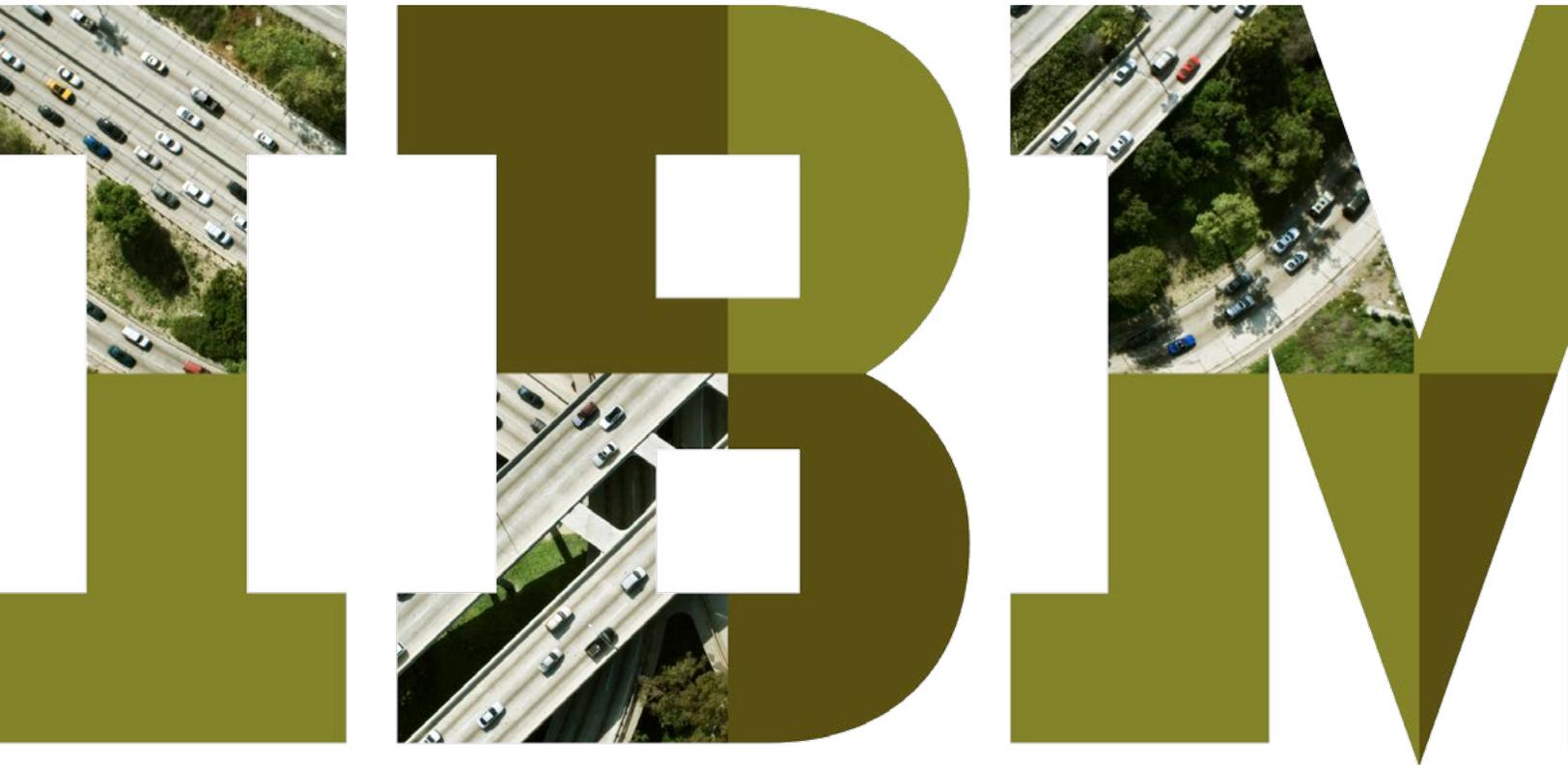


Identifying API use cases: Automotive industry



Executive summary

Many automotive institutions are planning their journey and participation in the API economy. One of the most common questions from companies starting the journey is about the potential use cases within their industry. This paper focuses on several objectives:

- Identifying the common business drivers for API initiatives
- Describing an API identification methodology
- Supplying automotive-specific examples using the methodology
- Discussing the current state of regulatory requirements and industry standards
- Providing recommendations for starting an API initiative

Determining an API economy strategy and planning a roadmap offer significant benefits, including:

- Consolidating and standardizing common APIs—or simply business services—within an organization
- Lowering cost of operations by having a central repository and index of enterprise business services such as “retrieve credit score”
- Accelerating digital projects and improving time to market with safe, quick access to business services by both internal and external parties

- Identifying a partnership ecosystem—especially outside your own industry—for formulating new value-add products and services to be more competitive
- Defining new business models for monetization purposes such as the mobile marketplace; that is, curating your company’s business capabilities aggregated with your partners’ business capabilities to provide a diverse range of related or complementary services

This paper is intended for business and IT leadership in the automotive industry interested in jump-starting API initiatives by learning about industry use cases.

What is a business API?

 Application programming interface (API) is a very old term that has been used to describe technical interfaces for software programs where one software program calls another through its API. Often, these APIs were extremely complicated and not really meant for wide consumption. A few other software programs inside the enterprise might use the API to invoke the program; a partner outside the company might use it as well, but with great difficulty.

This long-standing definition is not what’s getting businesses excited about an API economy. The excitement is instead around what is referred to as a *business API* or *web API* (although sometimes the additional qualifier is left off). These business or web APIs are easy-to-understand interfaces for a recognizable business asset—for example, a customer record, an account, a product catalog, a price, an order and so on.

A business API is a public persona for an enterprise that exposes defined assets, data or services for consumption by a selected audience of developers, either inside or outside your organization. Business APIs are simple for application developers to use, access, understand and invoke. And because a business API extends an enterprise and opens new markets, application developers can easily leverage, publicize and aggregate a company's assets for broad-based consumption.

Common business drivers for API initiatives

Companies that are executing successful API initiatives focus on one or more of four key drivers: speed, reach, Internet of Things (IoT) and domains.

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Speed (also known as two-speed IT, bimodal IT or multispeed IT): This driver focuses on allowing the business and IT organizations to run at different speeds. Traditional IT management of core systems of record can be changed at a certain rate. Trying to force rapid changes into core systems in the enterprise can result in outages or security exposures. Yet the business needs to react very quickly to new opportunities and competitive threats. It needs a higher rate of change than can be delivered by the controlled changes required to the systems of record. Using APIs, you can prepackage core system assets for consumption by the business to create new and innovative systems of engagement. This driver tends to be the first one that drives API use in the enterprise.

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Reach: To reach new markets and obtain new customers, you can make APIs available to other enterprises, such as partners who can generate additional revenue and new customers for your enterprise. For example, an auto dealership can reach new customers through independent car-shopping applications such as Autotrader.com, Carmax.com and Cars.com. The dealership gets access to a set of potential vehicle buyers who may not have contacted them directly.

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Internet of Things or devices: In many industries, devices are used in conjunction with APIs to provide new and innovative solutions. This tends to happen in one of three ways:

1. A device sends data via API call, such as a connected car sending data on driver behavior to an insurance company.
2. A device is sent a command via API call, such as an in-car assistance service sending an update to the Global Positioning System (GPS) technology and maps.
3. A device sends data through a non-API call using other technology such as MQTT—a high-volume messaging protocol and transport for telemetry devices—because not all data calls require an action. However, APIs can access the data inside the enterprise and look for or react to particular situations or events. For example, vehicle monitoring sensors are constantly sending data and analyzing it to identify potential problems. If an issue is found, the monitoring company uses APIs to alert the driver and service department before a breakdown occurs.

- Domains:** Typically, domains refer to interactions across multiple lines of business. They can largely work independently, but benefit from sharing data. APIs allow the data to be shared in a controlled, secured manner. Domains can also be seen as physical locations. Companies that have multiple locations, which may include cloud and on-premises data centers, sometimes use APIs as a method to secure and control the flow of data between locations. Considerations for regulatory and compliance constraints based on geographical and country specifications become evident.

Businesses often start by focusing on the requirement for speed. After initial success in this area, they address the other drivers. It is not uncommon for businesses to benefit from APIs across all four drivers.

API identification methodology

Who should identify the business APIs? Figure 1 displays several roles in a high-level organizational structure. Note that several people may be in each role, and a single person may be assigned to multiple roles.

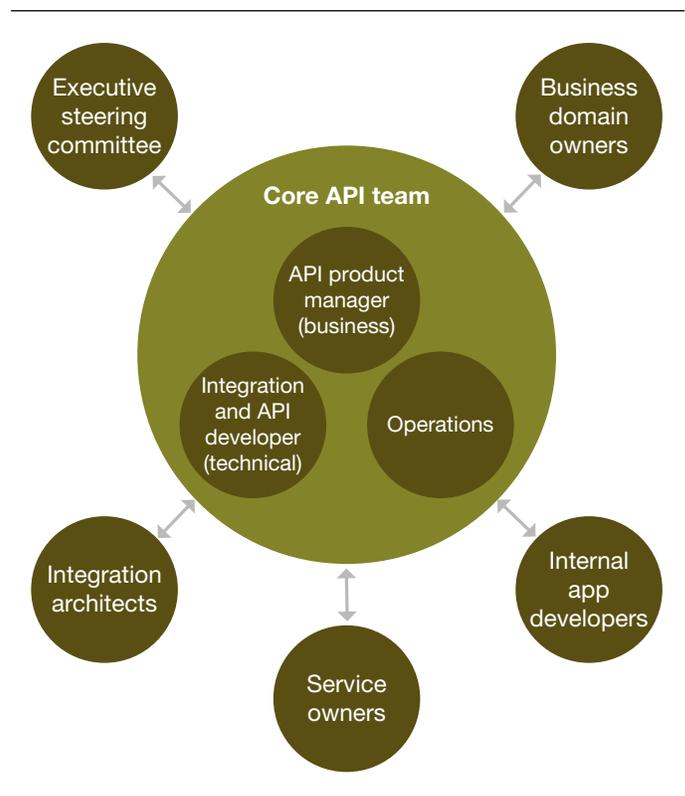


Figure 1. High-level organizational structure for an API development team.

A key role in the structure is the API product manager. The person or people in this role own the success of the APIs and the API initiative. Tasks associated with the API product manager role include:

- Working with the domain owners to identify desired business APIs to bring to market
- Working with the API developer to drive the creation of the API
- Reporting to executives on metrics
- Defining the product characteristics of the API (monetization, rate limits, audience and so on)
- Communication

Identifying good APIs is one of the most critical factors in achieving API initiative (and associated business) success. APIs must be focused on the needs of the consumer and should be simple. Three questions lead to a good API:

- Who is the audience?
- What do they want?
- Under what terms and conditions are you willing to make the asset available?



“The business of APIs: Best practices” white paper provides additional information on organizational structure and several other important topics.
[Download it here.](#)

Notice that none of these questions ask or refer to the systems of record that will ultimately deliver the response to the API request. Many companies incorrectly define their APIs by looking at what the systems of record do and adding an API in front of them. This approach may simplify the process for the API provider, but it does not meet the needs of the consumer.

When identifying a candidate API, the API product manager needs to understand the API user being targeted (question one). The second question is probably the most important of the three. Understanding what the audience is trying to accomplish can result in the best API. If the definition is focused on consumer need, then the interface is more likely to be useful to that audience and also more likely to stand up to change (versioning). The third question is related to the policies you want to have around the API. What security measures are required to allow the API to be used correctly? Are there rate limits that must be enforced?

Once you have answered these three questions, the API product manager and API developer must work together and potentially iterate to define the API. The API developer needs to map the proposed consumer interface for the API to the back-end system of record interfaces—and possibly to many other systems—to provide only the desired result back to the consumer. New business logic may need to be added at a microservice layer in front of the existing systems of record. If the existing systems do not completely address the requirement, the API developer may have to write additional code to add business logic to the existing environment.

Next, consider six categories in which APIs are often used, along with these top questions that can help identify potentially useful APIs in each area.

- **Internal developers (mobile)**

- What data and transactions would your own mobile apps need?
- Does generic data exist that is the same for all app users, such as business locations, rates and so on?
- Is there data specific to existing customers that should be accessible through your app, such as when to schedule service or check on repair status?
- What features of the mobile device—for example, the GPS or the camera—might be useful in conjunction with your APIs?

- **Partners**

- What data and transactions do you share among your current partners?
- Is partner onboarding a long, difficult process?
- Would self-registration of partners be of value—increasing the number of partners and broadening geographic coverage, for example?

- **Public**

- What apps might others write that could use your data and transactions?
- What information are you currently making available on your website?
- If there was a comparison app for you versus your competitors, would you want to be listed as an option? What data would the app need?
- What other industries or processes might also use your products? One example might be offering your APIs to businesses that target families preparing to send a child to college—a process that might also involve purchasing a new vehicle. The college preparation site or app can use your APIs to market your automobiles to that target customer.
- Think mashups: What other APIs might make sense with yours? Mapping? Social?

- **Social**

- How do your systems interact with social media? Can you spot trends in social media and raise alerts or take action?
- Can you gain insight on your brand and your competition through social media?
- Can you do real-time analytics combining current customer status, behavior and history with social interactions?

- **Devices**

- Does your company handle devices such as cars, appliances, sensors or meters?
- What scenarios can apply to the device? For example, needing repair/supplies, needing to send status information, controlling device behavior or enabling interaction between the device and enterprise systems.
- How are you positioned to integrate the next UI technology, such as wearables like smart clothing or augmented-reality glasses?

- **Data and analytics**

- What data do you collect about your clients? Would this data be of value to a larger audience inside the enterprise?
- Can your data identify market segments that would be of interest to a non-related industry? For example, can it identify a high volume of expensive car purchases in a particular region of the city and lots of family-oriented car purchases occurring in another neighborhood?

Identifying API use cases in the automotive industry



Now we will take a look at some examples that apply the API identification methodology to the automotive industry.

Internal developer (mobile app development)

General information

General information is information that is not tailored to the specific customer using the app. It may include general information about the auto manufacturer and its offerings, such as product catalog and product descriptions, available accessories, incentives, owner's manual information, service locations, product pricing and availability, and ratings and reviews. For dealerships, sample APIs include location, open hours, available inventory and prices.

Custom information and transactions

This example offers information and transactions that are tailored to the customer using the app. Obviously, these APIs require additional security to help ensure appropriate access. APIs that fit this category may include mapping specific vehicles to required services, managing recalls, assessing trade-in value and scheduling service appointments.

Mobile advantages

Customers using the app on a mobile device can benefit from using phone or tablet functions in conjunction with APIs provided by the auto manufacturer or dealer. Sample device functions include the camera, GPS services, near-field communication (NFC) and digital wallet. Mobile apps can access APIs for a range of functions; typical examples include unlocking the car door or starting the car. However, these APIs need to be secured so that only the owner of the car can access and perform them. Direct calls from the mobile app to car APIs can be hacked, leading to theft or other danger. As a result, authenticating the user is critical. For more on this topic, see Alan Glickhouse's LinkedIn blog post "[Internet of Things APIs – Focus on Security.](#)"

Partnering



Partners supply many automotive components such as the radio, navigation system, phone integration and entertainment systems as well as safety capabilities such as lane warning systems, close vehicle alerts and so on. These partners need to access auto APIs to integrate with the car's activity, and the partner offerings provide APIs for hands-free controls to help improve safety. All of these components add value to the car and generate revenue for both the auto manufacturer and the partner. Once again, appropriate security needs to be established to protect API calls and information.

In-car infotainment systems already offer much more than simple stereo receivers ever did. Soon, they could be used to enhance every aspect of the driving experience. To maximize innovation and minimize time to market, the auto manufacturer should offer external partners and developers the tools they need to create apps that run directly within the vehicle's infotainment system. These apps should deliver audio and voice-enabled content and information to drivers, and offer video and deep engagement to passengers. API methods include access to vehicle information, I/O commands, communication capabilities, audio and video playback, navigation, phone systems, user interface, and infotainment system commands and utilities.

As customers become accustomed to in-car connectivity, they are likely to demand the ability to access and purchase products and services directly from their vehicles. Manufacturers have much to gain from partnering with insurance providers and advertisers that want to deliver offers and e-commerce interfaces straight to the car. Developers can create in-car e-commerce apps that enable consumers to purchase personalized insurance policies based on driving behavior and pattern analysis. Retailers can allow shoppers to purchase products from the car and offer curbside pickup to speed up service. These apps must offer secure data integration between all parties, protect sensitive consumer data, and meet industry standards—such as Payment Card Industry Data Security Standard (PCI-DSS)—and regulatory requirements.

The apps also need to protect user privacy while providing all of this valuable consumer data to insurance companies and retail partners. An API solution enables creation of a data lens that securely externalizes important driver data—such as payments, driver profile and car location—to the manufacturer. A complete API solution makes it possible to integrate and mediate transactions between the car, enterprise and partner to provide secure, reliable services.

APIs help make doing business with you as an automotive manufacturer or dealership easy. They can introduce new value from avenues such as supply chain integration for parts or auto deliveries, reseller agreements for independent car applications and integration with banks and insurance companies to ease the sales process.

Public APIs



Auto companies can deploy many of the same APIs used internally and with partners as public APIs to drive additional business and help obtain new customers. Car purchasing is extremely competitive. Apps from Autotrader, Cars.com, Edmunds, Kelley Blue Book (KBB), TrueCar and many others enable buyers to compare cars from multiple manufacturers to enhance the buying experience. All can benefit by accessing public APIs to obtain car offerings and accessories, details, prices, reviews and so on.

Extending your reach to other industries that can send business to you is a big incentive for moving to the API economy. For example, apps that recommend gifts for special occasions or apps designed to help families plan to send a child off to college might suggest a new or used car purchase.

Many automotive companies make public APIs available. Here are just a few samples from ProgrammableWeb:¹

- [Dash Chassis API](#) is a connected car platform that provides access to fuel consumption, expenses and efficiency data. It also gives driving statistics and data, route information and real-time alerts.
- [Ford Developer Program API](#) offers a program for developers to create voice-activated applications that can be integrated into vehicle technology.
- [GM Developer Network APIs](#) support unlocking doors, activating the alarm and accessing subscriber or vehicle data.
- [Kelley Blue Book InfoDriver Batch VIN API](#) syndicates data about car models, features and selling prices from the provider's extensive database covering both new and used cars spanning the full range of makes and models across North American markets. Methods provide projected car values at levels for suggested dealer price, used car trade-in transactions and private-party sales. The API includes access to a vehicle identification number (VIN) decoder to determine a specific car's equipment level.
- [VIN Decoder API](#) returns data about manufacturers including manufacturer name, manufacturer address, product type, make, check digit, model year, plant code and sequential number, as well as data from police databases.

Social



You might already consume social APIs from companies such as Facebook or Twitter, mashing this information up with your own APIs. Acting on specific mentions of your company and trends in social media enables you to capitalize on opportunities or head off problems.

Among other things, you can combine Twitter feeds that reference your company with your own analytics to determine if you must take action to resolve customer satisfaction issues, promote positive comments or offer product discounts. Quickly acting on a customer complaint with an offer can turn negative comments into recommendations to do business with your company.

Social activity doesn't stop when we get into a car, so providing a safe environment to be social is a key focus within the auto industry. Manufacturers and feature suppliers are working on APIs to allow vocal commands to access or control various aspects of the car to enable texts, phone access and other functions. Social media itself is a valuable resource for auto manufacturers. Comments on social media such as "going off to college" or "16th birthday coming soon" can trigger marketing opportunities.

According to the inaugural Car Buyer Journey study commissioned by Cox Automotive and conducted by IHS Automotive, 78 percent of those who shop for vehicles on the internet use third-party sites or apps during the car buying process.² Freeing up time in automated cars can further increase targeted in-car advertising, sales of customer relationship management (CRM) data and new "bonus-as-you-drive-by" business models.

Automotive companies need to develop dynamic mobile apps that market their products directly to prospects and customers in an engaging, nonintrusive manner. To make these apps as frictionless as possible, developers need to integrate with social media APIs, particularly to leverage social identities for seamless login. A solution that allows integration with social identities from popular networks such as Facebook and LinkedIn can maintain convenient access across both channels. Companies can integrate their CRM systems or mobile apps with a mobile marketing API, creating a truly optimized mobile marketing platform.

An API solution enables unified access across web and mobile to ensure consumers receive a personalized experience over their channels of choice. Besides, mobile marketing automation lets you configure and establish business rules for your mobile marketing programs. For example, suppose you want to send a car maintenance reminder text to all customers in your mobile database based on their date of purchase and the number of miles driven. Simply configure the business rules in the enterprise and correlate optimal maintenance schedules with the car diagnostic's API, and you have a customer list at your fingertips.

Device integration and wearable devices



Gartner estimates that by 2020 about one in five vehicles worldwide will have some form of wireless connection, totaling more than 250 million connected vehicles and making a significant impact in the major functional areas of telematics, automated driving, infotainment and mobility services.³ These trends are transforming the relationship between car owners and manufacturers beyond the driving experience into a truly connected experience.

As connected car use cases become more prevalent, they can be aggregated into a number of categories including remote services, remote vehicle functions, location services, concierge services and value-add services—all enabled through APIs.

Remote services

Use cases for remote services involve accessing a vehicle remotely to check its status or prepare the vehicle for use.

Theft and impact alerts warn vehicle owners if the vehicle detects unauthorized entry or an impact. Many vehicles are now fitted with parking or dashboard cameras, which can capture a photo and send it with the alert. This capability allows owners to return to their vehicle if they are nearby or share this information with the police or their insurance company.

Levels and ranges let vehicle owners check fuel or battery levels and the estimated driving range before they reach empty. This capability enables owners to better plan their trips and determine if they must charge the battery or refuel the vehicle. As the number of pure electric and hybrid vehicles increases, drivers need to plan their journeys more carefully because charging stations are not as ubiquitous as gas stations. Knowing the current charge status and time or driving distance remaining is critical.

Odometer and trip information facilitates access to the vehicle's current odometer reading, which can be useful in a scenario such as calculating the current mileage driven when using a fuel card. Other odometer-driven situations may involve booking a service or recording expenses. And this option can provide peace of mind when handing the vehicle over to a parking valet.

Tire pressure maintenance is critical for driver and vehicle safety. Seeing the current tire pressure tells drivers whether they should stop and add air to the tires during a long trip, or can indicate a puncture and suggest locations for repairs.

Oil life is a good indicator of maintenance status. Although many maintenance intervals are based on time or distance, in many cases driving style and climate heavily impact maintenance cycles. Knowing the life of the oil based on all local factors helps drivers minimize the risk of breakdown and keeps their vehicle in peak running condition.

Remote vehicle functions

Remote access to vehicle functions can be highly convenient for drivers and passengers.

Remote start offers the ability to remotely start a vehicle while it remains securely locked, which allows drivers to cool or heat the vehicle before going on a trip.

Remote lock and unlock lets drivers remotely lock or unlock a vehicle securely or check the lock status. This can not only enhance safety but alleviate the common feeling of anxiety when trying to recall whether or not the driver remembered to lock the car.

Remote horn and lights can be useful to find a vehicle in a crowded parking lot, or to frighten off a suspicious individual who is lurking near your vehicle.

Location services

These convenient services offer functions that are specific to the location of the vehicle or area of travel.

Vehicle finder allows drivers to locate their vehicle, which can be handy if the vehicle was left in a large and unfamiliar parking garage, if the vehicle was stolen, or if roadside or emergency assistance is needed.

Send destination and route provides the capability to plan a route ahead of time and send it to the in-vehicle satellite navigation unit.

Concierge services

People drive for business, pleasure or social events. In many cases, drivers travel to an unfamiliar location. Concierge services can simplify elements of the journey by lending local expertise.

Restaurant reservations can be useful for booking a restaurant table based on the planned route and estimated time of arrival. However, APIs can also send alerts to automatically notify the restaurant of any changes to the reservation due to traffic delays, for example. Affiliations with local restaurants can be used to offer discounts or other loyalty-based incentives.

Theatre reservations can offer suggestions for live music or theater performances in the area or upcoming movie showtimes, based on travelers' interests and their known travel plans.

Multimodal transportation can help drivers plan the trip from start to finish. Usually, the car portion is just one of several segments in the journey. The entire trip, such as a commute to work, may require driving to a local train station to take a commuter train, followed by public transport in a bus or taxi to the final destination. Assistance with the end-to-end planning, ticketing and booking helps simplify the journey for drivers, enabling them to focus on the reason for the trip and not the travel method itself.

Value-added services

Services related or unrelated to driving and services for data-enhanced driving constitute value-added services. Driving-related value-added services include connected navigation and networked parking. Value-added services unrelated to driving include telephone and email access and web browsing. And data-enhanced driving functionality services range from autopilot to automated collision prevention.

Traffic management and vehicle-to-infrastructure (V2I) communication provide a usage-based tolling and taxation system as well as adaptive traffic control to optimize flow and divert traffic from congestion.

For example, Markets and Markets reported that the fleet management market is likely to be worth USD 30.45 billion by 2018.⁴ The connected car helps enterprises and consumers optimize routes, track fuel economy, log mileage and record trip duration. Smart manufacturers can take this opportunity to coordinate data sharing throughout the value chain—traffic management systems, part suppliers, fuel partners and so on. To share data without compromising it requires secure connectivity among the fleet, car telematics systems, back-end data repositories and partner systems.

Other examples of APIs for a connected car include road-condition awareness and parking space availability. IBM is already [working with Car2Go](#) to provide pay-per-drive rentals, and is working with a major French car manufacturer to enable the monetization of data for insurance providers.

Data and analytics



Automobile manufacturers and dealerships can gather data on their clients' behavior and analyze it to help identify marketing opportunities. This tactic can be carried out through traditional information gathering or through connected car technology. Typically, the data and analytics are targeted to a specific internal audience. Through APIs, however, the data and analytics can be made available to additional internal audiences that may derive additional value from the same data.

Cars can provide valuable data for marketing or opportunities for other industries. For example, car data can identify travel routes that may be valuable to businesses that advertise along or near the route. Businesses can monetize APIs that promote offerings to drivers looking for nearby restaurants or activities, and insurance companies can monetize the driving behavior information they consider highly valuable.

Industry standards

The automotive industry is working with the W3C standards organization to define API standards for the industry (see “[Automotive Industry Launches W3C Group for Bringing Web to Cars](#)”). Connected cars require standards to enable interoperability with the consumers of the information being provided. All of the vendors—automobile, entertainment systems, mobile phones and the like—need to work together across the manufacturing chain to avoid incompatible implementations of interfaces. Providers are expected to compete with value-added services that are integrated with their partner ecosystem, heighten their digital engagement and personalize offerings to their clients—but not by having a different API interface.

Closing thoughts and recommendations

The automotive industry is one of the most active industries in the API economy. Car-shopping apps are prevalent, and it is becoming common for APIs to supply the necessary information to compete for customer business. Connected car scenarios—supported through APIs—are also exciting the marketplace.

More on connected cars and APIs from ProgrammableWeb

Janet Wagner from ProgrammableWeb wrote a three-part article in 2013 on the use of APIs and API standards in connected cars. The article covers topics including connected vehicle developer programs, standards organizations involved and their efforts, infotainment, navigation and telematics, and ends by exploring the automobile as the next technology “platform.”

Read the full article here: “[Automobile: The Next Major Technology Platform, Part 1 – Connected Vehicle Developer Programs and Standards Groups.](#)”

If your enterprise has not started strategizing and planning for business APIs, the time is now. Do not wait until you know all the answers and have everything in place to begin. The market is moving too fast. Plan stages for the rollout that build on what you learn.

If you have already begun your API initiative, build on your successes and quickly identify false starts. Look at additional business drivers and use cases to obtain additional value for the business.

As we move into the API economy, huge opportunities are available for new and innovative solutions. IBM brings significant knowledge in the automotive industry and the API economy and would like to be your partner on your API journey, sharing our expertise and experiences to help maximize the value for your enterprise.

To understand more about the IBM approach to the API economy, visit the [IBM API Economy website](#). [IBM API Connect™](#) offers a comprehensive foundation for creating, running, managing and securing APIs. Learn more about IBM API Connect and download a [trial version](#) at the API Connect website.

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¹ Examples of public APIs came from a keyword search for “auto” on www.programmableweb.com. This information is not intended as a recommendation of these specific APIs, nor a statement about their capability or quality. ProgrammableWeb acts as a repository where any company can promote its public APIs. Consumers must evaluate the functionality and quality of any API and decide if it meets their needs before deploying.

² “2016 Car Buyer Journey Study,” by IHS and commissioned by Cox Automotive, March 21, 2015, www.dealerlearningcenter.com/insights/view/2016-car-buyer-journey-study

³ “Gartner Says By 2020, a Quarter Billion Connected Vehicles Will Enable New In-Vehicle Services and Automated Driving Capabilities,” January 26, 2015, www.gartner.com/newsroom/id/2970017

⁴ “Fleet Management Market by Deployment Type, Solution—Operation, Asset, Driver Management, Vehicle Maintenance and Leasing, and Driver Information System; Connectivity Technology; Industry; Service; and Region, Global Forecast to 2021,” Markets & Markets, September 2016.



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