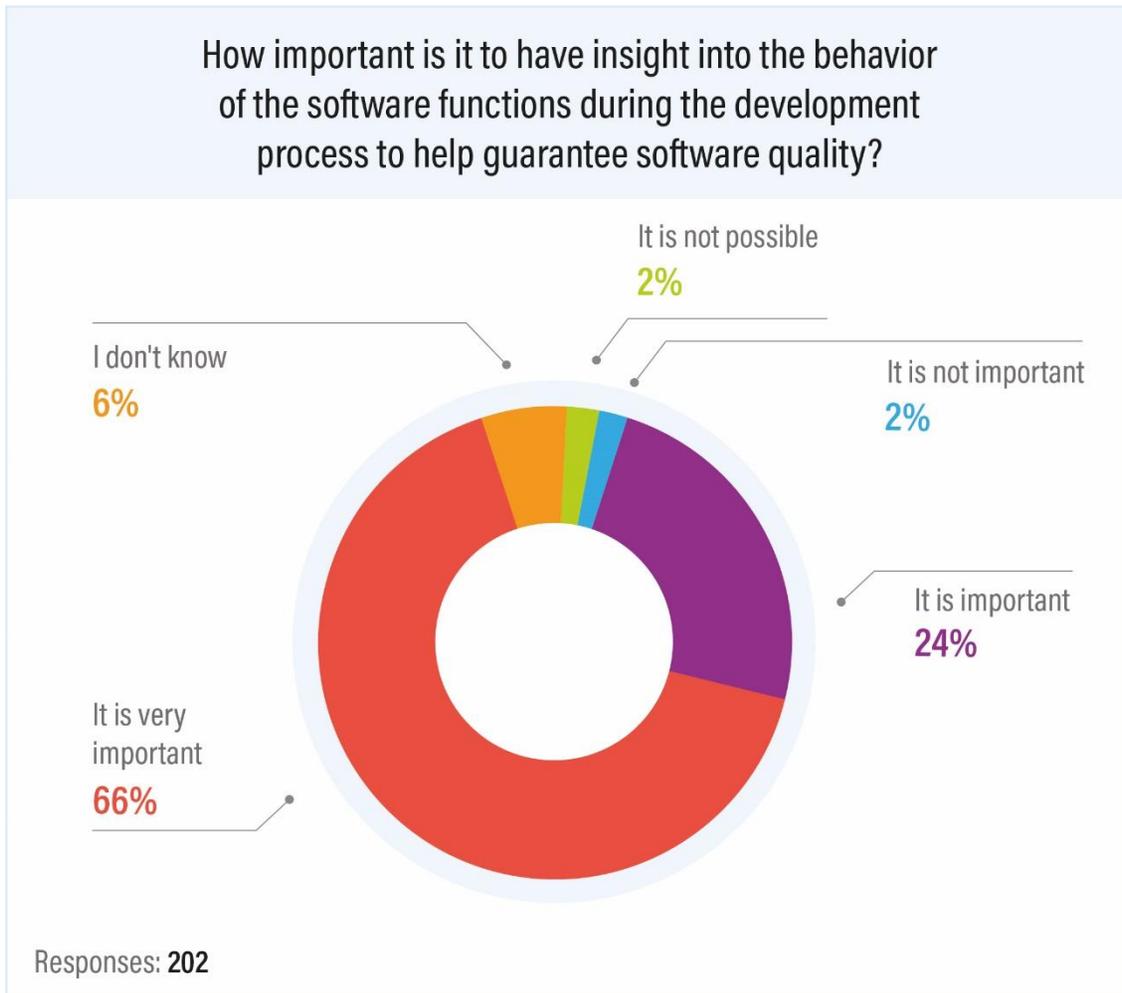


One reading of this trend could be that carmakers are currently insulated from much of the difficulty, as they are not responsible for the largest and most complex code bases used at present. With the trend that this survey has picked up for more software to be developed by carmakers it is imperative that OEMs do not underestimate the challenge ahead.

12. Insight Into Software Behavior During Development

Q10 - How important is it to have insight into the behavior of the software functions during the development process to help guarantee software quality?

Perhaps unsurprisingly, two-thirds of respondents (66%) stated that it is as “Very important” to have insight into software behavior during the development process, with a further 24% rating it as “Important”.



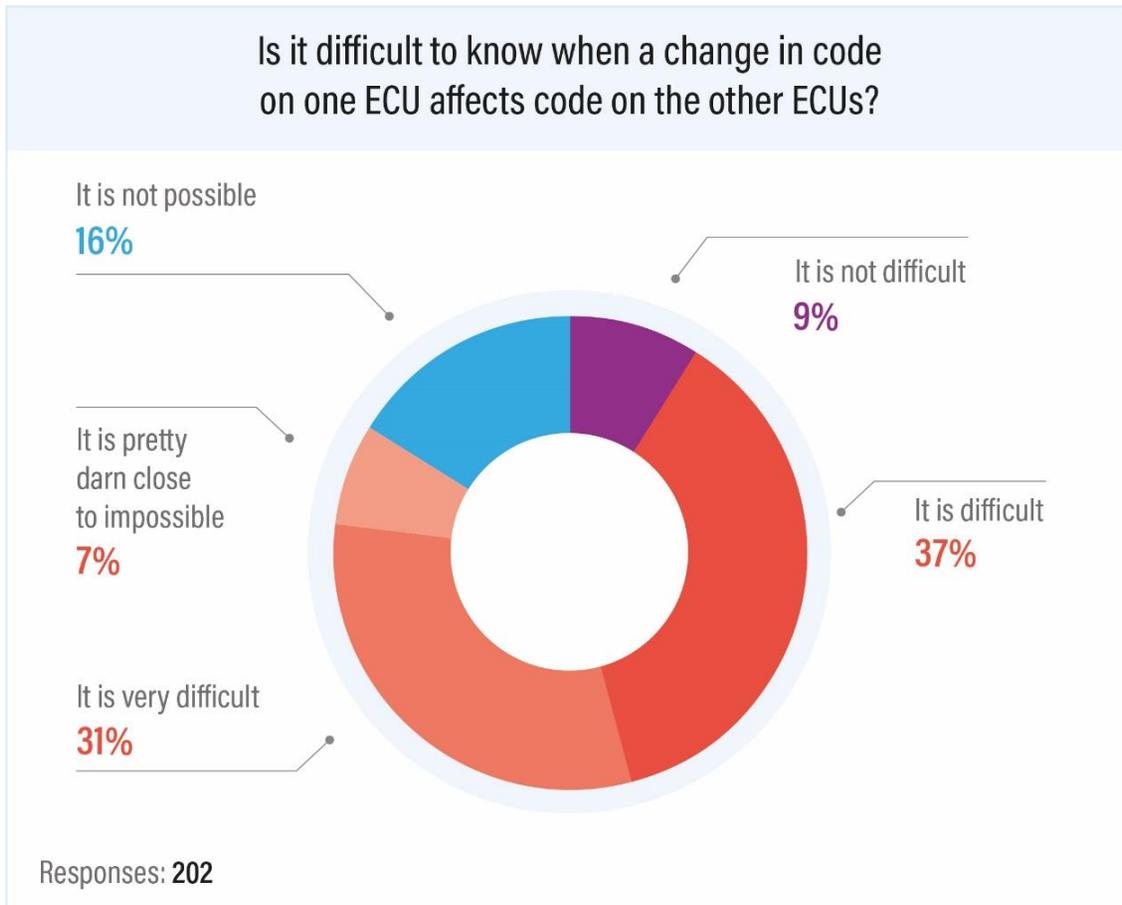
Increasingly vehicles are now defined by their software, not their hardware, and thus software quality is at least as important as all other areas of vehicle quality.

Aurora Labs sees these results as indicative of the fact that respondents realize that it is not enough to have insights into how the vehicle performs and vehicle functions behave at a high level. More granularity is required into the behavior of the software functions themselves if the industry is to guarantee vehicle quality, safety and security and be able to detect faults in the software behavior before they cause vehicle failure.

13. Impact of Changing Code in One ECU on Another

Q11 - Is it difficult to know when a change in code on one ECU affects code on the other ECUs?

Only 9% of respondents stated that they believed that it was “not difficult” to know when a change in code on one ECU affects code on the other ECUs, with an overwhelming 75% rating it as somewhere between “difficult” and “pretty darn close to impossible”.

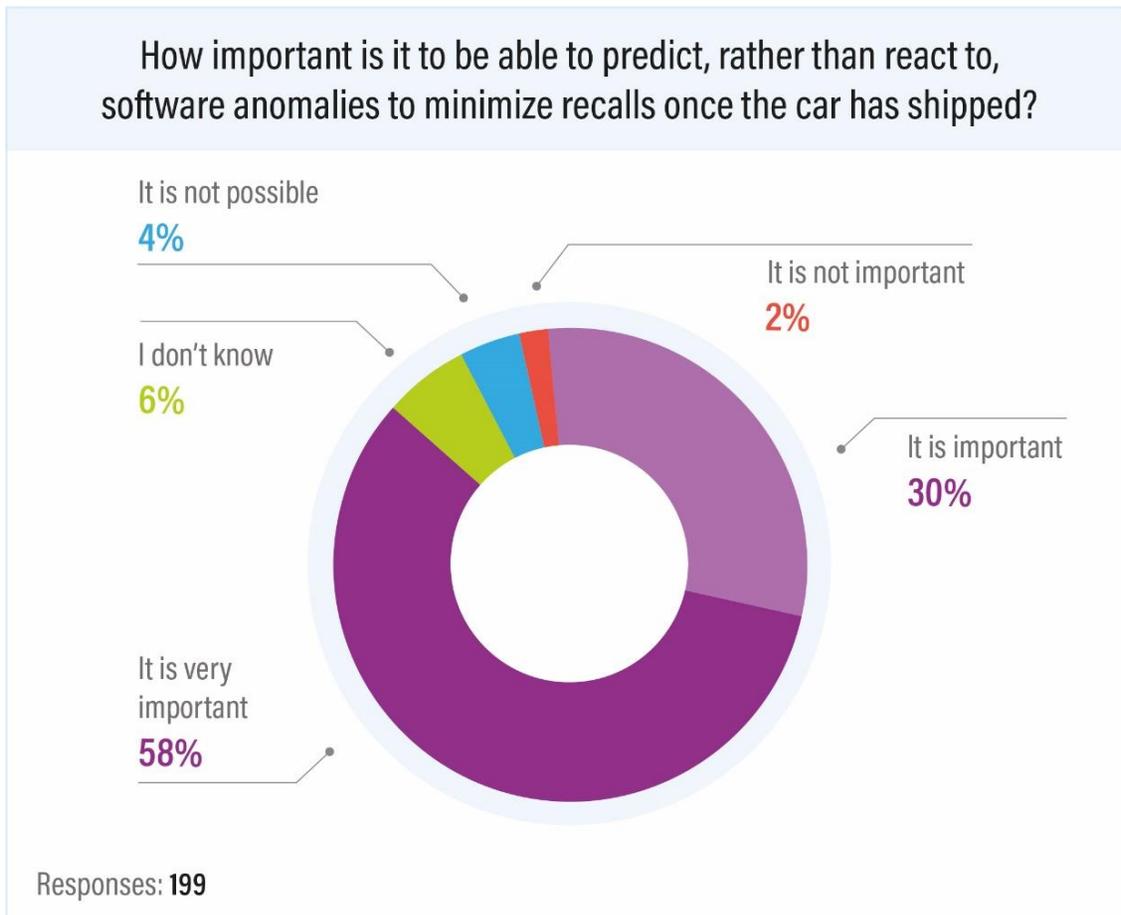


As more and more functions are added to vehicles, this is a problem area for the industry that will continue to get worse unless working practices are changed and toolsets improved. Simply reducing the number of suppliers and bringing software development in house will not solve the problem, even if it is also a part of a move to fewer, larger ECUs. These powerful domain controllers will still contain code for multiple features (potentially even legacy code virtualized onto new hardware) that could interact in complex ways, leading to bugs.

14. Predicting Software Anomalies

Q12 - How important is it to be able to predict, rather than react to, software anomalies to minimize recalls once the car has shipped?

This question led to a very similar set of responses as the previous one, with the vast majority of respondents (88%) seeing the ability to predict software anomalies as either “Important” or “Very Important”. Only a tiny 2% saw this ability as “Not Important”.



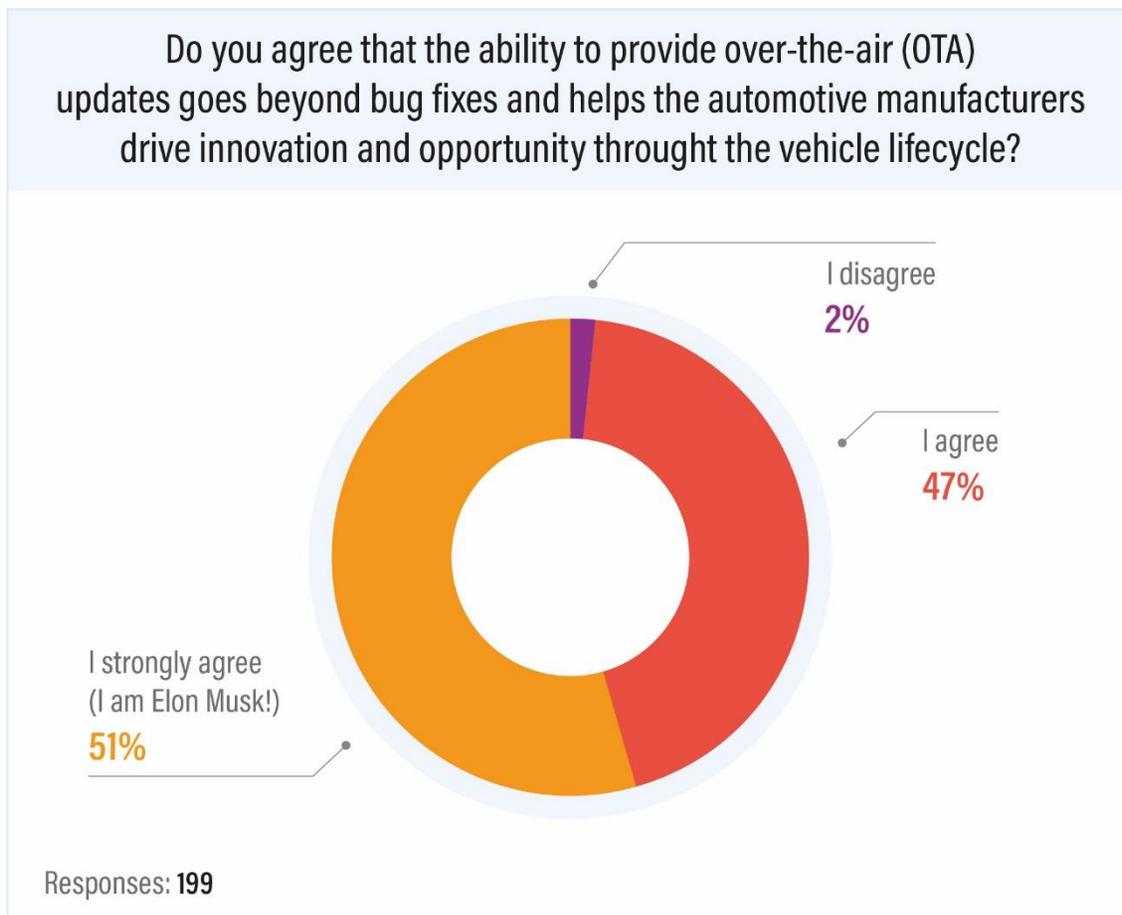
Getting it right first time is important – but the reality is that with the complexity of today’s automotive software a 100% bug-free launch is a practical impossibility. This is especially the case as we see ongoing pressure on reducing vehicle development cycles go hand-in-hand with and explosion in software complexity as cars get more connected and automated.

Aurora Labs notes that although the vast majority agrees that proactive is better than reactive, the OEMs still seem to be focused on reactive solutions and do not yet seem to have the technology in place to be predictive.

15. OTA as a Driver of Innovation During Vehicle Lifecycle

Q13 - Do you agree that the ability to provide over-the-air (OTA) updates goes beyond bug fixes and helps the automotive manufacturers drive innovation and opportunity throughout the vehicle lifecycle?

The automotive industry now stands on the cusp of a wide-scale roll-out of OTA update capabilities across all vehicle domains – something that hitherto has only been possible for Tesla. It is thus reassuring to learn from this survey that a massive 98% of respondents believe that the value of OTA updates goes beyond bug-fixing alone.



Just over half of respondents chose the “I am Elon Musk” response, indicating their enthusiastic agreement that OTA updates bring huge new opportunities. Interestingly, one respondent claimed to be Mr. Musk himself, and obviously chose this as their response to this question. Clearly, we have no way of verifying this, but Mr. Musk – if you read this and it was you then let us know!

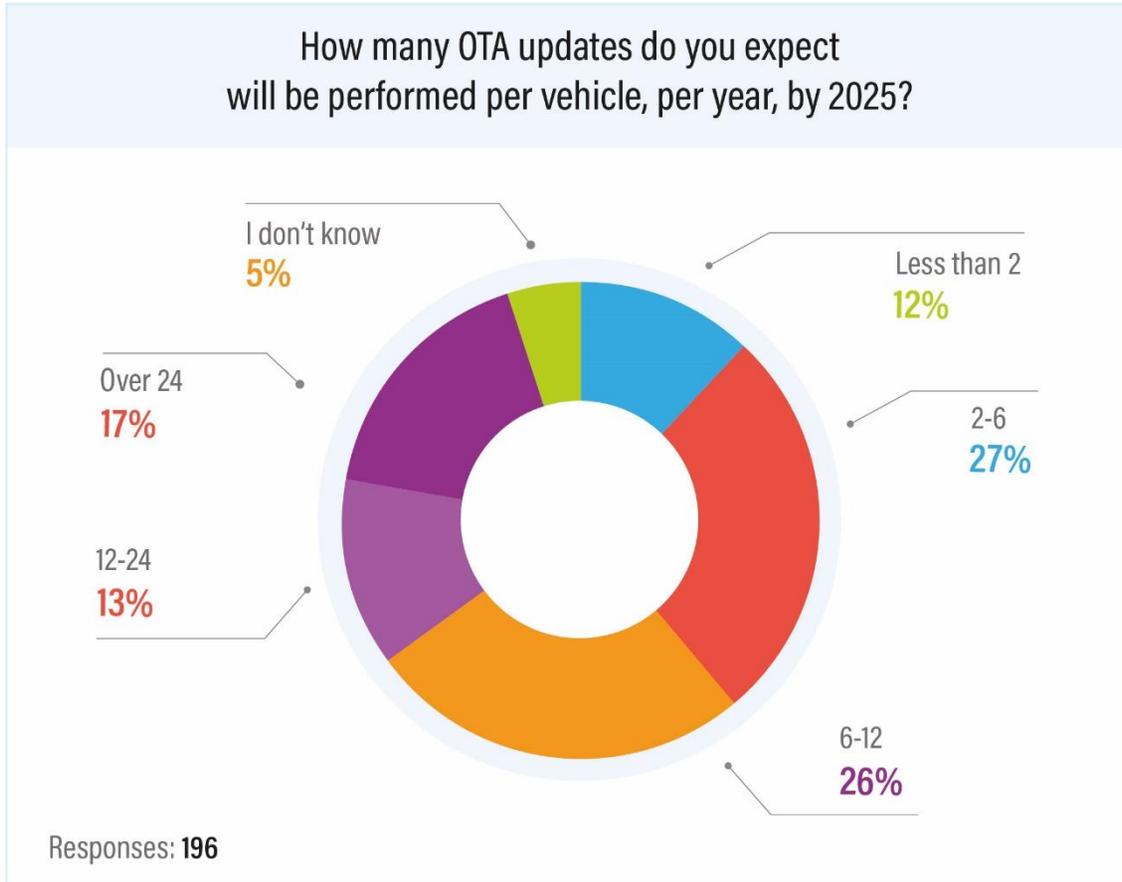
OTA capabilities will also bring new challenges. It’s now becoming possible for features to be rented rather than owned, or for vehicle OEMs to remove features from vehicles as they pass from owner to owner. Some consumers

will embrace this “new world” enthusiastically – but carmakers will need to be careful that they don’t inadvertently destroy consumer value by clumsy or heavy-handed approaches to try and maximize their revenues.

16. OTA Update Frequency

Q14 - How many OTA updates do you expect will be performed per vehicle, per year, by 2025?

Given (outside of Tesla and some Infotainment systems) the very low level of OTA updates currently happening in the market today, the responses to this question indicate that a revolution is truly underway.



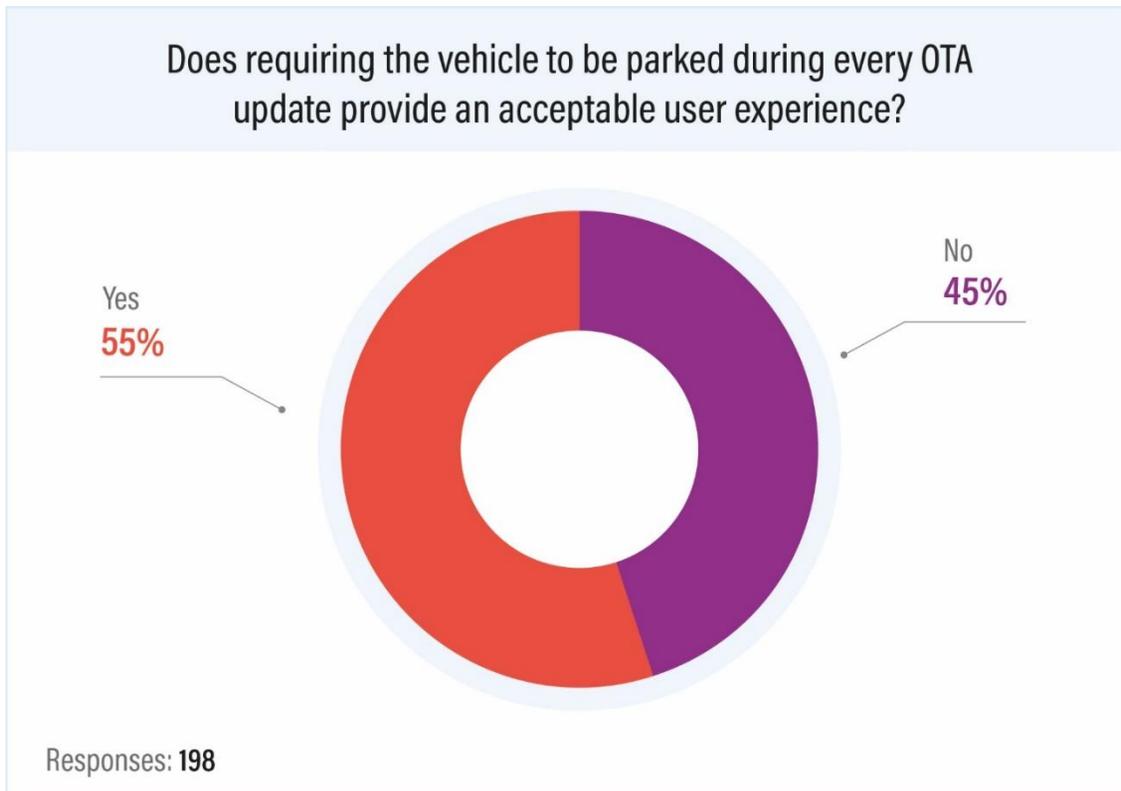
A full 83% of respondents envisaged at least 2 OTA updates per vehicle per year, with one-in-three (30%) predicting more than 12 updates a year. This truly validates the response to the previous question and makes it clear that OTA updates will be used for far more than just essential big fixes and physical recall-replacements.

It also makes it abundantly clear how important it is that the industry, together with its connectivity partners, gets this process right. High costs and a sub-optimal user experience could perhaps be tolerated if you were only doing one or two updates a year. If you are doing one or two updates a month, then a safe and secure solution that is cost-effective and delights the consumer is a requirement, not a nice-to-have.

17. Impact of Vehicle State During OTA Update on UX

Q15 - Does requiring the vehicle to be parked during every OTA update provide an acceptable user experience?

Out of all the survey responses, this was perhaps the one that was most surprising to Strategy Analytics. Maybe it's because we have an in-house team of user-experience experts who are constantly promoting best practice and championing the user, but the fact that over half of respondents saw it as acceptable for a vehicle to need to be parked for an OTA update to take place was still a little bit jarring. After all, an application such as Google Chrome now updates pretty silently and unobtrusively on desktops, laptops and phones – and it is these spaces that will be setting consumer expectations. The fact that the Windows Update experience is still seen as sub-optimal by many should not be used as an excuse to replicate long update times and lengthy system downtime in the vehicle.

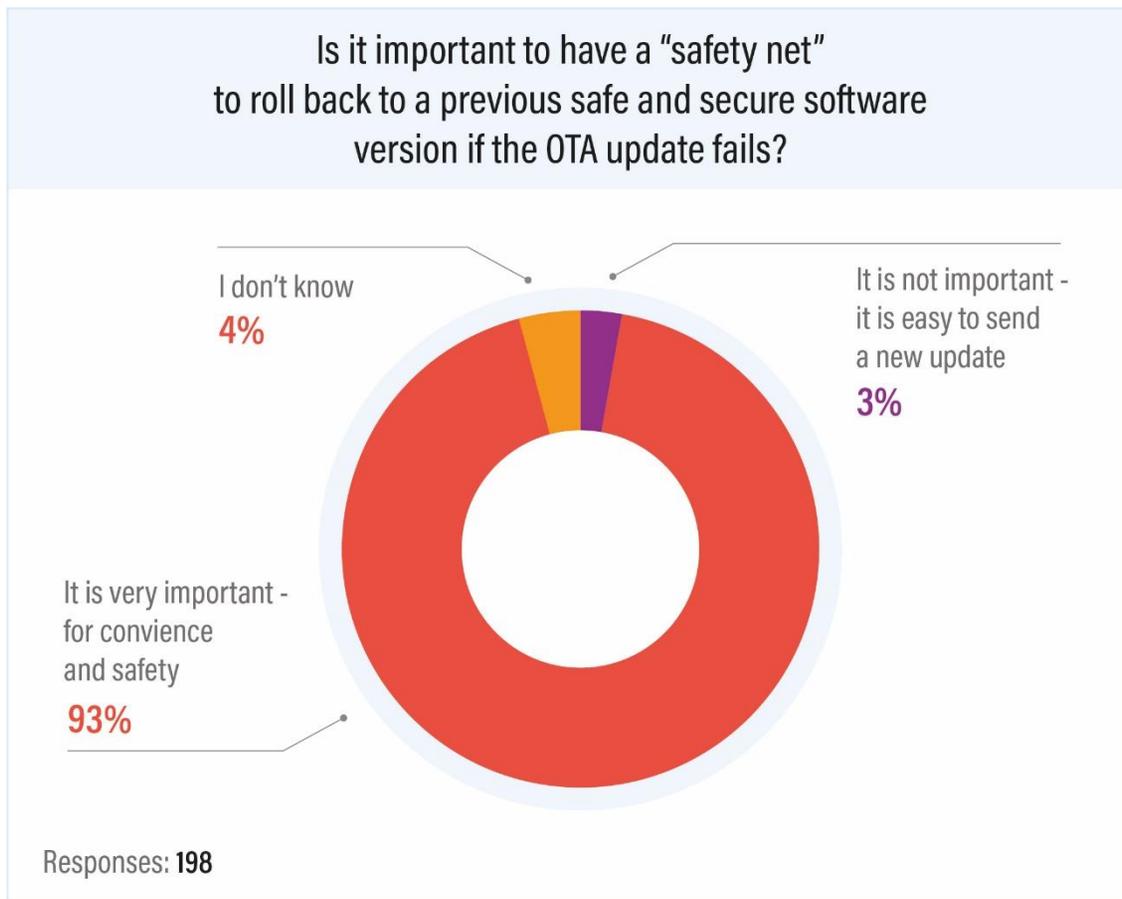


If carmakers are truly looking to use OTA updates to bring new features to consumers more than once a month – new features that they hope that they will pay for – then it is imperative that the update process itself be as pain-free as possible. Requiring a parked-vehicle for all updates could well limit user-driven updates and purchases, and hence hit revenues.

18. Importance of OTA “Safety-Net” for Roll-Back

Q16 - Is it important to have a “safety net” to roll back to a previous safe and secure software version if the OTA update fails?

Gratifyingly, a huge 94% of respondents agreed that a “safety net” to allow the roll-back of an update was important. Only a tiny 3% saw the OTA as an opportunity to effectively just keep blasting out updates until things worked.

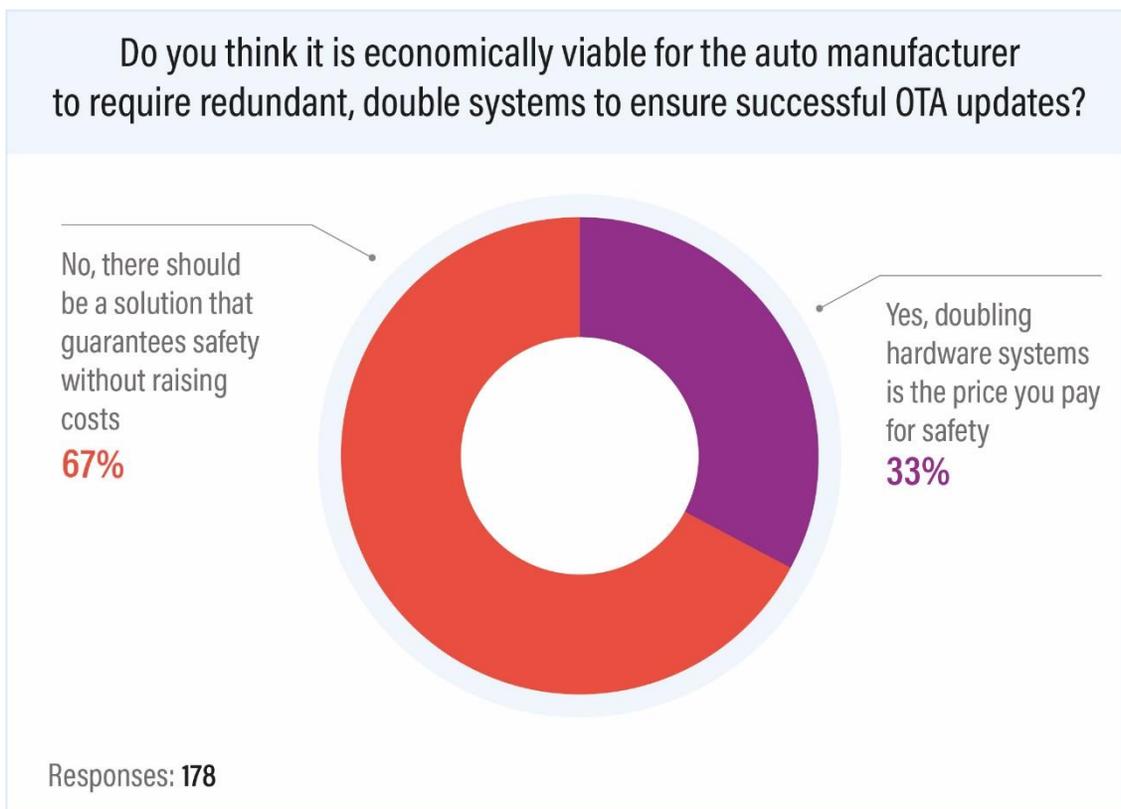


This question saw very harmonious responses across the value chain, as well as across length of experience in the industry. It was those identifying themselves as working for a vehicle manufacturer, however, that were the strongest in their response, with 100% of them stating “it is very important”. This should come as no surprise – as it will be the carmaker that has to bear the immediate brunt of any failed update. Even if they can eventually recoup some costs from an at-fault supplier, it is the OEM’s brand image and customer satisfaction that will take the hit.

19. Cost Acceptability of Redundant Systems for OTA

Q17 - Do you think it is economically viable for the auto manufacturer to require redundant, double systems to ensure successful OTA updates?

Although, as we saw in the previous question, there is near unanimity that a roll-back capability to a safe and secure state is needed, the majority of respondents appear unwilling to pay for this in the form of doubling-up on their hardware. The margins were small, but it was those who worked for vehicle manufacturers who had the highest percentage of such responses (71%).

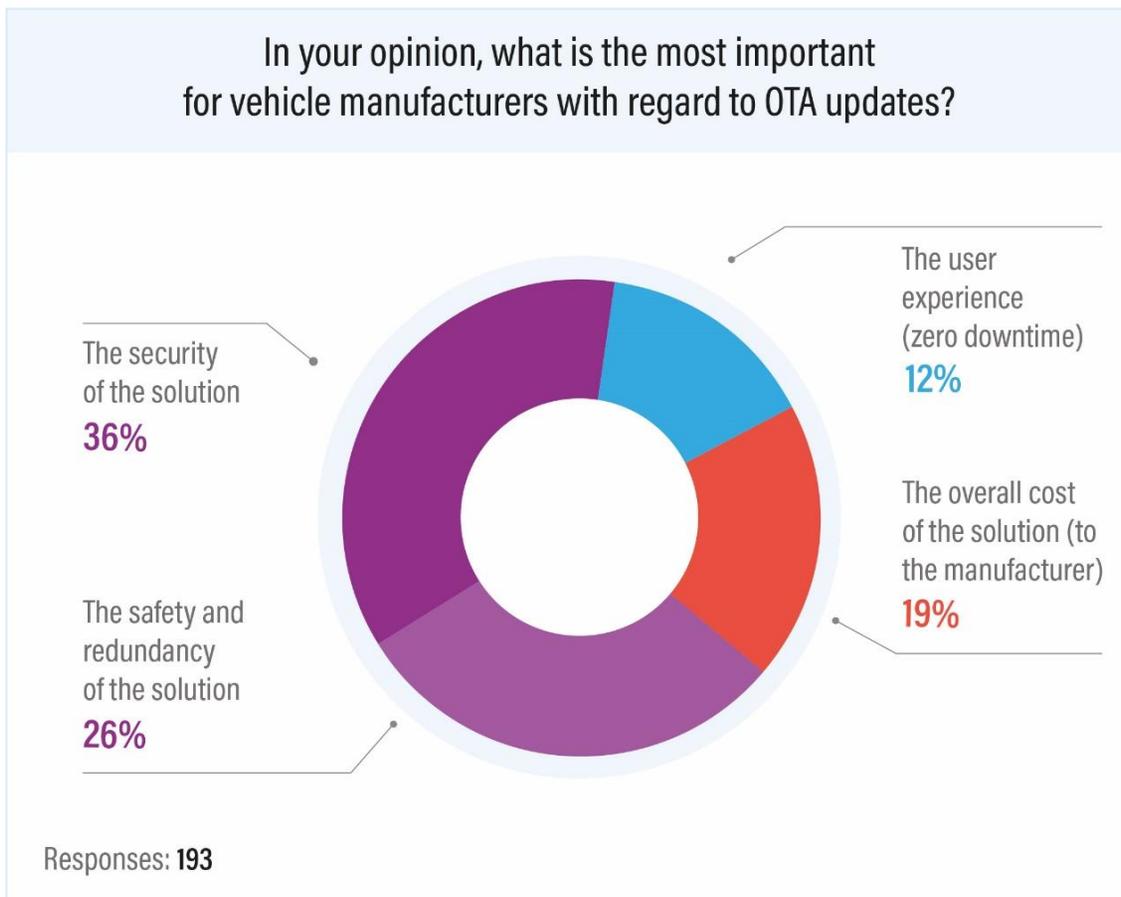


Taking Q16 and Q17 together, it is therefore very clear that the automotive industry is crying out for OTA solutions that allow roll-back without adding redundant hardware costs. Even semiconductor vendors, who could clearly benefit from doubled-up systems, saw this as the case, with 67% of such respondents agreeing that “a solution that guarantees safety without raising costs” was required.

20. Automaker Importance Hierarchy for OTA

Q18 - In your opinion, what is the most important for vehicle manufacturers with regard to OTA updates?

There were a wide range of answers to this question, with no overall runaway winner, but around two-thirds (66%) saw either “security” (typically defined in automotive as the resilience to outside threats) or “safety” (resilience to unforeseen events) as the most important factor with regard to OTAS updates.



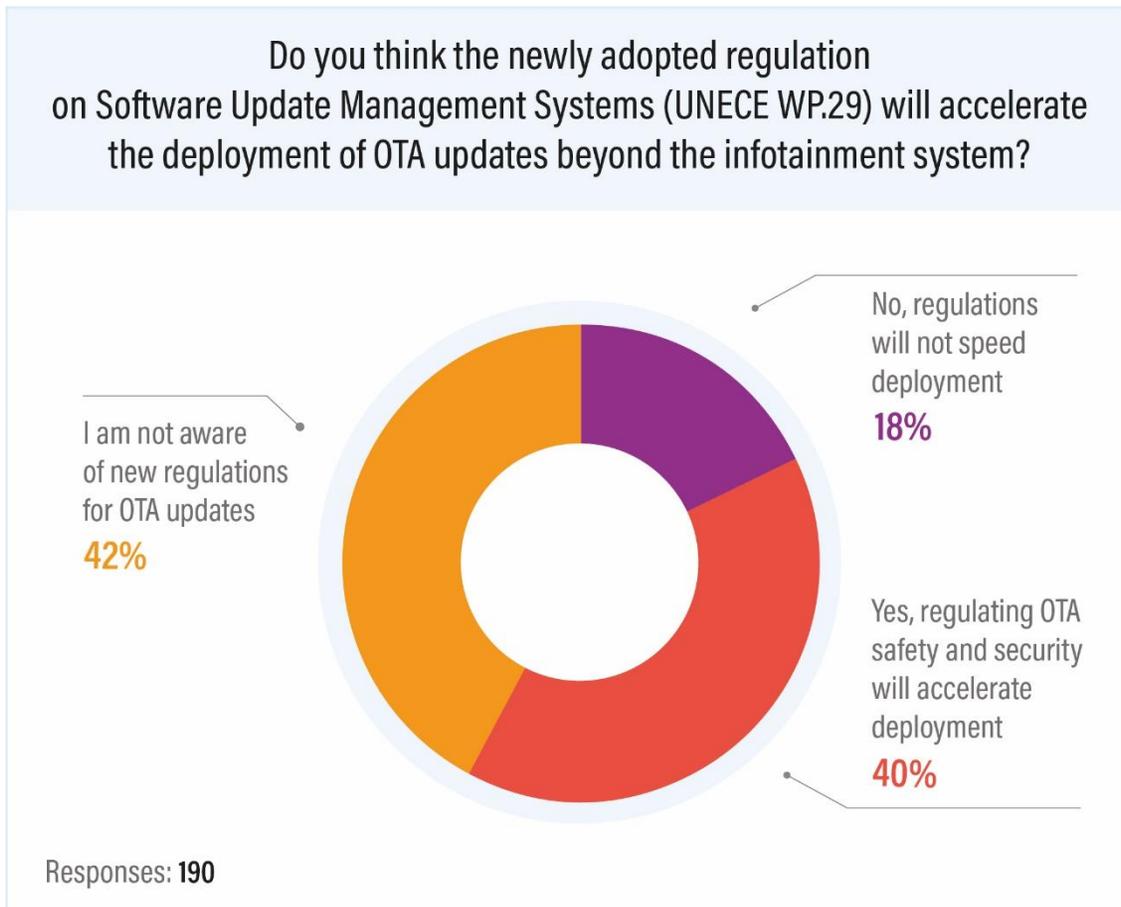
Looking at the names and companies that were left by survey respondents, many would have been completing the survey in a non-native language, which perhaps led to a lack of distinction in the results between safety and security.

What is abundantly clear, however, is that these two factors are considered more important than even the overall cost – a position that was repeated even for the vehicle manufacturer respondents who would have to bear this cost.

21. UNECE WP.29 Impact on OTA

Q19 - Do you think the newly adopted regulation on Software Update Management Systems (UNECE WP.29) will accelerate the deployment of OTA updates beyond the infotainment system?

This question has the second-highest level of effective “Don’t knows” out of all of those asked on the survey, with 42% stated that they were not aware of new regulations. This was perhaps not a surprise, as the question was a detailed one in a survey which was not specifically targeted at OTA experts.

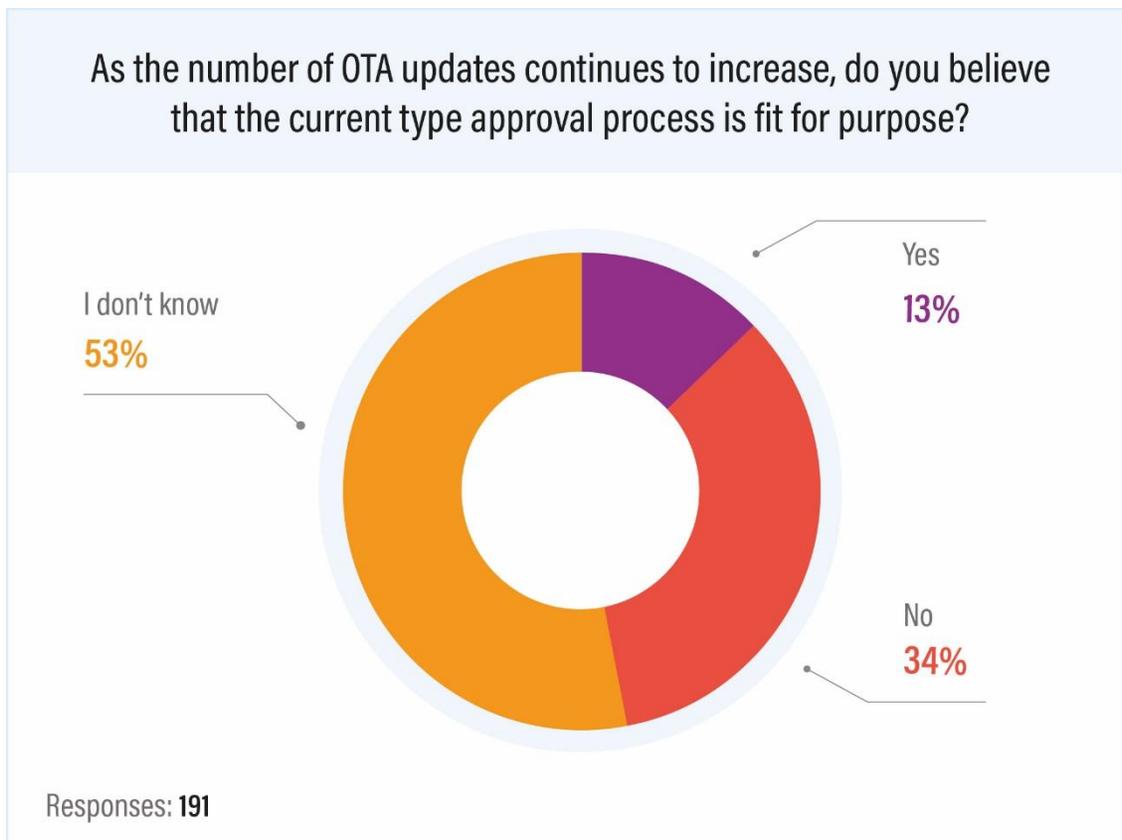


For those who were aware of UNECE WP.29, they responded in a ratio of more than 2:1 in favor of seeing the regulations as accelerating the deployment of OTA. Taken with all the other survey responses, it is clear that the OTA business will be on a very steep growth curve in the coming years. Market needs (a vehicle which continues to improve post-factory), OEM requirements (controlling the spiraling cost of physical recalls) and legislation frameworks are all now aligning. The onus is now on the carmakers and their partners to find a way of implementing all of this whilst avoiding the “doubling-up” costs that were rejected by a ratio of 2:1 in Q17.

22. Type Approval Process Suitability

Q20 - As the number of OTA updates continues to increase, do you believe that the current type approval process is fit for purpose?

Just over half of respondents (53%) were in the “Don’t know” category when it came to assessing whether the type approval process is fit for purpose. As with the previous question, this high level of “Don’t knows” is perhaps to be expected for a question on a specialist area in a survey not specifically targeted at experts in that domain.



However, those who did express an opinion responded almost 3:1 (34% to 13%) in seeing the current Type Approval process as NOT being fit for purpose. This is seen by Strategy Analytics as a huge challenge to be overcome. In recent discussion with stakeholders in this area, the nature of this challenge has been explained as:

- Many working in the Type Approval field have been doing so for years, and are essentially mechanical engineers by background. They are not well versed in software.
- Attracting and retaining software experts into Type Approval roles is not easy, as it is not typically seen as a preferred career path.

23. Find Out More

About Aurora Labs

Aurora Labs has reinvented remote software management, remote diagnostics, and over-the-air (OTA) updates for the automotive and IoT industries. Using machine learning algorithms to analyze risks and changes in the software functionality and behavior, Aurora Labs' Line-Of-Code Behavior™ technology improves the user experience and lowers the cost of software quality, safety and security. Aurora Labs' Self-Healing Software solutions continuously collect actionable data, enabling pre-error detection of line-of-code faults, software error fixes on-the-go, reliable and cost-effective OTA updates without any downtime for the user and software change validation to streamline regulation and certification.

Aurora Labs, founded in 2016, has raised \$34m and has been granted dozens of patents. Aurora Labs has customers around the world and is headquartered in Tel Aviv, Israel, with offices in Germany, North Macedonia and the US.

For more information, go to auroralabs.com or contact Mary Maguire, Director, Industry Relations, Aurora Labs: marym@auroralabs.com

About Strategy Analytics

Strategy Analytics provides strategic and tactical support to global clients through a range of customized solutions:

- Multi-Country [primary research](#) assignments using leading edge tools and techniques
- [User Experience](#) Design and Innovation engagements
- Real Time Mobile Consumer [On-Device Tracking](#) projects
- [B2B](#) Consulting Projects and Whitepapers

Please contact us at Custom@strategyanalytics.com for more details.

Supporting Clients Across The Planning Lifecycle

STRATEGYANALYTICS

