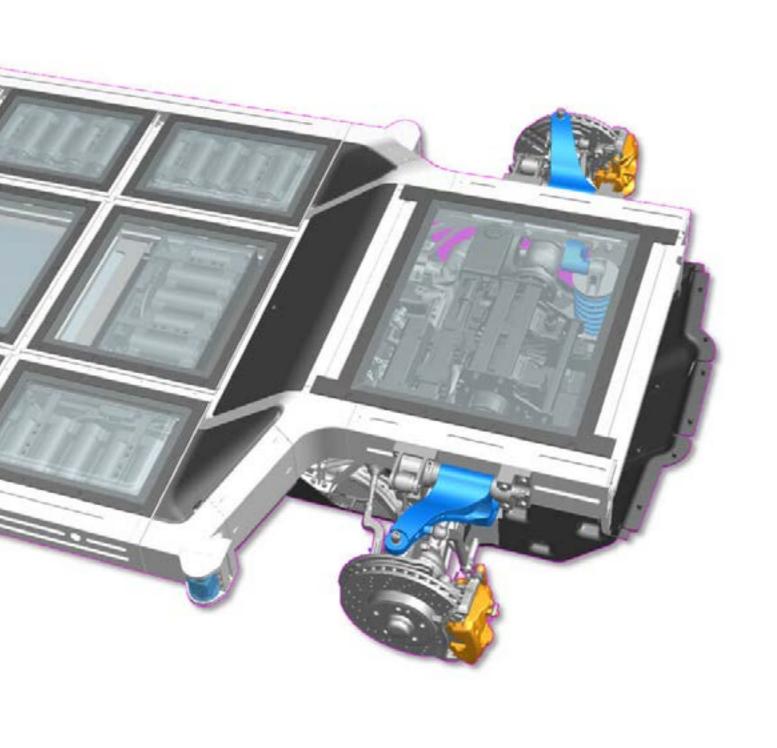


by Jürgen Dettling, Technology Strategy Consultant, DXC and Volker Haninger, Sales Director Europe, Excelfore





#### **Summary**

Future mobility concepts depend heavily on software, with applications both in the vehicle and in the cloud. This software should come with flexible accessibility and must be deployable in multi-million vehicle fleets.

Specific and deep over-the-air (OTA) connectivity from the cloud to every edge device in the vehicle is a key enabler for any software-defined vehicle functionality, but only a few technologies and engineering teams can achieve it.

DXC, Luxoft and Excelfore showcase a pilot of OTA software-updating within an automotive research environment and give proof of how OTA connectivity can be achieved industrywide in a robust, secure and economic manner.

# FlexCar research vehicle: Deep cloud-connectivity that supports open platform philosophy

FlexCar is a mobility research project which addresses numerous engineering and social sciences questions on the future of mobility. It involves multiple research institutes and industry partners.

The rolling chassis vehicle, an open cyber-physical platform built at the Arena 2036 facilities in Stuttgart, is at the center of all activities. The involved teams' aspiration is to provide a template of updatable and upgradable vehicle concepts for sustainable mobility in the 21st century.

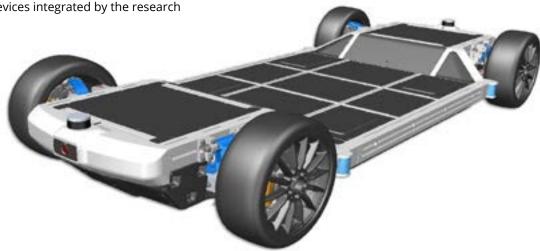
Its open platform philosophy fosters an approach new to the automotive industry and is inspired by the software industry with its open source, collaborative and crowd development activities and inherently continuous innovation potential.

The research teams were looking for a technology that would be able to connect the rolling chassis (with all its functionalities and devices integrated by the research

teams) to the cloud. This technology had to support the open platform philosophy, scale to any application, and be unrestrictive regarding bandwidth and high responsiveness provided by 5G.

DXC and Luxoft, industry team partners of FlexCar, reviewed the OTA options available in the automotive industry before selecting the eSync OTA software platform — a specification published by eSync Alliance to be tested for the purpose.

Excelfore, a provider of eSync-compliant cloud-connectivity software, sponsored the endeavor by providing the necessary software development kit (SDK) and implementation training. The eSync technology is widely used in the automotive industry for OTA software updating of embedded systems in field-deployed vehicle fleets.

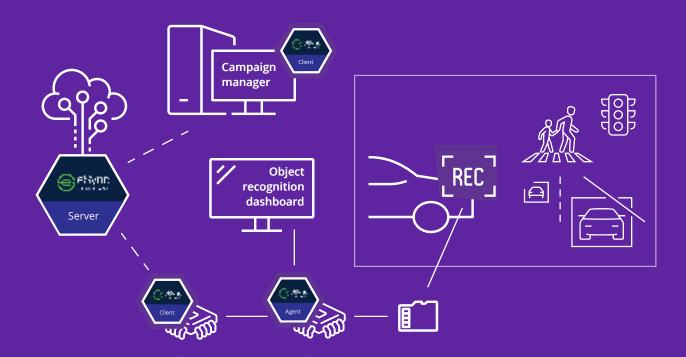


## Proving the cloud-connectivity conception with eSync

At first, DXC and Luxoft designed a pilot setup for OTA software updating using eSync technology. This was to prove the technical feasibility of the cloud-connectivity software to integrate into any application and edge functionality. As an example, for embedded functionality, DXC and Luxoft chose the object recognition system which the research team intends to use on the rolling chassis.

#### DXC and Luxoft's goals were:

- To prove the technical feasibility of the cloud-connectivity software for research project requirements
- To establish a template and process for establishing cloud-connectivity of any current or future research set-up on the rolling chassis



With the eSync software development kit (SDK) provided by Excelfore, the middleware components eSync Client and eSync Agent were provided for flashing to i) the Raspi serving as a gateway and ii) the object recognition device. DXC and Luxoft got access to a dedicated account on the eSync cloud server. The Excelfore service team trained and instructed the DXC and Luxoft engineers to integrate eSync technology accordingly.

#### Use case summary:

The research team deploys a new version of object recognition software to the embedded controller (installed in the rolling chassis) under operation — testing if ADAS functionality improves upon the software update.

With this pilot setup, an OTA software update campaign was executed successfully:

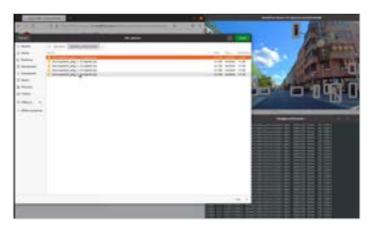
The operating DXC and Luxoft engineers released the software update onto the cloud instance of eSync. When the Raspi gateway was switched on, it registered with the eSync cloud instance and was recognized in the cloud campaign management function. At the same time, the object recognition device registered with the eSync Client and was visible in the cloud.

Then, the DXC and Luxoft engineers created a software deployment and update campaign on the cloud campaign dashboard and deployed the software update to the Raspi gateway via internet and WLAN. As soon as the software reached the Raspi, its eSync Client middleware directed the software to the eSync Agent middleware integrated in the object recognition device. The eSync Agent then flashed the software update to the controller.

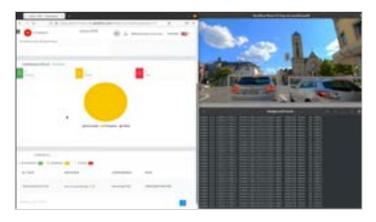
During the OTA campaign, the object recognition was operating (as could be observed on the screen). Upon the software update, the additional features — object identification number, and reduced cycle time for more precise object recognition — went live.

The experiment showed that the eSync SDK is suitable for use by a software engineer without prior OTA software experience. Both short-term integration of OTA functionality into an embedded system and OTA campaign management with the eSync Server in the cloud are easy to understand. Remote help desk support from the Excelfore team enabled the DXC and Luxoft engineers to perform the integration tasks and run OTA campaigns with confidence.

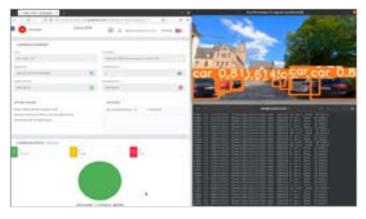
The OTA campaign executed, including software deployment from cloud to the Raspi emulation of the rolling chassis. Triggering and execution of the software update in the embedded system were successful in terms of robustness, time-efficiency and security. Upon campaign execution, a log documented the OTA campaign and the new status of the object recognition device was documented in the cloud instance.



i. Running the object recognition v1 in vehicle fleet while uploading released software update into OTA campaign manager in the cloud



ii. Running the object recognition v1 in the vehicle and simultaneously deploying the software update v2 over-the-air to the vehicle fleet



iii. Running the object recognition v2 in the vehicle and reporting of the successful software update v2 in the cloud



#### **Outlook**

With this pilot, the DXC and Luxoft team has gained experience and confidence in eSync OTA software technology. The Excelfore team is now acquainted with use cases of the rolling chassis for the FlexCar research projects and can better understand the target system.

With this successful test, a milestone has been passed and a template created to proceed with implementations of OTA capability directly on the rolling chassis. In the coming months, several research teams will be supported by DXC, Luxoft and Excelfore to connect their electronic setups on the rolling chassis with the cloud.

Furthermore, this pilot serves as a template for future set ups as may be requested by automotive industry partners of DXC, Luxoft and Excelfore. The cross-company team has proven its capability to collaborate in this environment efficiently and to successfully establish device connectivity, and execute OTA campaigns for software updates in deployed embedded systems.



## **Acknowledgements**

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### **About the authors**



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Focused on engagement with key automotive industry customers. Jürgen's interest is, to apply technology and innovation in order to solve the customer's business problems. He has a strong interest in driving new business models across the automotive value chain.

Jürgen has more than 30 years' experience in the IT service industry, and has held various positions in global and regional management and technology sectors.

He holds a degree in business information systems from Cooperative State University Villingen-Schwenningen and a degree in information science from the University of Konstanz.

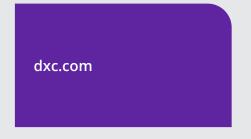


**Volker Haninger** Sales Director Europe, Excelfore

Responsible for automotive industry customers across Europe. He is strongly engaged in conceptions of OTA-enabled automotive and digital services use cases and contributes to eSync technology applicability by making the connection to customer's and user's perspectives.

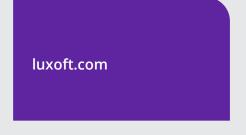
Volker joined Excelfore in 2019. Prior to this, he held project management roles in the automotive industry, including at Johnson Controls, Kiekert, MBtech and Daimler.

Volker holds an MSC in biology from the University of Tuebingen, Germany and a BA in engineering economics from HTW University of Applied Sciences of Berlin, Germany.



#### **About DXC Technology**

DXC Technology (NYSE: DXC) helps global companies run their mission critical systems and operations while modernizing IT, optimizing data architectures, and ensuring security and scalability across public, private and hybrid clouds. The world's largest companies and public sector organizations trust DXC to deploy services across the Enterprise Technology Stack to drive new levels of performance, competitiveness, and customer experience. Learn more about how we deliver excellence for our customers and colleagues at dxc.com.



#### **About Luxoft**

Luxoft is the design, data and development arm of DXC Technology, providing bespoke, end-to-end technology solutions for mission critical systems, products and services. We help create data-fueled organizations, solving complex operational, technological and strategic challenges. Our passion is building resilient businesses, while generating new business channels and revenue streams, exceptional user experiences and modernized operations at scale.