



#connectedcar



IN 30 SECONDS

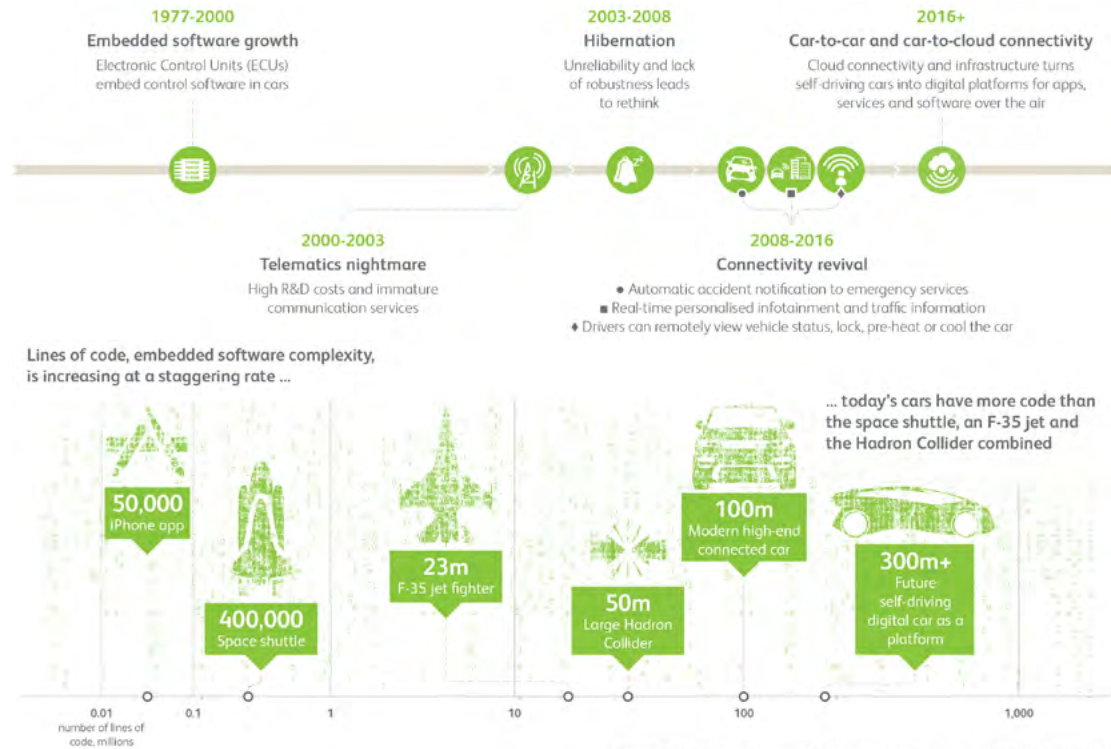
- In the era of the connected car, OEMs need to transform their supplier relationships
- OEMs face stiff competition from their software suppliers in providing immersive experiences where customers can be provided with a range of services
- We provide five recommendations for OEMs in transforming their supplier strategy for a connected world

How can vehicle manufacturers fit into the new connected car ecosystem?

Why car manufacturers must rethink their supplier relationships and offerings or risk being left behind

Connected cars: running on code

Software has grown in importance from controlling mechanical parts to being a key differentiator for the customer experience





#connectedcar

- Introduction
- Adapting to a changing role
- 1. Overcome complexity with collaboration
- 2. Keep tabs on industry trends and supplier strategies to exploit both
- 3. Build a new culture
- 4. Keep data (and customers) safe
- 5. Make choices based on suppliers' agendas
- Key Takeaways
- About the author
- Notes and bibliography

The first production car to incorporate embedded software ('code') was the 1977 General Motors Oldsmobile Toronado, which had an electronic control unit (ECU) that managed electronic spark timing¹. We have come a long way since then: most components in the car are now monitored and controlled by code, and most high-end cars also have code to talk to software services outside the car, from simple features like real-time traffic warnings to the more complex, like remotely controlling the climate in the car from your smartphone app.

Connected car technology is rapidly becoming a key differentiator for consumers. As original equipment manufacturers (OEMs) rush to incorporate innovative software into their cars, they find themselves operating in a new landscape – one in which, for the first time, they risk losing their place at the top of the supplier pyramid.

Consumers should already be able to sense OEMs' shift in focus from a car's hardware specs to its connectivity and the services that on-boarding, remote software and apps can provide – such as vehicle status, remote door-lock, remote pre-heat, GPS tracking, journey logs, and a plethora of in-vehicle infotainment.

Software providers to the auto-manufacturing sector have the potential to completely disrupt this current supply-chain structure. Customers want the same kind of connectivity and access to information whilst driving their car as they have 24/7 on their phones whilst walking down the street. For OEMs, setting the right supplier strategy will be crucial. Yet many are a long way from having plans in place.

Adapting to a changing role

The hardware that traditionally distinguished one car from another is becoming increasingly standardised across models and brands. This is thanks in part to the evolving role of suppliers in the final product, and the development of new technologies that supersede existing vehicle platform capabilities, such as hybrids, electrification and third-party infotainment platforms like Apple Car Play and Android Auto. At the same time, these software features are becoming a key differentiator for customers. Software features can be delivered by software solely in the car or by a mixture of in-car software and cloud-based

As OEMs rush to incorporate innovative software into their cars, they find themselves operating in a new landscape where, for the first time, they risk losing their place at the top of the supplier pyramid

software services optionally combined with smartphone apps. Software in the cloud can be changed in the blink of an eye to immediately 'upgrade' all vehicles using it, if required. Software in the car can be changed using 'Software Over the Air' (SOTA) – this is slower and carries a greater cost, as it is done per car over the mobile network. OEMs need strategies for deciding which aspects of new software features should be implemented in hardware, as software on the car, as cloud-based software services, or in smartphone apps. Vehicle platforms are being simplified as OEMs introduce electric cars and start to design virtualised on-car computing platforms that promise to replace hundreds of modules with a small number of general purpose ones.



#connectedcar

- Introduction
- Adapting to a changing role
- 1. Overcome complexity with collaboration
- 2. Keep tabs on industry trends and supplier strategies to exploit both
- 3. Build a new culture
- 4. Keep data (and customers) safe
- 5. Make choices based on suppliers' agendas
- Key Takeaways
- About the author
- Notes and bibliography

Soon, even the way we think about cars could change. Rather than being products in their own right, cars are poised to become platforms through which services can be delivered – and key to this is software, and those companies that supply it.

So how much have things really changed since code was first introduced to manage spark-plug timing? A modern high-end car has 100 million lines of code. To put that into perspective: the average iPhone App has 50 thousand lines of code, the space shuttle has 400 thousand lines of code, an F-35 Jet Fighter has 23 million lines of code, and the large Hadron Collider has 50 million lines of code². That's right – the connected car has more lines of code than all of those combined (see lead infographic).

In order to keep up with the pace of change, OEMs will have to build relationships with software suppliers that can give them the upper hand in areas such as big data, cyber security and cloud computing. But the suppliers are numerous and the market is fragmented.

On top of this, many software providers are less interested in transactional

relationships with OEMs, and more interested in getting their own hands on user data – and users. Whilst shifting to a service model, OEMs stand to lose the chance to create a new revenue stream through connected-car software if they don't get their partnering strategy right the first time.

OEMs must adapt their supplier strategy and make some crucial choices about how they wish to partner and position themselves in this evolving environment.

Today, more than half of auto suppliers and manufacturers (55%) are still at the initial stages of connected-car development³ – many have some connected features on some models and are in the process of rolling this out further. Some have effectively bought-in solutions in an attempt to catch up or gain a foothold. It is vital – both for this group and for others that have done more work with connected cars – that the way supplier relationships are governed internally changes to reflect this new connected-car reality. With this in mind, here are our five recommendations for best managing suppliers in the age of the connected car.

It is vital that supplier relationships change to reflect this new connected-car reality

1. Overcome complexity with collaboration

One simple solution for OEMs to gain a foothold in the connected-car space whilst ensuring they are not losing ground to their software providers is simply to buy a stake in them. This is exactly what Porsche did in 2014 by acquiring a 10 per cent stake in INRIX, a traffic intelligence company⁴. But as the complexity of the software ecosystem grows, individual OEMs will not be able to pursue this strategy across every software service they require. One solution to this is to join forces with their traditional rivals.

In October 2015, German OEMs Daimler, BMW and Audi formed a consortium in order to buy Nokia's mapping business



#connectedcar

- Introduction
- Adapting to a changing role
- 1. Overcome complexity with collaboration
- 2. Keep tabs on industry trends and supplier strategies to exploit both
- 3. Build a new culture
- 4. Keep data (and customers) safe
- 5. Make choices based on suppliers' agendas
- Key Takeaways
- About the author
- Notes and bibliography

HERE⁵. By collaborating with rivals, OEMs will be able to manage the complexity of this new environment better. Just as five rivals in the aerospace sector came together to create BoostAeroSpace⁶, a private cloud solution, OEMs could overcome their differences as traditional rivals in order to ensure their survival through this latest disruption.

However, even this plan will not solve the whole problem. OEMs will need to develop deep relationship strategies: work out which suppliers should become partners (where rivals face the same challenges), who to work with as a traditional supplier, and where it is worth investing in technology and companies.

2. Keep tabs on industry trends and supplier strategies to exploit both

As the technology develops in areas such as modular car updates, over-the-air software updates, vehicles-as-a-service, and self-driving cars, there will be a vast range of services that OEMs will want to

introduce into their connected cars. Most OEMs will choose to focus on some of these, but not all.

Each new piece of technology may lend itself to multiple uses. Take geofencing⁷, which is software that sets up virtual barriers for driving. Some OEMs will want to use it to develop fleet management systems for commercial customers. Others will want to use it to offer consumers more choice in the way they personalise their cars – setting speed and location geofences for cars driven by teenagers, for example. For an OEM, picking the right partner for geofencing services will depend on the way it wants the software to be implemented in the car.

Because connected-car technologies are at such an early stage, car manufacturers will need to choose these suppliers carefully. They must make partnering decisions based not only on which companies are able to fulfil their requirements today, but also to what extent these suppliers are pushing boundaries in their niche, how they might develop and what they will have to offer the OEM in the long-term, and whether supplier and OEM visions and strategies align.

Supplier management will have to become ecosystem management in the connected-car space

3. Build a new culture

Supplier management will have to become ecosystem management in the connected-car space. This will extend to 24/7 service provision for connected features – yet another example of the impact of connected cars on the auto-manufacturing operating model. OEMs must move from their current position at the top of the supply-chain pyramid, working with suppliers through an incentive-based approach where a constructive tension of time-to-supply, costs, quality and volume hang in the balance, to developing true partnerships with suppliers in the broader connected-car ecosystem, where innovation and agility are at the core of the relationship.



#connectedcar

- Introduction
- Adapting to a changing role
- 1. Overcome complexity with collaboration
- 2. Keep tabs on industry trends and supplier strategies to exploit both
- 3. Build a new culture
- 4. Keep data (and customers) safe
- 5. Make choices based on suppliers' agendas
- Key Takeaways
- About the author
- Notes and bibliography

One of the biggest changes needed within OEMs will be bringing in the skills and cultural expertise required to handle the assembly of connected cars: expertise in enterprise architecture may end up being more important than mechanical engineering as OEMs look to put together diverse software components. Hiring policies will have to change to reflect this new required skill set. Employees that can bring a start-up mentality to OEMs will be increasingly valuable, but this will be a profound cultural shift in what has been traditionally a conservative, 'waterfall' and safety-oriented sector. The car is now a layer cake. The base layer is engineering, which for safety's sake must jump through the time-consuming hoops of myriad worldwide certifications and regulations – so change must be tightly controlled. The top layer is the software and services that will be updated over the net. This will allow OEMs to leapfrog each other with new features, sent wirelessly to existing customers and cars already on the road.

This new culture will help manufacturers to change the way they interact with their suppliers, moving from transactional relationships to collaborative ones. Asking their suppliers what new innovations they have to offer must become a reflex question for OEMs to ask. BMW recently established BMW i Ventures⁸, a venture capital company based in New York

The introduction of connected software will entail product lifecycles that are much faster than anything OEMs have been used to before

that invests in start-ups with a strong focus on improving personal mobility in urban areas. In such an ecosystem, small tech companies will be able to work hand-in-hand with the OEM to develop technologies that are a natural fit for both parties. The company also runs BMW Startup Garage⁹, a program that helps automotive start-ups through co-development partnerships, with the OEM serving as a client to these new enterprises. Ford and General Motors have opened their vehicle APIs to enable innovation from outside the OEM. Jaguar Land Rover is planning the same strategy; they recently ran a three-day 'hackathon' with developers and suppliers to create new apps for their connected car. JLR are also setting up an innovation incubator¹⁰ as well as running research projects to work out how to use cars to crowd-source and share data, such as pothole locations, with other cars or the authorities¹¹. Daimler and Qualcomm announced a strategic collaboration focusing on pioneering innovation for connected cars and 'always-on connectivity'¹².

The introduction of connected software will also entail product lifecycles that are much faster than anything OEMs have been used to before. Processes and strategies will need to be updated to reflect this – and built into the culture as early as possible. The agile, sprint-based, world of software development that must deliver new features with frequent prototyping, review and revision must dovetail into the traditional 'waterfall' engineering lifecycle of concept design, build, test, and certification of physical vehicle platforms and models.

OEMs are expert at building vehicles that are a complex combination of parts from different suppliers. They must become experts at deploying software onto connected cars that, whilst themselves being complex and constructed with parts from many suppliers, must also interact in real time with even more third-party software services in the cloud that are changing dynamically, outside of OEM control.



#connectedcar

- Introduction
- Adapting to a changing role
- 1. Overcome complexity with collaboration
- 2. Keep tabs on industry trends and supplier strategies to exploit both
- 3. Build a new culture
- 4. Keep data (and customers) safe
- 5. Make choices based on suppliers' agendas
- Key Takeaways
- About the author
- Notes and bibliography

4. Keep data (and customers) safe

As the consumer offering will rely on services and technologies working outside the car, OEMs will increasingly need to build or source new solution components through managed cloud services connected to data centres around the world. With increasing country-specific legislation around Personally Identifiable Information (PII) and where this must be stored and processed, increasing attention must be paid to how data and systems are physically deployed and connected around the globe.

The more third-party software services are added to a car – a natural development as more services are added to vehicle feature lists, and the connected car app ecosystem grows – the more entry points for hackers there will be. This leaves OEMs in a challenging situation when it comes to protecting consumer data, and even the possibility of hackers using these avenues to gain access to control the vehicle.

This brings new risks for OEMs that must also be managed – an important concern when dealing with new suppliers and building relationships with both them and consumers. Data privacy and vehicle security should not be an afterthought for OEMs, but should be addressed comprehensively, in-depth, from day one to ensure that manufacturers avoid incidents that could ruin consumer appetite for connected cars.

5. Make choices based on suppliers' agendas

In the future, a large part of OEMs' revenues could come from services rather than products. This needs to be considered and built into any supplier strategy. Some of the suppliers that might look tempting at this early stage of the connected car revolution, such as Apple and Google – which have excellent consumer recognition and reputation – will also be aiming for this service space. Such companies also have the scale to enter negotiations with OEMs from extremely strong positions. They do, after all, bring many customers with them.

OEMs must decide how important a service-based revenue stream will be for them in the years to come, and make supplier decisions accordingly. These decisions will determine the capabilities and limitations of their platforms in the future, as well as which ecosystem they will be working within eventually. Whether OEMs choose an Apple, Google or in-house ecosystem, this is where information services and virtual customer accounts will live – and hence be the place where new customers and revenue streams will come from.



#connectedcar

- Introduction
- Adapting to a changing role
- 1. Overcome complexity with collaboration
- 2. Keep tabs on industry trends and supplier strategies to exploit both
- 3. Build a new culture
- 4. Keep data (and customers) safe
- 5. Make choices based on suppliers' agendas
- Key Takeaways
- About the author
- Notes and bibliography



KEY TAKEAWAYS

- OEMs face a steep learning curve in adapting to the world of the connected car, and the impact this will have on their supply chains
- Technologies will be much more focused on software than hardware – this shift will be compounded by increasing standardisation and simplification of hardware components across models and brands
- Many of these technologies are in areas where OEMs have no traditional expertise – acquisitions can help to solve this problem, but partnerships will be crucial
- A key part of this process will be to establish which suppliers would make good partners, and even whether it will be possible to work with traditional rivals in order to weather the storm of complexity
- OEMs must establish long-term goals for their connected-car ventures, and choose the right suppliers based on vision as well as current capabilities, so that ecosystems created as suppliers come together can meet both short-term needs and long-term goals
- The working culture of OEMs must change to adapt to this move from hardware to software. New types of engineers with software expertise will be required, as well as people with more of a 'start-up' mentality. This will have a knock-on effect on relationships with suppliers.
- Cyber security must be a crucial consideration from day one, in order to keep customers safe as the move to connected cars results in ever more data being created and held in different places. Much of this work will happen off-site, by suppliers or partners, which will present its own challenges.
- OEMs must bear in mind that software suppliers have different priorities to traditional hardware suppliers, which revolve around getting end users locked into their ecosystem so that they can be sold new products and services. If OEMs want to have access to such ecosystems, they need to choose their partners and negotiate their contracts wisely.



#connectedcar

- Introduction
- Adapting to a changing role
- 1. Overcome complexity with collaboration
- 2. Keep tabs on industry trends and supplier strategies to exploit both
- 3. Build a new culture
- 4. Keep data (and customers) safe
- 5. Make choices based on suppliers' agendas
- Key Takeaways
- About the author
- Notes and bibliography

About the author



Mark Burnett

Head of Innovation, BearingPoint, London

Mark Burnett has over 20 years experience in enterprise architecture, IT strategy and innovation. He started his career in automotive, finding ways to exploit new technologies and software engineering techniques before moving on to architecture and IT strategy. After becoming chief architect for a number of firms in different industries – including a global aerospace firm, an international logistics firm, and a UK-based Systems Integrator – Mark became Chief Innovation Officer for a major system integration and outsourcing firm. In the last three years Mark's focus has been entirely on connected car, where he has been acting as Design Authority for a major OEM responsible for the end-to-end architecture of the connected car, working across feature owners, component suppliers and cloud-service providers.

mark.burnett@bearingpointinstitute.com

Project team

The author wishes to thank Sarah-Jayne Williams and Christophe Grosbost from BearingPoint for their valuable input.

Acknowledgements

The author would also like to thank Angélique Tourneux, Ludovic Leforestier, Tanja Schwarz and Sharon Springell from BearingPoint; Karim Meggaro from Longtitude Research; Christopher Norris from CopyGhosting; and Michael Agar from Michael Agar Design.



#connectedcar

- Introduction
- Adapting to a changing role
- 1. Overcome complexity with collaboration
- 2. Keep tabs on industry trends and supplier strategies to exploit both
- 3. Build a new culture
- 4. Keep data (and customers) safe
- 5. Make choices based on suppliers' agendas
- Key Takeaways
- About the author
- Notes and bibliography

Notes and Bibliography

1. 'This car runs on code', *IEEE Spectrum*, New York, NY, USA, web, Robert N Charette, 01/02/09 <http://bit.ly/IEEESpecCode>
2. 'Codebases: millions of lines of code', *Information is Beautiful*, London, UK, blog, David McCandless, 24/09/15 <http://bit.ly/InfoIBcode>
3. 'Connected car in Europe', *Pierre Audoin Consultants/BearingPoint*, London, UK, PDF, 02/15 <http://bit.ly/BPccinE>
4. 'Porsche SE takes stake in traffic intelligence company Inrix', *Reuters*, Frankfurt, Germany, web, news, 12/04/14 <http://bit.ly/ReutPorsche>
5. 'BMW, Daimler and Audi clinch purchase of Nokia's maps business', *Wall Street Journal*, New York, USA, web, Friedrich Geiger, 03/08/15, subscription <http://bit.ly/WSJNokiaHere>
6. 'Collaborate with your peers', *BoostAerospace*, Paris, France, web, home, 2015 <http://www.boostaerospace.com>
7. Full definition of 'geofencing': a feature in a piece of software that uses a global positioning system (GPS) or radio frequency identification (RFID) to define geographical boundaries, with the potential to trigger different actions once a specific geographical point is reached.
8. 'BMW i Ventures', *BMW*, New York, NY, USA, web, landing page, date of access 26/02/16 <http://bit.ly/BMWiVC>
9. 'BMW Startup Garage', *BMW*, Munich, Germany, web, home, date of access 26/02/16 <http://www.bmwstartupgarage.com>
10. 'Jaguar Land Rover courts start-ups for Portland incubator', *PC Magazine*, London, UK, web, Doug Newcomb, 03/04/15 <http://bit.ly/PCmagJLR>
11. 'Jaguar Land Rover announces technology research project to detect, predict and share data on potholes', *Jaguar Land Rover*, Whitley, West Midlands, UK, web, news, 10/06/15 <http://bit.ly/JLRholes>
12. 'Daimler and Qualcomm announce strategic collaboration on connected car technologies', *Qualcomm*, Monaco, web, press release, 23/05/15 <http://bit.ly/QCccCollab>



#connectedcar

- Introduction
- Adapting to a changing role
- 1. Overcome complexity with collaboration
- 2. Keep tabs on industry trends and supplier strategies to exploit both
- 3. Build a new culture
- 4. Keep data (and customers) safe
- 5. Make choices based on suppliers' agendas
- Key Takeaways
- About the author
- Notes and bibliography

About the BearingPoint Institute

At the BearingPoint Institute, our ambition goes beyond traditional 'thought leadership'. We aim to contribute original ideas to the science of business management whilst equipping decision makers with practical advice gained in the field and through our research projects.

www.bearingpointinstitute.com

About BearingPoint

BearingPoint consultants understand that the world of business changes constantly and that the resulting complexities demand intelligent and adaptive solutions. Our clients, whether in commercial or financial industries or in government, experience real results when they work with us. We combine industry, operational and technology skills with relevant proprietary and other assets in order to tailor solutions for each client's individual challenges. This adaptive approach is at the heart of our culture and has led to long-standing relationships with many of the world's leading companies and organisations. Our global consulting network of 9700 people serves clients in more than 70 countries and engages with them for measurable results and long-lasting success.

www.bearingpoint.com



CONNECT



Follow us on Twitter at @institute_be



Join us on LinkedIn at www.inst.be/linkedin



www.bearingpointinstitute.com

Send us your comments, thoughts and feedback:



editor@bearingpointinstitute.com



www.inst.be/feedback



DOWNLOAD

Read the BearingPoint Institute on your tablet with the mobile app:



iOS version from the iTunes AppStore



Android app on Google Play



Amazon Kindle (Fire only) store

(to guarantee a good reading experience, these apps are for tablets only)