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Driving a Connected Auto Ecosystem with Automotive Digital Universe

Abstract

The automotive industry is riding high on connectivity which is slated to generate $9 billion in revenue by 2027[1]. Thanks to advances in 5G, long term evolution for machines (LTE-M) connections, and growth in aftermarket connections, innovation in the automotive industry will be primarily led by partnerships between various traditional and non-traditional entities. Such alliances will help automotive firms create advanced products and services to fulfill existing demands and define new needs. The underlying connectivity – enabled by V2X or vehicle-to-everything functionality (vehicle to vehicle, pedestrian, infrastructure, network, etc.), blockchain, and connected ecosystems – will provide automotive firms access to data, which can be leveraged to draw insights and develop new business models.

This paper examines how firms can leverage such partnerships and access data through an automotive digital universe to create innovative digital applications, services, and solutions.

Uncertainty spurs innovation

The disruption brought forth by connected, autonomous, shared mobility, and electrification (CASE), and the socio-economic crisis induced by COVID-19 has made it imperative for original equipment manufacturers (OEMs) to realign their digital strategy. OEMs need to be responsive to these changes to retain market share while diversifying into untapped areas for growth

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[1]Analysys Mason; The automotive sector will drive the demand for 5G; March 13, 2019; https://www.analysysmason.com/Research/Content/Comments/iot-forecast-comment-rdme0/

Automotive enterprises can leapfrog their product innovations and transformation by taking advantage of digital technologies. Increased access to data from automotive ecosystems is creating personalized experiences and services for end customers. Technology players like Google, Amazon, and Facebook, to name a few, have carved a new digital revenue stream with intelligent, responsive, and adaptive value chains concurring with the requirement of ecosystem participants.

The day when hyper-personalized ads will be flashed on infotainment systems, just like they appear on Facebook or YouTube, is clearly not far. This provides automotive players an opportunity to create new business models for generating non-traditional revenue streams by leveraging ecosystem data.

Essential to the development of new business models is openness and access to data. Currently, data ownership resides with internal stakeholders with limited access to external players based on regulations, insurance, etc. Compare this with smartphones, where everyone has access to third-party applications or offerings via respective marketplaces (The App Store and Play Store, for instance). If data from the OEMs and surrounding automotive ecosystem can be tapped or made available, its true economic value can be realized. Tesla is already collecting data points and creating not only new revenue models but also developing vehicle functionalities using passenger and vehicle-generated data[2]. The crux to creating intelligent value chains – where ecosystem entities can contribute in an agile fashion through distributed decision making – is to ensure seamless availability of contextual intelligence at the edges of the ecosystem. This requires cross-pollinating the data from different entities like insurance and finance companies, retailers, ride-hailing aggregators, and others.

Technological advancement, legislation, and regulations, along with uncertain socio-economic scenarios are fueling consumer needs that demand a convergence of multiple players across industries. Without a systemic collaborative setup and framework, organizations will quickly become overwhelmed by hundreds of disparate point solutions, data sets, and management systems brought forth by hastily drawn business cases. If the first decade of the millennia was about breaking functional silos to achieve organization-wide synergy, we are currently moving into an era of enhancing that synergy by breaking inter-organizational silos.

[2] CIO India; Tesla, the data company; August 28, 2019; https://www.cio.com/article/3433931/tesla-the-data-company.html

A collaborative platform strategy can help auto OEMs and suppliers to rapidly integrate new technologies, services, and ecosystem entities to addresses current and future business scenarios. The core principle of the platform must be to support critical data management functions—including data ingestion, orchestration, movement, data security, and availability—and embed artificial intelligence (AI) and machine learning (ML) into process and storage capabilities. Such a collaborative platform provides the neural fabric for the ecosystem to sense, perceive, and act to achieve its key purpose of being resilient in this current environment, while driving adaptability, purpose-driven business agendas, and the emergence of B2B2C business models.

Transforming the automotive industry with ecosystem partnerships

An automotive digital universe (ADU) will be pivotal for transforming the automotive industry by serving as a playground to innovate, co-innovate, collaborate, share, buy, and sell data-enabled products and services. Ecosystem entities (see Figure 1) will be able to carve out new products and services quickly and gain from wider customer outreach at lower acquisition costs. ADU will leverage the collective intelligence of the ecosystem, engendering application excellence and usability across the entire ecosystem span.

To conceptualize ADU capabilities and features, it is necessary to identify three key aspects:

- Who – The ecosystem entities (OEMs, partners, and collaborators).

- What – Data the entities can buy (consume) and sell (generate).

- Why – The potential areas of use cases.

Based on the above, the following can be established:

- How - Key considerations and requirements for the target architecture.

To identify the ecosystem entities (see Figure 1), automotive firms must think beyond the existing value chain and focus on how additional entities can transact with each other to fill in the white space.

Figure 1: *Auto digital universe and ecosystem entities*

For example, in 2017, General Motors became the first automaker to offer in-car purchases for retailers via an app called Marketplace[3]. The same concept can be extended to various other infotainment applications like music or video applications, newsfeed, and live sports to carve out new monetization services with the evolving car-as-a-service model.

Table 1 below lists ecosystem entities along with their areas of interest.

S.No	Eco System Entity	Identified Areas
1	Reseller	Lead Generation, Target Advertising, Cross Sell, Up Selling, Dynamic Pricing, Personalized Offers, Visual Inspection and RV Calculation for Returned Used Cars
2	Dealers	Right to Repair, Lead Generation, Target Advertising, Cross Sell, Up Selling, Dynamic Pricing, Sales, Demand Forecasting, Personalized Offers, Dealer Footprint Optimization, Product Marketing
3	Repairers / Service Centers	Right to Repair, Inventory Planing, Target Advertising, Pre-emptive Maintenance
4	Dealer Call Center	Chatbots, Virtual Assistance, Up/Cross Sell, Personalized Marketing
5	Car Owners	Personalized Services

[3] Automotive News; GM first to offer in-car purchases via Marketplace app; December 5, 2017; https://www.autonews.com/article/20171205/OEM06/171209897/gm-first-to-offer-in-car-purchases-via-marketplace-app

S.No	Eco System Entity	Identified Areas
6	Mobile Service Providers	Data Usage Packages
7	Infotainment Providers	In-App Analytics, Application Bundle, Up/Cross Sell (Application), UI/UX
8	Insurance	Fraud Analytics, Pricing & Product Optimization, Claims Prediction & Resolution, Behavioural Intelligence and Analytics to Predict New Customer Risk and Fraud, Claim Prevention, Up/Cross Sell, Churn Prevention/Predicition, Pay per Usage
9	Navigation / Maps Providers	Repairs/Service Offers, Restaurant Offers, Payment Offers, Retail Offers
10	JD Power / Rating Agency	Market Research, Satisfaction and Quality Surveys
11	Battery Manufacturers	Remaining Useful Life (RUL), Assest (Battery) Performance, Battery-as-a-Service
12	Tyre Manufacturers	Tyre-as-a-Service
13	Parking Service Providers	Restaurant Offers, Payment Offers, Retail Offers
14	Wearable Compaines	Driver Vital Health Monitoring and Telemedicine
15	Streaming Compaines	Restaurant Offers, Payment Offers, Retail Offers, Target Advertising
16	Weather Compaines	Geographical Weather Conditions
17	Road Side Assist (RSA) Companies	Workforce Management, Improved Customer Service with Estimated Time of Arrival Data, Increase a Company's Bottom Line by Monitoring Vehicle Use, Near Real-Time Roadside Assistance, Enhanced Safety Measures with Instant Vehicle Location
18	Toll Booth Service Providers	Restaurant Offers, Payment Offers, Retail Offers, Target Advertising
19	Payment Service Providers	Restaurant Offers, Payment Offers, Retail Offers, Target Advertising, Repair/Service Offers
20	Advertisement Planning Agency	Restaurant Offers, Payment Offers, Retail Offers, Target Advertising, Repair/Service Offers

S.No	Eco System Entity	Identified Areas
21	Remanufacturer	Environmental Factors
22	Fleet Owners / Rental Agency	Restaurant Offers, Payment Offers, Retail Offers, Target Advertising, Customer Curated Offers, Pay per Usage
23	Car Pooling Aggregators	Restaurant Offers, Payment Offers, Retail Offers, Target Advertising, Pay per Usage, Mobility-as-a-Service
24	Ride Hailing Compaines	Repair/Service Offers, Restaurant Offers, Payment Offers, Retail Offers
25	State Authority	Public Transport Planning, Insurance Premium, Emission Analytics
26	Start-ups / University / Research	New Products & Services
27	EV Charging Providers	Charging Infrastructure N/W, Rate Card, Battery/Charging Efficiency, EV Charging Station Recommendations, Proactive Driver Alerts, Charging Load Management, EV Charging Site Planning
28	ISV (Independent Software Vendor)	Features Introduction
29	ADAS	Lane Departure Warning Systems, Forward Collision Warning Systems, Tire Pressure Monitoring Systems (TMPS), Night Vision and Pedestrain Detection, Parking Assistance Systems, Adaptive Cruise Control
30	Telematics Service Providers	ALL (Sensor Related Information)
31	Retailer	Target Advertising, Retailer Offers, Payment Offers
32	Connected Home	All-In-One Personal Assistants
33	Finance Service Providers	Personalized Offers, Retail Offers, Restaurant Offers, Repair & Service Offers
34	Social Media	Personalized Recommendations

Identifying ecosystem entities can help automotive firms understand what each entity consumes and/or generates, as illustrated in the example in Figure 2. Currently car insurance premiums often rely on the declared mileage provided by the customer. There are limited ways through which insurance companies can ascertain the driving behavior, which in some cases involves installation of a telematics device in the customer car by the insurance companies. With the ADU, auto OEMs can sell telematics data to insurers to set up usage-based premiums. The data can also be used by an independent app developer (or even by the insurance company or the OEM) to build driving behavior models for multiple use cases. Additional datasets, like warranty claims and credit ratings, can enhance the products.

Figure 2: *Insurance company as a producer and consumer of ADU*
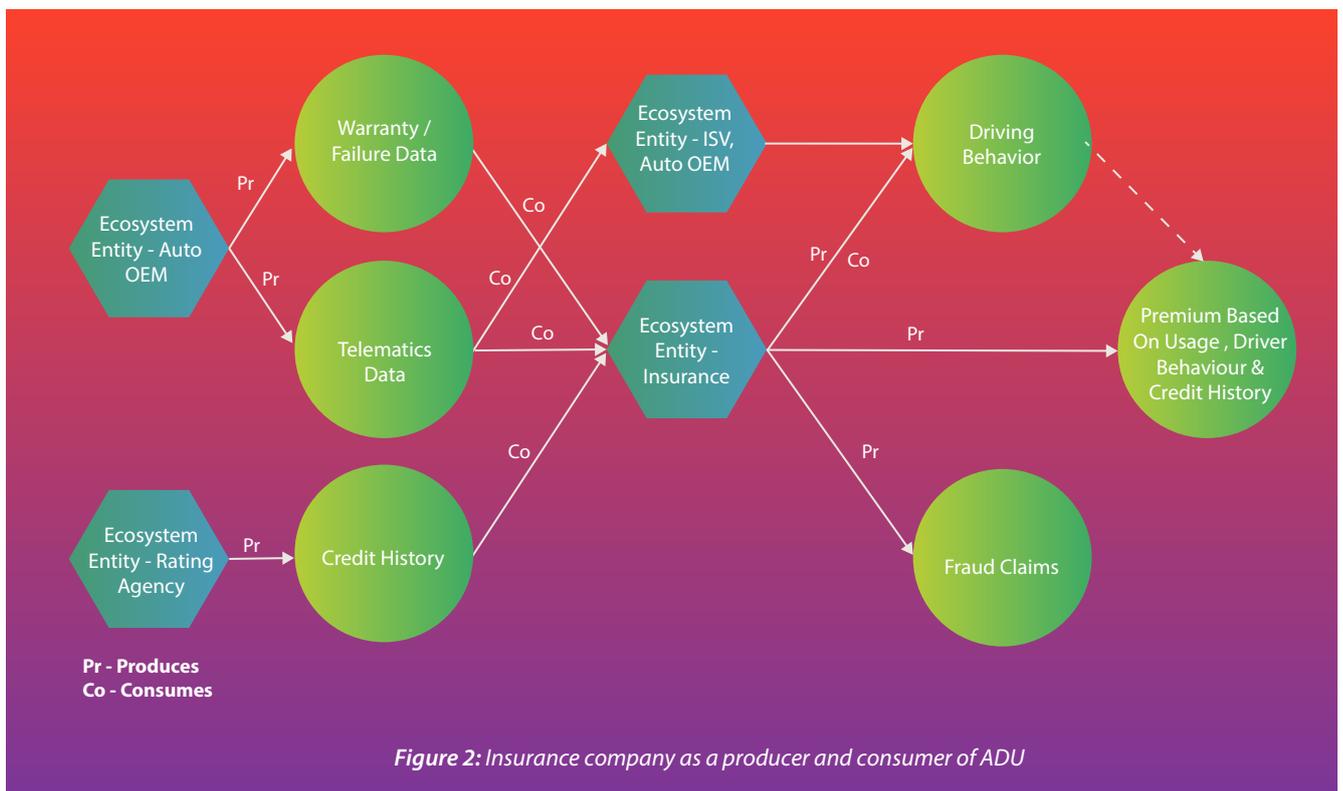
The neural fabric of ADU enables ecosystem participants to customize their offerings, deploy targeted advertisements, drive mass personalization, create usage-based warranty models, and leverage insights on driving behavior patterns for bundling of infotainment, aftermarket services, and more. ADU also democratizes access and the consumption of data to enable innovative services and business models.

The overarching guiding principles to realize the ADU platform are described below:

Remain inherently cloud native: While the ADU is developed for the cloud, it also needs to support non-stickiness vis-à-vis cloud service providers as well as on-premise setups.

Adopt standards: ADU can service a large plethora of stakeholders, if and only if, the platform adheres to domain or industry-specific standards with respect to data cataloging, data persistence, access interfaces, and data model compliances.

Manage technology refreshes: Associated processes to handle technology obsolescence are expected to ensure that ADU is always relevant and at the cutting edge from a technology standpoint.

Secured by design: Security forms the most critical foundational block realizing ADU, from design to development to operations, and finally, to maintenance and retirement.

Agile in development and operations: The ability to continuously rollout new releases in a seamless manner without impacting stakeholder experiences is paramount.

Experiential usage: The ease of using the platform for contributing or consuming data will be a major step towards wider adoption among stakeholders.

Embracing the era of Neural Automotive

Given the rapid changes in industry fundamentals, auto OEMs run the risk of being degraded to mere hardware providers, while third parties—for example, Android Auto, Apple CarPlay, etc.—monetize value creation opportunities. Such third-party entities can leverage their service development skills around data monetization from sources like vehicles and smart devices. These entities already have much stronger established customer points of contact than auto OEMs through vehicles. However, since data marketplaces are subject to strong network effects with clear benefits for large marketplaces, a coordinated approach from multiple OEMs to organize themselves into purpose-driven ecosystems will help them embrace Neural Automotive – a thought leadership framework, where the automotive value chain operates like a neural network, with an intensely networked set of collaborative partners aligned to a purpose-driven ecosystem.

A platform that promotes data exchange and ensures seamless transmission of intelligence across purpose-driven ecosystems caters to the foundational need for ecosystem participants to become intelligent, connected, and collaborative in real-time. ADU acts as that neural fabric for auto OEMs that want to embrace a future with new business models and establish competitive advantage.

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