



15 August 2009

From: Michael L. Sena  
To: Thinking Highways  
Ref: TelematicsCallCenters\_V4  
Re: Proposed Article

## TELEMATICS CALL CENTERS WHAT DOES IT REALLY TAKE TO BE ONE

### INTRODUCTION

There is view that I have encountered among automotive OEMs that call center service delivery to vehicles equipped with telematics systems is extremely complex and difficult to master. The incumbents who are delivering vehicle-centric call center services today to systems like BMW Assist, Volvo On Call or OnStar have had a strong incentive to convince their OEM customers that the specific services they have developed for each of them are so specialized that only they are uniquely qualified to offer these services, and that switching to another call center service provider is not only unwise, but unthinkable. OEMs that have not yet initiated telematics services cite as reasons for delaying system introductions the lack of choice of call centers, due to high barriers to entry, and high switching costs.

While the qualifications for handling voice calls from telematics system users are certainly not commodities, they can be mastered by professional call center operators who are used to working with stringent requirements and are prepared to invest the time and money in both systems and operator training to adapt their operations to the specific requirements of telematics services and become as capable as any incumbent. Automotive companies should not feel that they are captive to any system or service supplier with whom they have chosen to initiate a service, or that the only choice is to terminate services in a market if the call center service provider is unsatisfactory. Volvo Cars switched to a new call center service provider in Sweden after working with another provider for over three years, and no changeover problems appear to have been encountered.

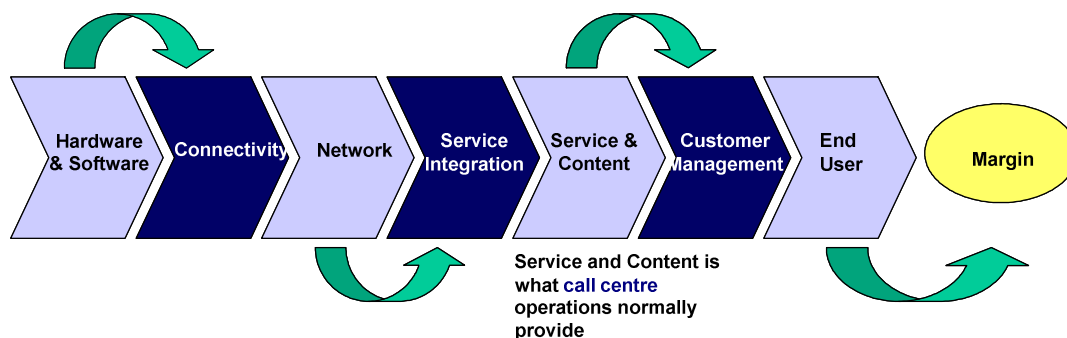
Let's explore what it really takes to be a telematics call center, what the OEM can do to make sure there will be the widest possible choice of call center providers who can deliver the services designed into their telematics systems, and how to design a service delivery package to make the first implementation of, and possible future migration from, a telematics call center as easy and pain-free as possible. We will start by looking at the Telematics Value Chain.

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## TELEMATICS SERVICE FUNCTIONS AND WHO PERFORMS THEM

## The Telematics Value Chain



Turn inputs into value-added outputs and end up with **margin**.

**Connectivity**

- Data message routing to and from Vehicle
- Routing of data messages to and from Service Providers

**Service Integration**

- IP connection to multiple content and service providers
- Data message conversion to and from Service Providers

**Customer Management**

- Billing
- Provisioning
- Customer and Vehicle Database
- Database interfaces

In the Telematics Value Chain, a position-enabled communications device in a customer's vehicle connects via a telecoms network to a set of providers who provide the desired services and content to the customer. How each of the links in the chain are executed, and by whom, is the result of many OEM decisions, including:

- Design of the in-vehicle system;
- Which services to deliver;
- Whether there is a billing component to customer management; and,
- Whether the full complement of services is delivered in multiple countries.

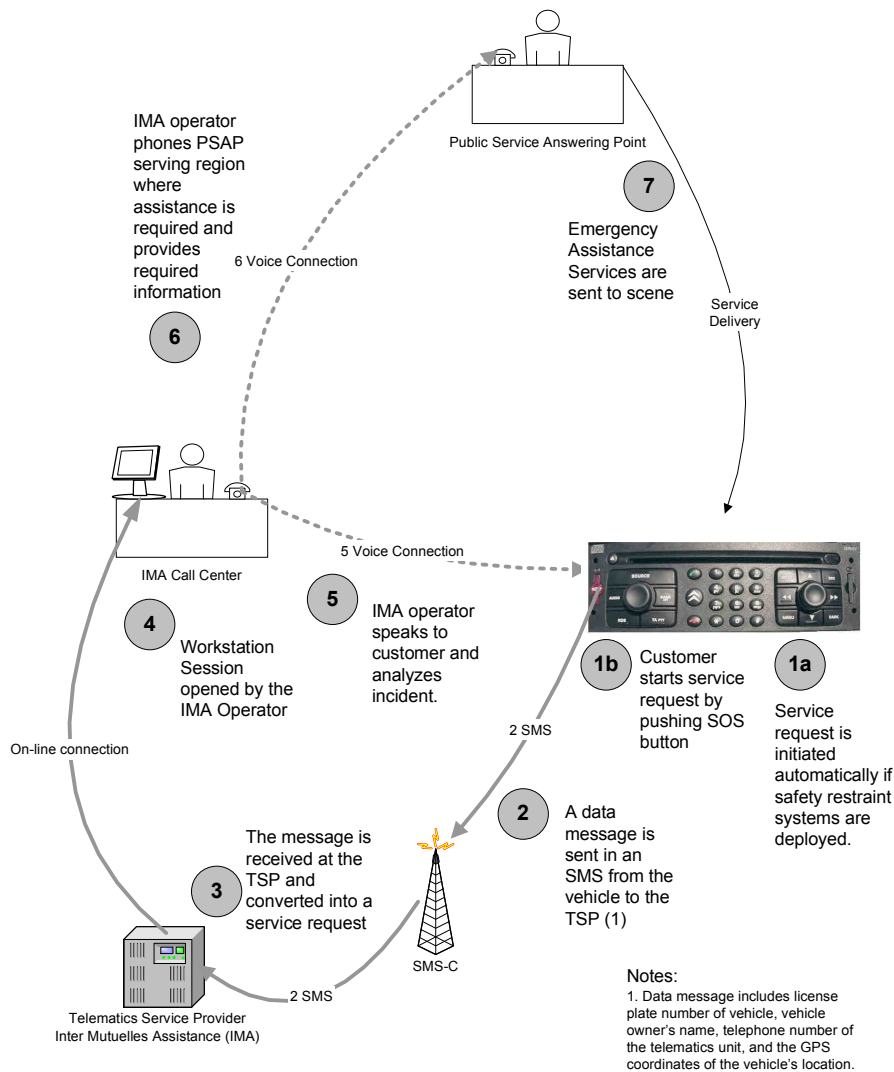
For the customer in the vehicle, the voice on the other end of the line is the most evident part of the service chain. The call center operator is also the "face" of the OEM to the customer. In the following section I have identified the specific functions provided by the call center, the relationship the call center has with the other parts of the value chain, and the impact the delivery of the other components in the value chain has on the ease or difficulty of initiating a telematics call center service or moving from an incumbent to a new call center or centers.

CALL CENTER OPERATION

Call Center operations involve the service and content delivery component of the value chain. A call center receives voice calls from the vehicle, processes information (e.g., position, incident type, requested service) that is delivered via a data channel—either directly from the vehicle or indirectly via a telematics service provider—and delivers a service or connects to another service provider who delivers the service.

**PSA: eCall  
Emergency Assistance**

REF: PSA\_EmergencyAssistance

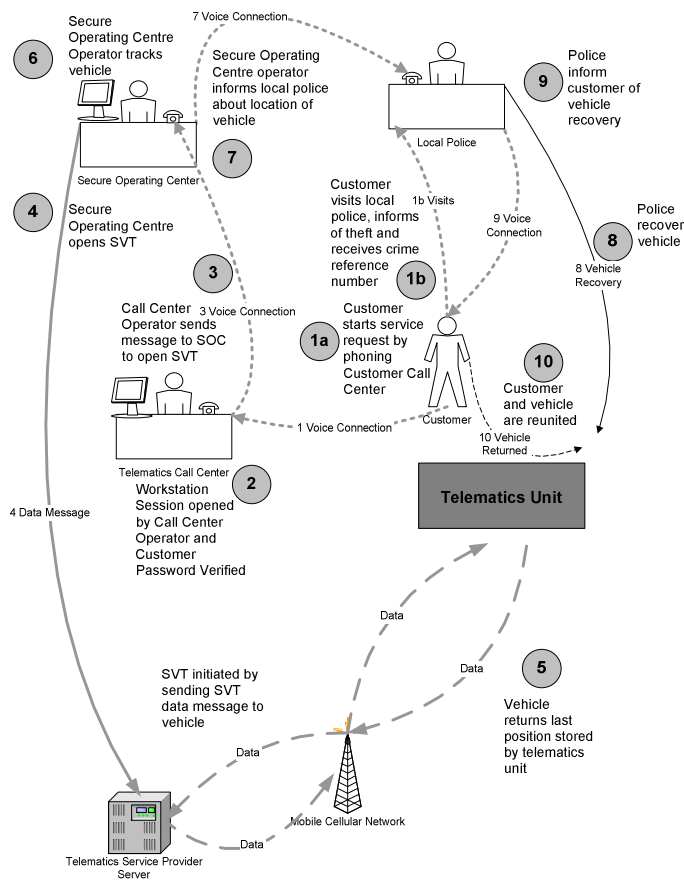


In combination, the range of services that the system in the vehicle can deliver, the regulations in the country in which the services are provided, and the qualifications of the call center team determine whether there is one or multiple call center operations involved in service delivery. A single call center is possible if the call center is qualified and allowed to deliver all services. For example, in most European countries, and in the US, it is possible for an emergency assistance call made from a vehicle to be directed to a private call center, who then contacts the

emergency authorities on behalf of the customer in the vehicle. This same call center can also be the first line call center for roadside assistance services, directing a call to the OEM's roadside assistance provider.

In contrast, in the UK, it is illegal for a vehicle to send an emergency assistance call to a private call center; it must be sent directly to the emergency authorities, the Public Safety Answering Point (PSAP). However, the UK PSAP may not handle calls for vehicle assistance or any other types of non-emergency services. Therefore, in the UK there must be a separate call center to handle vehicle and information assistance services, while the emergency calls are directed to the UK PSAP. BMW and Volvo Cars have implemented this solution for their telematics systems in the UK.

**Service if a Secure Operating Center is required  
Stolen Vehicle Tracking**



Country regulations affect the delivery of other services. For example, theft notification and stolen vehicle tracking may be provided by a “general” call center in most European countries and in the US, but not in all countries. In The Netherlands and Belgium, there are strict regulations on what type of company can deliver these services. They must be specially certified and have specific types of facilities and equipment. Therefore, if a vehicle OEM wants to deliver theft notification and stolen vehicle tracking in these countries, along with the roadside assistance and emergency services, the OEM must engage a separate authorized security services company and create specific connections to this company's systems. The illustration above shows how such a service might be delivered if a secure operating center were required.

*Call Center Operation Functions*

The following table lists the functions that an OEM should expect its telematics call center (TCC) to provide and the specific functions that need to be performed to deliver a satisfactory service. Many of these are functions are not specific to telematics. A competent, well-run call center should be able to perform the telematics-specific functions following a suitable period of system integration and staff training.

Basic TCC Functions	Responsibilities
Voice and Data Receipt and Language	The TCC is responsible for the receipt of voice calls and data messages initiated by the telematics device in the vehicle. Staff should be capable of working with data management systems and telephone switching systems, trained to handle phone calls from callers who may require medical or other types of emergency assistance, and trained to connect to the necessary services quickly and efficiently. Multiple languages spoken by individual staff members is an advantage.
Voice and Data Sending	The TCC is responsible for initiating a voice call and sending data messages to the vehicle. Staff should be capable of working with data management systems.
Matching Voice and Data	The TCC is responsible for matching the voice call with the corresponding data message from the vehicle. This process should be automated.
Display of Vehicle and/or Driver Information	The TCC is responsible for displaying vehicle and/or driver information to the call-receiving operator who is handling the voice call and data message initiated by the telematics unit (TEM) in the vehicle. Staff should be capable of working with data management systems.
Display of Vehicle Position	The TCC is responsible for displaying the position of the message-sending vehicle on a digital map that is directly viewable by the call-receiving operator. Call center operators must have a good understanding of geography and a basic knowledge of how to work with a digital map application (pan, zoom, turn on/off layers, etc.).
Matching of Vehicle Position to Location	The TCC is responsible for ensuring that the position of the vehicle on the digital map is clearly identifiable by the call-receiving operator. Call center operators must be able to work with maps.
Determining Nature of Call	The TCC is responsible for determining the nature of the call. This determination will be accomplished both automatically by interpreting the message which is sent from the TEM, and non-automatically by speaking to the driver. Staff should be able to communicate in emergency situations.
Notification of Service Provider	The TCC is responsible for notifying the appropriate service provider(s) who will deliver the service(s) required by the calling customer. A mapping system identifying boundaries of services providers is needed. Staff require emergency call handling training and ability to work with map application.
Delivery of Position to the Service Provider	The TCC is responsible for delivering the verified position of the vehicle to the service provider(s) who will deliver the required service(s)
Call Forwarding to Service Provider	The TCC is responsible for forwarding a call to a service provider when such forwarding is part of the delivered service. Staff require telephone switching training.
Maintaining Connection between TCC and Customer	The TCC is responsible for maintaining the telecommunications connection between the TCC call-receiving operator and the phone in the vehicle.
Maintaining Connection between Service Provider and Customer	The TCC is responsible for maintaining the telecommunications connection between the service provider with whom the customer has been connected and the TEM in the vehicle.
Verification of Service Provision	The TCC is responsible for verifying that the required service has been delivered to the customer by the service provider.
Call Termination	The TCC is responsible for properly terminating a call whether initiated by the vehicle or by the TCC. Basic call center skills are required.
Call Recording	The TCC is responsible for keeping records of all voice calls and/or data messages which have been handled by the TCC.

Customer Records	The records for all Telematics Customers should be available from an OEM-provided database at every TCC location. The OEM and the TCC provider should work together on the most efficient way for the OEM to provide Customer data.
Customer Activation and Deactivation	The TCC is responsible for activating and deactivating customer services. Staff require basic call center skills and data management training.
Service Provision Verification	The TCC is responsible for verifying that a caller is entitled to the requested services in those cases when the caller is not using the TEM unit for placing the call.
Demonstration Calls	The TCC is responsible for processing demonstration calls from the dealer. Staff skills are the same as for receiving and sending data and voice calls.
Service Quality Management	The TCC is responsible for customer satisfaction and retention. A retention rate shall be mutually agreed by the OEM and the TCC.
Reporting	The TCC is responsible for reporting on any or all voice calls and/or data messages processed by the TCC, and the service provided as a result of the voice call and/or data message, according to the records kept and maintained by the TCC.
Service Delivery Design	The TCC is responsible for preparing a document which defines how each service will be delivered by TCC operators. The staff should be trained in the delivery of all services.
Information on New and Modified Services	The TCC, at the discretion of the OEM, may be responsible for providing the OEM's customers with information on new services and modifications to existing services. The staff should be trained in the new service content and delivery methods.
Customer Queries on Invoices for Telematics Customers	In connection with invoicing, the TCC may be given the responsibility for passing Customer queries about invoices to the OEM. The staff require basic call handling and customer management skills.
Agreements with Service Providers	The TCC is responsible for establishing and maintaining any agreements with service providers which are required for providing the services as agreed with the OEM.

It is the system and service design, not call center capabilities, that are the critical factors in determining how easy or difficult it is to redirect calls and/or data to the various call centers as required by a country's regulations. Professional call centers are used to adapting their systems and processes to the specific requirements of their customers, and have the telephone and IT technology to make the necessary adaptations. The extent of these adaptations depends to a great degree on whether there is a separate Telematics Service Provider in the value chain.

#### TELEMATICS SERVICE PROVIDER

A Telematics Service Provider (TSP) provides, at a minimum, the *Data Connectivity* and *Service Integration* components in the Telematics Value Chain. The TSP can also provide *Customer Management*. The TSP's main responsibility is directing data messages from a vehicle to the appropriate call center or information services center. The TSP can also provide connectivity to non-call center information services. TSPs, like other participants in the value chain, can attempt to extend their services into adjacent responsibility areas. GM/OnStar and ATX North America in the US, and PSA and Fiat in Europe, established models for telematics service provision in which the call center and TSP functions are combined. OnStar functions as a virtual network operator as well, providing calling services in addition to the standard telematics services. In contrast, Volvo in all European markets, and BMW in all European markets except Germany, have separated the task of TSP and call center, with WirelessCar and ATX Europe respectively serving in a "pure" TSP role.

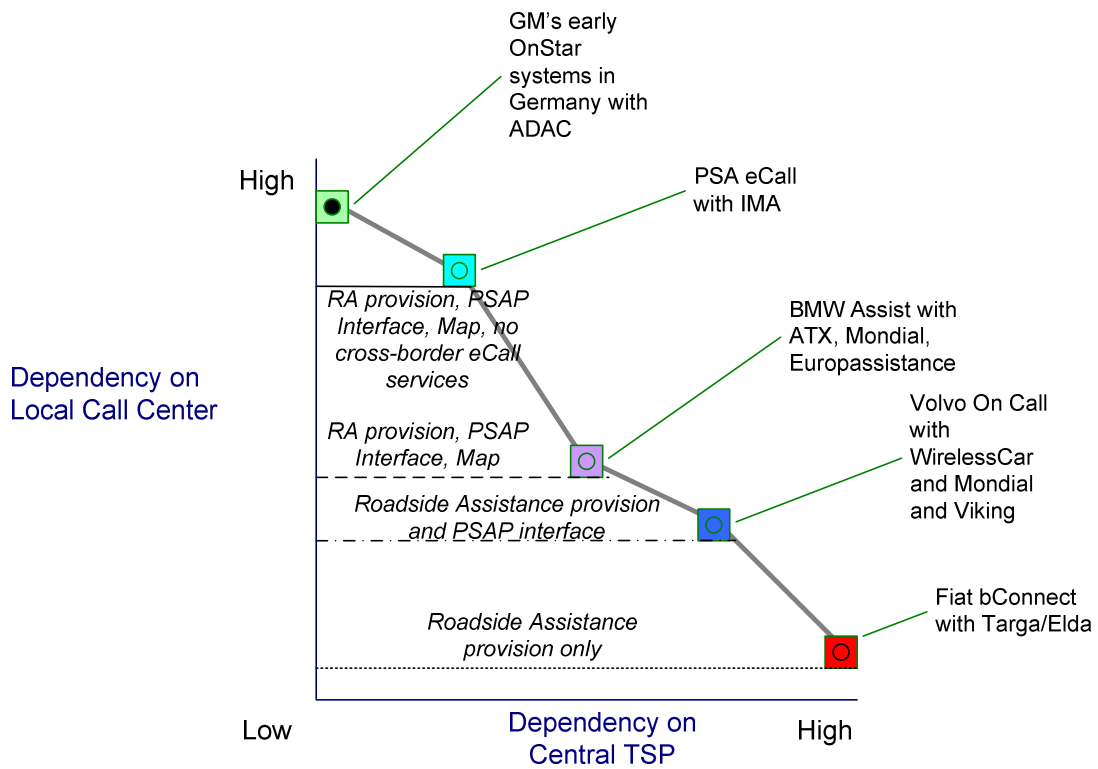
The presence or absence of a special TSP in the value chain is one determinant of the degree of specialized IT services that need to be provided by a call center. The other major factor is

the presence or absence of a centralized operator workstation server. If there is TSP providing a central data management center (e.g., WirelessCar in the Volvo On Call service delivery chain), and if there is a central workstation server that is accessed as a web service (as is also the case with the Volvo On Call system), then the call center requires a minimum amount of IT infrastructure. If, on the other hand, there is no specialized telematics service provider, as is the case with the PSA telematics service, then the data messages are transferred directly to a local call center. In this case, the call center must build a system that can store all required vehicle and/or customer data, convert the data messages, and display all the information, including position of the vehicle, to the call center operator.

The more work done by a telematics service provider, the less the dependency will be on the local call center, the easier it will be to switch call center providers, and the faster it will be to introduce new services to all markets served.

#### *Platforms and Service Delivery*

There is normally an inverse relationship between the dependency a vehicle manufacturer places on a Telematics Service Provider and the degree to which the Telematics Call Center must provide complex message translation and message transfer services. The more non-call center tasks performed centrally by the Telematics Service Provider (such as data message translation), the fewer non-call center tasks that need to be performed by the Telematics Call Center. For example, the GM/Opel solution implemented as OnStar Europe in Germany at the beginning of the 2000s was based on a personal SIM-card (Subscriber Identify Module) from the customer, and both the phone call and the SMS data messages were sent to ADAC in Germany. There was no way to obtain services outside Germany, and OnStar-equipped cars were sold only in Germany. ADAC handled all data and voice services for OnStar. At the other end of the spectrum, Fiat has a telematics system also based on the customer's SIM-card that can be sold in any European country, but all calls and data messages are directed to the Elda/Targa TSP/Call Center located in the outskirts of Milan.



The diagram above illustrates the relationship between local call center dependency and TSP dependency. It is possible to reach a happy balance between the two extremes of full dependency on either the local call center or the TSP. By creating a balance, the OEM can ensure that there is flexibility in being able to move to a new TSP or call center if good business practices indicate a move. What makes the BMW and Volvo systems more independent from call centers is their on-board systems combined with their central TSP.

NETWORK OPERATOR

The network operator's place in the value chain is to provide the technical means for the in-vehicle system to communicate with the service providers, and for the service providers to communicate with the vehicle. For those systems that have embedded SIM-cards (i.e., Volvo and BMW), the network operators (Telenor Sweden and T-Mobile Germany respectively) organize the roaming agreements and deliver the SIM-cards for installation in the telematics systems. As services are expanded beyond the home country of the SIM-card provider (e.g., Germany for T-Mobile Germany) the network operator needs to ensure that Short Message Service (SMS) messages are not blocked at the Mobile Switching Center in the foreign network, and needs to provide for fast and dependable access from its own SMS-C to the TSP server. In addition, the operators must know the telephone numbers and SMS-C account number(s) that are used by the systems if these numbers are placed on the SIM-card, and they must keep track of the delivered SIM-cards in their own database even if there are no usage fees—just in case something goes wrong and the subscription must be terminated.

With an embedded and pre-programmed SIM-card with the call center telephone number on the SIM-card, the main implication for call center operations is that this telephone number must either be easily changeable on the SIM-card (e.g., over-the-air re-programming), or it must be



owned by the OEM so that if the OEM decides to change call center providers, the change can be made easily and smoothly.

#### PUBLIC SAFETY ANSWERING POINTS

Based on the eCall (emergency call) services that have been implemented to date, most PSAPs appear to be satisfied to have a private call center receive the initial phone call or data message from the vehicle and to have the private call center provide them with the information about the location of the emergency and the condition of the vehicle's occupants. There are no PSAPs who currently have a system that can communicate directly with any vehicle's emergency alert system, nor are there any PSAPs that can accept a data message in one of the format used by the OEMs, such as GATS, ACP or GST, or the Minimum Data Set message proposed by the eSafety Working Group for a European eCall Minimum Data Message. The PSAPs and the TCCs communicate over the phone, or in rare instances, with fax messages.

If the call center is the first line response to emergencies, the call center's operators must be trained to receive calls from individuals in extreme emergency situations. Their principal job will be to make a connection as quickly as possible to the PSAP that will actually attend to the accident victims. However, they must also be able to help to calm the accident victims and to understand how to respond to different types of emergency situations. This is a service that needs to be provided by call takers who are specifically trained to handle emergency tasks.

The first line call center providing connections to emergency authorities must have the necessary information for placing a phone call to the correct emergency service (police, fire, ambulance) that is serving the region where the customer requires assistance. The boundaries of the service regions must be part of an operator workstation application, and since these boundaries are subject to frequent change, they must be constantly maintained.

#### ROADSIDE ASSISTANCE PROVIDERS

OEMs have sometimes tied their telematics services and roadside assistance services together, hoping for synergies and cost-saving advantages. OnStar Europe (though not OnStar US), PSA and Fiat did this. Volvo and BMW each have a few markets in which their telematics system call center is the same company as their roadside assistance provider. This can be a problem if the OEM wishes to cancel one service agreement because another service provider offers lower prices and better quality, while the other service is delivered in a superior and low-cost manner. Both BMW and Volvo in Europe, and the automotive OEMs that offer systems in the US, have apparently determined that there are no significant advantages to combining their warranty roadside assistance services with their telematics call center services.

#### SECURITY AND TRACKING SERVICES

Companies like Securitas, ADT, and Group4 have call-taking centers to handle house and business alarm services. ATX North America, the second largest call center for telematics systems after OnStar, actually began life as a security service company, Westinghouse Security Services, and participated in the development of the first telematics system called RESCU, which was developed by Ford Motor Company. Security services companies have some advantages compared to general call centers and roadside assistance providers. These advantages include Secure Operating Center facilities, authorization to make direct contact with the police, and staff who are trained to track stolen vehicles. These capabilities are not easy or inexpensive to establish. However, if an OEM does not wish to offer security services with its telematics

system, rather than as an aftermarket fitted option—Volvo is the only company in Europe that does—these capabilities are unnecessary.

In those markets in which an authorized stolen vehicle tracking service with secure operating center facilities is required, it is possible for the OEM who wishes to offer security services to engage such a company to supplement the services of its primary call center. This is exactly what Volvo has done in The Netherlands, Belgium, and Spain, where there are regulations on the type of company that can provide security services.

### INITIATING OR MOVING TELEMATICS CALL CENTER SERVICES

For an OEM, initiating or moving from the incumbent telematics call center in a particular market, or especially in all markets, can seem like an formidable task, even when good business judgment or the performance of the incumbent make it desirable. It is a more difficult job when the call center is expected to perform other services in the value chain, but it can be done no matter how deeply the telematics call center seems to be embedded in the process. The table below provides a migration strategy made up of a number of individual steps that directly relate to each of the call center's responsibility areas.

The most important step is to select a new Telematics Call Center partner. Local, country-based call centers offer the best possibility for direct connection to the local emergency services, roadside assistance services, and security services. Select a new call center provider that has staff who are customer service oriented and have multiple language skills. The new company should also be strong in IT to offer flexible but robust connections to the communications network.

Basic TCC Functions	Strategy
Voice and Data Receipt Voice and Data Sending Language Handling	<p>Focus the new staff training on delivering the core services in a superior fashion. Prepare the switch-over to the new center well in advance and test it rigorously before the final move. If the current solution is built around country-based TSPs, move to a central TSP solution to de-couple the voice and data processing from the call center. Once the central TSP solution is in place, it will be relatively easy to select country-based call centers that can be interfaced to the TSP.</p> <p>Deliver a web-based workstation solution to the call center that has pre-defined screens and commands for all services that are delivered to and from the on-board system.</p>
Matching Voice and Data Identifying Nature of Call Maintaining Connection between TCC and Customer	<p>A single Computer/Telephone Integration system (CTI) solution for all call centers would be ideal, but the choice of CTI software is dependent on many factors, and there does not appear to be a single package that runs in all environments. The new call center will need to implement the CTI and test it thoroughly before the switch-over of services can be completed.</p>

Display of Vehicle Position Matching of Vehicle Position to Location	If the service currently uses multiple map visualization tools provided by each call center, establish a single, web services-based map processing solution that can be used by all call centers prior to moving, or select a TCC that has a robust map server that can be accessed simultaneously using web services by multiple call centers. There are private web services solutions, such as the one offered by PTV, or there are commercial solutions, such as Microsoft's MapPoint/LiveLocal.
Notification of Service Provider Delivery of Position to the Service Provider Call Forwarding to Service Provider Maintaining Connection between Service Provider and Customer Verification of Service Provision	The selected TCC must demonstrate that it can access the correct PSAPs in each region where they are delivering services. If the selected TCC does not have this capability prior to selection, it can acquire it during the changeover phase. Special consideration needs to be given to the following: <ul style="list-style-type: none"> <li>▪ Emergency services generally prefer to have a town and street address or kilometer marker referenced to an exit number or name on a highway.</li> <li>▪ The call center mapping application should clearly display the administrative area in which the vehicle is located, the street and the closest address.</li> <li>▪ The call center application should also display the geographic coordinates of the vehicle's position, ideally in both WGS84 and the country grid reference coordinates.</li> </ul>
Call Recording Customer Records	The call center chosen to replace the incumbent should have a call recording facility that its call taking operators are familiar with using. To reduce dependency on a specific call center, customer records should be stored centrally, either at the TSP or the OEM, and accessed by the call center via a web-based server.
Customer Activation and Deactivation	Minimize the involvement of the call center in the activation and deactivation process by automating the process between the vehicle and the TSP.
Service Quality Management Reporting Service Delivery Design Information on New and Modified Services	The OEM should have direct access to customer service records so that service statistics can be viewed directly, without having to depend on reports from the TCC or TSP. This will minimize dependency on the call center's need to keep records and submit reports. A central customer/vehicle database in which all service records are stored, plus an easy-to-use interface, will allow the OEM to access the information directly. Access can also be provided to the TSP and call center services provider so that they can monitor the quality of their service.
Invoicing of Telematics Customers	Build the invoicing process as much as possible into the OEM payment flow process for parts and services.
Agreements with Service Providers	Direct contracts by the OEM with third party providers, such as breakdown assistance providers and stolen vehicle tracking services, will reduce the dependence on the call center and allow contracts with these providers to remain in place even if the call center operator is changed.

## SUMMARY

When markets are young and standards are non-existent, value chains tend to be controlled by single players. This is often the only way to create the necessary connections between the various systems, and the best way to extract profits. OnStar and ATX are examples of highly integrated operations which operate as full TSPs and call centers simultaneously. These solutions lock customers in to an all-or-nothing service. So, for example, when OnStar North

America decided to close its service offering to its non-GM customers, like Toyota Lexus, the OEMs that had been using OnStar's service were forced to develop their own end-to-end solutions.

Although telematics components are still not standardized, it is possible, even desirable, to develop a partially **dis-integrated** model that uses the best-of-breed approach to selecting different service providers who meet specific requirements better than a generalist company trying to perform all the tasks in the telematics value chain. BMW has done this to a limited extent in Europe, and Volvo has adopted this approach totally for its pan-European solution. Volvo has two companies at present providing first-line call center services: Viking in Sweden, Denmark, and Norway, and Mondial Assistance in the other 11 countries where the system is supported. Volvo also has three secure operating centers in three countries interfaced to the country's Volvo On Call call center, and it has connections to the official Volvo roadside assistance providers in each of the countries. And Volvo has switched call center operator in one of its markets, and moved from a local server to a central server in this same market.

Working with a new supplier is never an easy task unless the component or service is completely standardized. This is definitely not the situation today with telematics services. Nevertheless, this does not mean that initiating or changing a telematics call center—or any supplier in the telematics value chain—has to be so difficult and painful that the OEM avoids it even when it otherwise makes good business sense to go ahead.