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Automotive Telematics: Is it Time for a Renaissance or an Obituary?

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1 Introduction

Recent years have seen a rapid boom and bust cycle surrounding the automotive telematics market in the United States. This cycle is the result of two primary forces: the prevailing overall economic conditions in the U.S. technology sector and the inability of the market to create a successful business model to serve as an example and foundation for further growth and investment. While telematics services and applications have been available since the mid-1990s, the mainstream emergence of automotive telematics was not generally recognized until GM OnStar's mass launch in 2000, when the boom cycle in venture capital for telematics-focused companies was already at its peak (Barraba et al., 2002).

Although there has never been a generally accepted definition of automotive telematics, the buzz surrounding perceived market opportunities grew to a fever pitch just as the U.S. technology bubble was beginning to burst. Just between January 1999 and April 2001, it is estimated that private companies who focus primarily on telematics market opportunities received nearly \$1 billion in venture capital (Figure 1). This excludes investments made directly by automakers in subsidiaries (e.g., General Motors' OnStar, Ford's Wingcast joint-venture with Qualcomm) and investments made in public companies.

Automakers were scrambling to put together telematics ventures believing that the automobile was the final frontier in wireless communications, a destination for mobile content delivery that they could control, and a potential cash cow. After all, most individuals spend the overwhelming majority of their time in their home, their office or their car. Automakers focused on the fact that 50%-70% of all wireless airtime is used in the vehicle. Finally, they saw the business of automotive telematics (herein defined as vehicle-related communications and services) as a potentially large, non-cyclical, high-

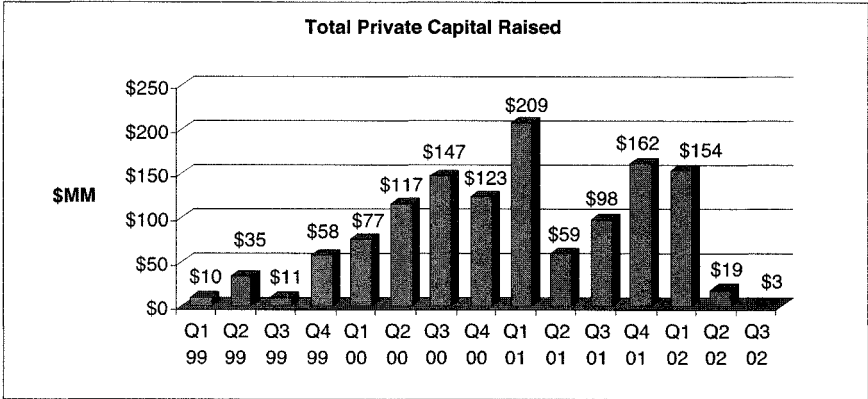


Figure 1: A Brief History of Venture Capital In Automotive Telematics
 (Source: VCBuzz and corporate reports)

margin revenue stream for the otherwise intensely cyclical, low margin auto industry.

The wireless industry agreed and joined the automotive industry in creating business plans and making investments to address the opportunities that some analysts estimated could reach \$50 billion a year worldwide by 2010. However, both industries did so largely independently of one another and soon realized their views and goals were not compatible. And so the market developed based on some false premises.

The aim of this chapter is to examine the development of the automotive telematics market, its current dysfunctional state, and to suggest a new paradigm for the future. It begins by briefly reviewing the misconceptions that led to inflated market forecasts, misguided business models, and over-investment. Then analyzes the dynamics between various links in the value chain in an effort to illustrate the types of inter-industry collaboration necessary to bring telematics applications and services to fruition so that market opportunities can be successfully realized.

2 The Origins of the Automotive Telematics Market

General Motors and Ford Motor Company began offering enhanced in-vehicle communications options in the mid-1990s. At that point, ‘enhanced’ simply meant any solution more sophisticated than an embedded cellular phone. While Ford’s solution and plans for telematics remained modest, its rival GM,

perhaps inspired by the torrid growth of its Hughes Electronics subsidiary which operated DirecTV, the nation's largest satellite television service, began planning for an all-out assault on the market for mass media content for mobile wireless communications in the automobile.

GM's OnStar subsidiary has since grown into the nation's largest telematics service provider (TSP) with three million subscribers in 2004 (OnStar, 2004). Still, OnStar has yet to turn a profit and legislative developments in the wireless industry have all but eliminated the possibility of that occurring for years. While OnStar continues to operate and even win new automotive original equipment manufacturer (OEM), its business model is generally regarded as unsuccessful. Based to a large extent on OnStar's results, Ford decided in 2002 to scrap its own telematics joint venture Wingcast, whose blueprint followed the OnStar business model. Ford had already plowed several hundred million dollars into Wingcast, along with the wireless technology company Qualcomm.

3 False Assumptions, Hard Truths, and Lessons Learned

Next is a review on the primary issues and challenges that have impacted the development of the automotive telematics market.

3.1 Embedded Wireless Technology

In retrospect, the most glaring mistake automakers made, and continue to make, is the decision to embed non-scalable/non-upgradeable wireless hardware in vehicles. 95% plus of the telematics enabled vehicles on the road today use an embedded analog only transceiver as the communications link to enable service. The theoretical problem with embedding wireless technology in automobiles is that technology changes rapidly, while automobiles stay on the road for 15-20 years and can only be modified or retro-fitted at significant cost. The inability to predict or adapt to future changes in technology makes embedding wireless communications technology in vehicles illogical.

As an example, in 2002, the FCC agreed to phase out the analog wireless network compatibility mandate (i.e., that all cellular handsets sold in the U.S. also work on existing, but outdated, analog wireless networks) on all carriers over a 5-year period. The wireless industry pressured the FCC to drop its requirement in order to faster upgrade to digital networks and improve spectral efficiency. Both OnStar and ATX Technologies (the two largest TSPs)

vehemently opposed this action. The net effect of this ruling on TSPs and the OEMs whose vehicles they serve was to effectively place a 5-year ‘expiration date’ on all existing subscribers. At yearend 2002 there were approximately 8 million vehicles on the road with embedded analog-only telematics technology at an original equipment cost of over \$3 billion. By 2008, the value of this investment (excluding R&D and cost of service) should fall to virtually nothing. The cost for an OEM to retrofit an existing subscriber’s vehicle are estimated to be at least \$700, making it an unattractive option. High churn rates and vehicle turnover should erode most of the existing subscriber base by 2008 anyway. Nevertheless, the nature of the auto industry and the difficulty of changing production lines and vehicle designs means that the majority of automotive telematics systems being factory installed after 2002 for quite a while remained analog-only, despite the fact that automakers knew that analog networks will largely be gone by 2008.

3.2 The Perils of Wireless Resale Business Models

Compounding the obsolescence of the technology are the inherent flaws in the business models. TSPs buy large blocks of wholesale airtime to provide basic services and subscribers usually have the option of purchasing more pre-paid airtime for premium services. Thus, TSPs operate wireless resale business models. These models historically have failed because margins on the mark-up of airtime that resellers are able to garner tend to be razor-thin—a dynamic that the wholesaler controls indirectly. Because the carrier dictates wholesale airtime prices, they can ensure that the price of the reseller’s service (no matter how differentiated it is) never becomes compelling enough to lure their more profitable direct subscribers away. This is true of TSPs, where carriers already offer the majority of premium services (non-vehicle specific) themselves. Consumers will not pay twice for the same services their wireless carrier already provides.

So TSPs and automakers are now focusing their business models and marketing on the safety and security services (e.g., automatic collision notification or ACN) that they alone can control. This brings us to another false assumption that is typically made in early stage markets, and was certainly made in the case of automotive telematics—accurate market forecasting.

3.3 Accurate Market Forecasting

The most common misconception relating to automotive telematics is that it is an industry. It is not. Automotive telematics is a set of applications and serv-

ices based largely on existing technology that deals specifically with the automobile. Many of these applications and services represent new revenue and cost saving opportunities for the wireless, mass media content and automotive industries. The natural evolution of the wireless industry has created many offshoots similar to telematics, including location-based services (LBS) and mobile commerce. These too have been viewed as distinct ‘industries’. A cursory examination of the major themes of these market opportunities reveals that they largely overlap in the products, services and applications they encompass. Thus, there is a great deal of double and triple counting of opportunities that has left the market with wildly optimistic forecasts for growth and demand.

3.4 Safety Sells—But at What Price?

Automakers conducted numerous studies and focus groups to determine whether and how much consumers would be willing to pay for various services, including automatic crash notification, access to news reports, stock quotes, and sports scores and real-time traffic reports to name a few. In some studies, consumers were asked to rate the importance of more than a dozen service offerings and how much they would be willing to pay for each. Of course, different services are of higher value to different people. However, *these services cannot be purchased individually* and the failure to recognize the implications of this on consumers led to a myriad of market forecasting errors. The business practice shows that TSPs bundle services together into “packages”. Consumers are smart enough not to pay twice for the same services and when confronted with the option of purchasing a bundle of services, some of which they already have, don’t want or don’t need, they have opted not to purchase at all. Unfortunately, automakers sell vehicles mostly from inventory through dealer networks. So they install all of the hardware necessary to enable all services, before knowing whether the eventual buyer will ultimately pay for any.

While consumers seem most interested in safety and security services, they don’t value them highly enough to justify the costs associated with installing them in a subscriber-oriented business model. Low retention rates have proven this to be true. Most consumers ultimately expect to receive these services for free, and that is likely to happen beginning with luxury vehicles, as manufacturers attempt to utilize telematics as a product differentiator in an increasingly competitive selling environment.

3.5 Subscription based Telematics Business Models

Mercedes, BMW and other luxury manufacturers, some of whom offer OnStar, price-impact their vehicles for telematics systems or offer them as dealer-installed options. Either way, they are recovering the costs of the system (and usually the first 2-3 years of service) at the point of sale, greatly reducing, if not eliminating any dependence on the consumer to become a permanent subscriber. Luxury manufacturers can do this as their customer base is far less price sensitive. For example, BMW only offers their 'Assist' telematics system standard on their most expensive models, the nearly \$80,000 7-series. The system is available as a dealer-installed option on lower-priced models (~\$4,000 for the full system before installation costs), but the option take rate is under 10% according to a random sampling of BMW dealers who were surveyed. BMW makes money by *not* offering the system standard, only to those that can afford it and are willing to pay for it up-front on a cost plus basis.

GM OnStar, on the other hand, operates a subscriber business model. Most other volume manufacturers largely decided to wait to see OnStar's results before making their own automotive telematics plans. Following OnStar's mass roll out, Ford created a joint venture with Qualcomm (Wingcast) and proceeded to largely re-create the OnStar blueprint. Roughly a year into the project, which was behind schedule and over budget, Qualcomm pulled the plug on their end of the venture. Ford was left to fund Wingcast's launch itself, a cost they were unwilling to bear after reviewing the first two years of results in the telematics marketplace. Ford dissolved Wingcast in 2002. OnStar is the only purely OEM-operated, subscription-based, volume TSP in the U.S. Nearly all of ATX Technologies' subscribers are under multi-year pre-paid contracts with the manufacturer (e.g., Mercedes Tele Aid) most of which have not yet come up for renewal.

In the U.S., OnStar and ATX Technologies dominate the TSP market. OnStar uses a subscription-based model, while ATX operates as an outsourced service provider. ATX managed to turn cash-flow positive around March, 2002 with fewer than 400,000 subscribers according to company officials. GM officials admit that OnStar did not turn a profit despite millions of subscribers. However, the comparison is not an apples-to-apples one. OnStar's business model includes hardware and marketing costs, while ATX is an outsourced, private-label service provider that operates without these costs. The important difference is the OEMs' approach: If the OEM recoups hardware and service costs up-front, telematics can be a profitable business. If not, profitability becomes incredibly difficult and the only justification for offering service is to have a competitive product in the marketplace to help maintain, or even grow market share.

4 The Business Model of the Future

4.1 Focus on Core Competencies

Analysts, investors and market participants are looking at the current state of disarray in automotive telematics and reaching the conclusion that the telematics business model enigma must be far more complex than previously thought. In contrast, I believe that market participants have been overcomplicating the business model. The existing business models for the industries that are needed to enable automotive telematics are already well understood. The wireless telecommunications and automotive industries need to adapt so that they can work seamlessly together to bring automotive telematics services to consumers. If each industry can resolve itself to focusing on its core competencies, there are benefits to be reaped from the opening of new revenue streams, the enhancement of existing revenue streams, accelerated cost reductions, and improved customer satisfaction.

4.2 The Automotive Telematics Value Chain

The telematics value chain consists of three broadly categorized industry groups: the wireless industry, the auto industry and the mass media content and service industry. Mass media content and services is the most loosely defined of these groups, as we include automated information services, voice-enabled Internet content, live operator assisted services, and emergency services.

Existing mass media services have proven to be the most difficult to bundle and sell to consumers for many reasons. Most importantly, as mentioned above, the majority of drivers simply don't need, don't want, and are unwilling to pre-pay for these services in addition to their existing cell-phone bill. There is only a small minority of drivers that includes business professionals, business fleet owners, affluent consumers and "gadget enthusiasts" that make up the legitimate target market for delivery of mass media content to the automobile. Second, consumers can already access much of this content, in particular wireless information services such as stock quotes and sports scores, through their existing cellular phone service. Wireless carriers continue to expand the breadth of information and services offered on wireless devices as handset technology and wireless networks improve in order to keep existing subscribers and attract new subscribers. Third, in-vehicle telematics user interfaces are prohibitively expensive, inevitably obsolete, not scalable and cumbersome to manipulate. From OnStar's voice-activated, embedded hardware system starting at

approximately \$300 (basic service starting at \$200 per year) to basic navigation displays costing \$1,500 to fully-integrated, top-of-the-line systems such as BMW's complete Assist package at over \$4,000, automotive telematics user-interfaces are several times more expensive than the average cell-phone, while their installation in the vehicle prohibits scalability.

We have left automotive OEM-owned, 'end-to-end' TSPs out of the value chain as they can be disintermediated by other segments of the value chain in most of the functions they serve. OEM-TSPs have argued that the centralization of various services and their ability to manage and deliver content specifically for the vehicle environment makes them indispensable. This is only true if automakers refuse access to vehicle systems and the related information and services that can be offered (e.g., ACN). OEMs guard this information closely, especially diagnostic codes. Until 2002, automotive OEMs refused to even agree to divulge to independent repair shops the diagnostic codes and tools necessary to perform many repairs on their vehicles. The issue became so politicized that legislation was introduced in the Senate to force automakers to change this practice. In September 2002, automakers finally agreed to comply with new rules granting repair shops access to the codes by August 31, 2003. This battle demonstrates how valuable this 'content' is to automakers. However, automakers have no experience in delivering this content as a service provider.

4.3 The Auto-Maker as Content Provider Instead of Service Provider

Auto OEMs should abandon the service provision business in favor of being content providers and service enablers. Since auto OEMs own the "real estate" in the vehicle, they can establish a defensible market position in selling access to vehicle-specific content and service provision. They can do this without embedding expensive, non-scalable hardware. The EPA's OBD-II (on-board diagnostics phase II) emissions monitoring guidelines, posted on the EPA's web-site, mandate the centralization of vehicle emissions data and many OEMs have expanded the functionality of these systems to include diagnostic information and control over a multitude of additional vehicle systems and sensors. Just as auto OEMs recently agreed to give independent repair shops the information needed to access these systems, they could agree to provide access to other companies for a fee.

As a content provider, OEMs could get immediate access to the huge number of wireless subscribers in the United States today. Of course, not all vehicles on the road today are OBD-II compliant, as the mandate went into

effect for new vehicles in 1996. Nevertheless, the greatest benefits in telematics for OEMs lie in obtaining diagnostics data on new model introductions to reduce the number of recalls and their associated expenses. Additionally, OEMs would not need to set up or manage a billing system and other back-office operations. This is not an area of core competency for automakers. Consumers are more likely to pay for incremental automotive telematics services if they are bundled in with their existing wireless bill. This model is also more conducive for pay-per-use billing in that consumers would be able to pay for just those services that they wanted and on the same bill they receive from their existing carrier.

4.4 The Benefit of Long Vehicle Lifecycles

One of the most frequently cited challenges in automotive telematics is hardware scalability. Automakers and wireless carriers understand the challenge but there are benefits as well. While one cannot predict the course of technology over time, we do know that the vehicle's systems will stay the same over its lifespan. Thus, wireless device manufacturers need only to make sure that their next generation products are backwards compatible with the vehicle's technology in the same way that Microsoft introduces new versions of their software that are compatible with older versions. This does not always work perfectly, but the point is that the vehicle's interface with the wireless communications device it utilizes should be kept as simple as possible. The vehicle bus can serve as the central "database" for vehicle systems information. The data should be accessible through existing standards, ones that would be relatively inexpensive to maintain if they became obsolete. This would not preclude encryption of the data which automakers consider critical to guarding their product secrets.

As a content provider, auto OEMs could work with any carrier the customer chooses. Since carriers subsidize a healthy percentage of the cost of wireless handsets, carriers would also be willing to subsidize part of the incremental hardware costs to enable automotive content access. This is a simplistic overview of just one potential solution for unlocking the value of telematics, and it is not without significant challenges. Nevertheless, it is an example of the kind of role each player in the value chain needs to resolve themselves to play if the value of telematics is to be unlocked without help from the public sector. The public sector's role here is undefined and complicated and largely gets into work in Intelligent Transportation Systems (ITS) which are at this point unrelated to telematics and certainly unrelated to mass media.

5 Summary

The market for automotive telematics applications and services has developed in a dysfunctional state, based on some false assumptions and the inability of diverse industries to work together successfully. The overwhelming majority of existing telematics enabled vehicles should have a limited useful life, due to the FCC's ruling to lift the mandate on wireless carriers to maintain analog compatibility in their networks. The cost to upgrade the necessary in-vehicle hardware is prohibitively high. Subsequently, it is not feasible to place any long-term value on the current pool of automotive telematics subscribers in the U.S.

While market participants have learned many lessons, new business models have been slow to emerge. This is due to the economic environment, long automotive product cycles and the inability of technology companies and automakers to successfully collaborate with one another. Companies in the automotive, wireless and mass media industries need to recognize their place in the value chain and resign themselves to delivering products and services within the scope of their core competencies. This means that auto-makers need to transition their role as service provider to one of service enabler and content provider, leaving service provision and the majority of mass media content delivery to wireless carriers and media conglomerates.

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