INNOVATIVE STRATEGIES FOR IMPROVING TELEMATICS CALL CENTRE OPERATIONS

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ABSTRACT

With the steady increase of embedded OEM navigation systems, the unprecedented boom of the portable navigation device (PND) market, and the imminent explosion of the GPS phone segment, consumers are more and more exposed to navigation systems. Their expectations have increased to benefit from richer, up-to-date, accurate location-based content with easy-to-use services, available ubiquitously. Consumers' interaction with their devices is still complicated by virtue of the devices' form factor and the environments in which they are used. Although many companies are utilizing operator assisted services to facilitate data entry, the telematics industry has not yet managed to overcome the significant voice service operational costs despite several attempts using embedded voice recognition systems. However there are a number of ways that these costs may be reduced whilst still improving the quality and the customer value proposition of the service. This paper discusses efforts underway to implement innovative technical approaches to vehicle telematics and navigation enhancement services: People-Assisted Computer Systems™ (PACS™) and distributed call centres.

KEYWORDS

Telematics, People-Assisted Computer Systems™ (PACS™), speech recognition engine (SRE), location-based services (LBS), distributed call centres, work-at-home agents

BACKGROUND

The OEM navigation installation base is projected to rise from around 12% in 2008 to around 30% in 2014. Portable Navigation Devices (PNDs) shipments in Europe and North America are expected to grow from 23 million units in 2007 at a compound annual growth rate of 18.2% to reach 53 million units in 2012, and it is now widely accepted that the GPS phone market will rapidly expand, with an estimated compound annual growth rate of more than 30% from 2007 to 2012.

In a Eurobarometer survey of 26,000 individuals throughout Europe, which was undertaken in May 2007 for the Galileo Satellite Programme, 68% of respondents knew the term "satellite navigation":

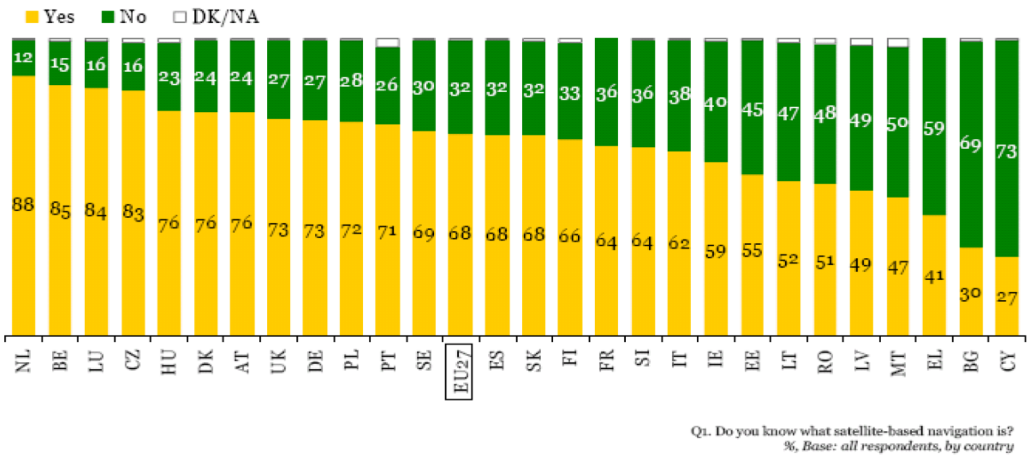

Figure 1: Familiarity with satellite-based navigation systems (Europe)

Consumers' familiarity with core satellite navigation functions – routing from A to B, map display, POI search, and even traffic information – has raised their level of expectation for richer, more up-to-date, and accurate location-based content and services.

Vehicle manufacturers, and makers of PNDs and handsets, have anticipated this need for ubiquitous access to up-to-date rich information. They have started to bring to market smart, connected, service-oriented navigation systems that provide online access to live search, yellow pages, real-time and predictive traffic information, and dynamic content such as petrol station locations with daily gas prices, movie times, local weather, and so on.

Using these navigation enhancement services whilst driving requires an easy-to-use, user-friendly interface. Despite several attempts either with the use of embedded voice recognition systems or with the setup of call centres with agents remotely assisting customers, the telematics industry has not yet managed to overcome the challenges of significant voice service operation costs and limited service quality. There are, however, innovative technical approaches to reduce costs of operations and improve quality and accuracy of voice-assisted location-based services. One such solution is People-Assisted Computer Systems™ (PACS™), a hybrid of server-based speech recognition system and human agents, and distributed call centres with work-at-home agents.

PEOPLE-ASSISTED COMPUTER SYSTEMS™ (PACS™)

The automotive industry has investigated over many years the means to assist drivers using navigation multimedia systems and telematics services. Vehicle manufacturers swiftly turned to embedded voice recognition technologies with the intention of enabling drivers to keep their hands on the wheel whilst still being able to control navigation functions and access services. Originally these approaches were often reliant on speaker-dependent technology where the driver had to "train" the system by recording a corpus of keywords. Subsequent generations of in-car platforms, such as Ford Sync™ or Fiat's Blue&Me®, both developed in cooperation with Microsoft, are now speaker independent and allow users to perform functions including voice-activated digit dialling, calling contacts in a phone book, or selecting and playing mp3 files located in a complex folder tree. At the 2008 CeBit, Navigon

even displayed an advanced PND with single confirmation address voice destination entry (VDE) capacity powered by Nuance.
However, embedding speech recognition in vehicles remains expensive, and the technology has not yet proven to be mature enough to address all the challenges associated with open natural language, especially in a noisy cockpit environment, with limited processing and storage capacity. This is especially true with navigation systems, which often require a complex input of information, and may also require significant user interaction to filter and choose the most appropriate selection. In most countries, some place names are not pronounced following typical linguistic rules, complicating both speech recognition and text to speech.
To overcome the complexity of open natural language requests in multiple languages, many automotive and telecom companies have set up call centres where agents can remotely assist drivers to find, for example, the nearest open pharmacy or other business location, or to set a complicated destination. However, these call centres require significant capital and labor expenditures, with long call transaction times resulting in high costs that often exceeds the customers' perceived value.

A more economic and efficient alternative to both embedded voice recognition and traditional call centres is People-Assisted Computer Systems™ (PACS™), a hybrid of server-based speech recognition and human agents.

PACS™ Workflow

PACS™ consists of a unique workflow which processes voice requests for location-based services in open native language, without multiple steps of confirmation or specific pattern to follow when speaking. It combines the benefits of a powerful, server-based speech recognition engine and the availability of human agents in reserve to assist in interpreting unclear commands or complicated requests from the driver.

PACS™ can take advantage of the cost savings of voice recognition while eliminating much of the customer dissatisfaction related to computer-generated dialogs – the trademark of existing speech recognition solutions – and interpretation errors.

The successive steps of the PACS™ workflow are represented below:

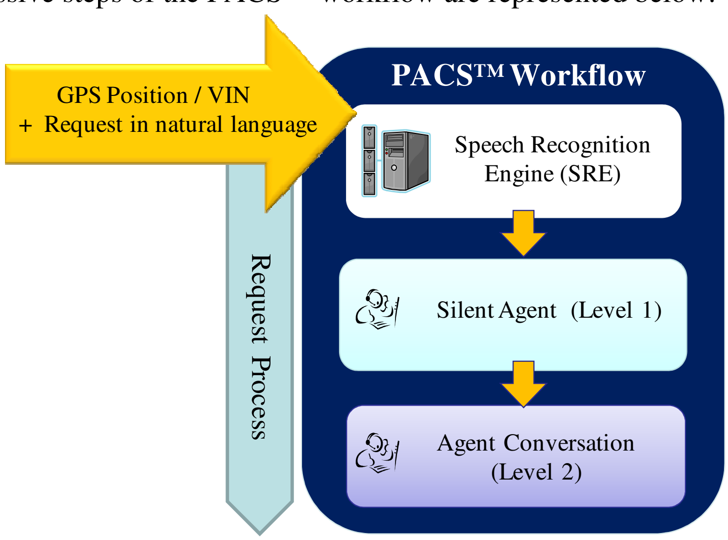

Figure 2: Successive Steps of the PACS™ Workflow

The process handles data and voice communication in a unified manner. Conversation begins with the driver's request in true, open natural language, and ends with the downloading of the desired data. The request is initially interpreted by the server-based speech recognition engine. Should it fail, or be unable to serve the driver's request, a human agent takes over the transaction.

Step 1:
The server receives the driver's request consisting of an identifier – ideally vehicle identification number (VIN), or caller line identifier (CLI) – the GPS position of the vehicle or the handset, and the driver's voice request made in open natural language. If the SRE has a high level of confidence in its analysis of the request, the result is communicated to the vehicle/customer using text-to-speech (TTS).

Step 2 (if needed):
If the SRE does not have a sufficiently high level of confidence, the recorded request is relayed to a Level 1 (silent) customer service agent who examines the options provided by the SRE. If the agent is sure of the result, the appropriate response is communicated to the vehicle/customer, again using TTS.

Step 3 (if needed):
If silent analysis cannot determine the appropriate response, or if the request is garbled or otherwise unclear, a Level 2 customer service agent intervenes and engages directly in discussion with the driver to respond to the request.

A typical use case for the PACS™ workflow is the download of a point of interest destination. Imagine that Mike is looking for the nearest Thai restaurant. He presses the Agent button in his vehicle and asks in natural language for the nearest one. Mike is offered a Thai restaurant which is 28 miles away from his vehicle. It is too far for him, so he rejects the restaurant proposed. An agent then directly engages in discussion with Mike and recommends him another restaurant with good, spicy food and very close to Mike's location. The POI is downloaded to Mike's car, which follows the route guidance to the location.

PACS™ can handle POI/destination requests with multiple attributes such as a restaurant with a specific type of cuisine, rating, average meal cost, and access for the disabled.

The PACS™ POI/destination download service has already been demonstrated to a number of vehicle manufacturers on existing navigation platforms and featured in advanced engineering projects. The key findings from these programs are:

- Transaction times for requests fully managed by SRE are four times shorter than those for traditional call centre discussions.
- Even when switching to level 1 silent agent, the transaction times remain twice as fast as traditional call centre interactions.
- Customers don't feel the usual frustration of speaking to a machine, since they always use natural language and are immediately assisted by the human agent if the system yields an incorrect interpretation or an incorrect proposal.

The figure below shows the average transaction times measured during an early prototype test of PACS™ POI/destination download where voice request is handled directly by SRE; by

SRE then a Level 1 silent agent; by SRE and then a Level 2 agent; or by all components of the workflow (SRE, then a Level 1 agent, then a Level 2 agent).. The key factor is the relationship between the different transaction times, not the transaction themselves since they are dependent on the test environment (length of the welcome message, telematics control unit specificities etc.)

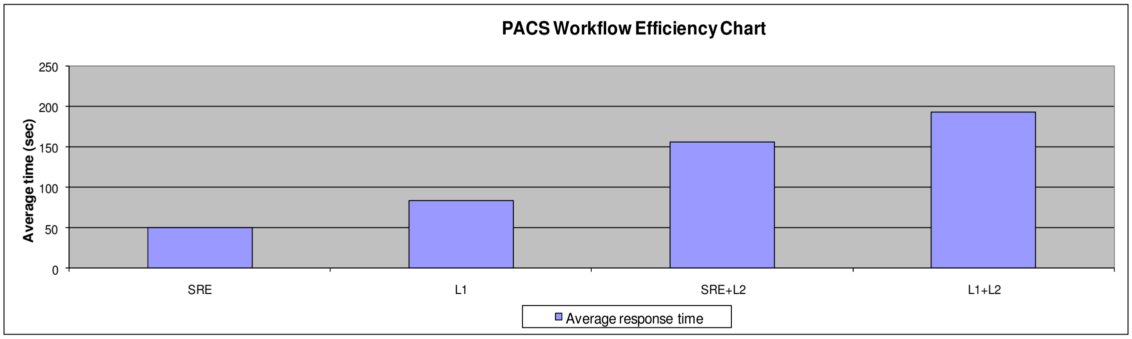

Figure 3: PACS™ Workflow Efficiency

Several vehicle manufacturers currently envision launching services using this workflow with new generations of their navigation systems for POI/destination assisted search. Other telematics services such as remote functions (e.g. door lock/unlock) could use the PACS™ workflow in the future.

PACS™ minimizes the interactions between the driver and the call centre agent in order to reduce the number of requests handled by human agents, the processing time of requests, and therefore the overall operational costs of the service. The quality of the service is never compromised since human agents always compensate for the potential errors of interpretation of the voice recognition engine. Reduced waiting times improve customer satisfaction and reduced operating costs result in a stronger customer value proposition, which will in turn increase the attractiveness of voice input as an option.

DISTRIBUTED CALL CENTRES, WORK-AT-HOME AGENTS

Distributed call centres introduce, an additional innovative approach which can be combined with PACS™ to improve quality of location based services delivery and to reduce operations costs.

Some forward-thinking industries have realized that the days of the huge call “warehouses” are gone, to be replaced by an era in which distributed, virtual call centres are the norm. Significant economies in deployment and operations encourage call centre companies to switch to a distributed model where agents are regrouped in smaller groups or even working from their own homes.

Factors Driving the Growth of Distributed Call Centres

The growth of distributed centres in the call centre market is largely driven by lower operating costs. Using work-at-home agents saves on facility charges and other overhead costs, including recruiting, training, and personnel administration. Through the use of work-at-home agents, companies will see on average a 15% reduction in operation costs compared to

traditional call centres whilst delivering better quality results. Right now, it is estimated that there are upward of 150,000 remote agents working in the U.S. According to the analyst group IDC, the number of work-at-home agents is expected to reach 300,000 by 2010. Work-at-home agents might make up 50% or more of the total call centre agent population in the next 20 years (1).
The growing phenomenon of distributed call centres is enabled by the ubiquity of high-quality, high-bandwidth connections, and the proliferation of Internet Protocol (IP) for telephony transport in the contact centre. High quality Voice over IP (VoIP) removes geography as a barrier on effective communications, enabling workforces to be increasingly distributed. These technologies have made work-at-home agents much more affordable from a telecom perspective. Web-based customer service and thin clients also present a strong business case for the work-at-home agents, who can perform their duties from any place that has a computer with a high-speed Internet connection.

Another factor behind the growth of distributed centres is the need for more qualified and productive agents, higher retention rates, and greater flexibility in responding to the peaks and valleys in voice traffic.

The work-at-home deployment model can deliver the following competitive advantages:

Higher Calibre Employees, Easier Recruitment
The convenience of a work-at-home for the employee attracts mature individuals generally with a higher level of education. In addition, they can be hired from a larger geographical pool than a typical call centre operation area.

A More Stable, Satisfied Workforce, with Less Turnover
Turnover and absenteeism significantly decrease due to the fact that employees are more comfortable working in their homes. Rising gas prices contribute in encouraging them to work from home. High housing costs in urban centres force longer commute times from suburbs again providing further incentive to work from home. Home agents tend to be older, more mature, with more experience and therefore retention rates among work-at-home agents range from 85% to 90%, whereas traditional call centres have turnover rates between 25% and 30%, and can reach 100% (2).

Greater Staffing Flexibility
The number of agents can be quickly adjusted to meet changes in the service demand.
The scheduling flexibility allows to flex up or down by more than 100%, based on fluctuating call volume needs.

Efficient Training, Scheduling, and Performance Management
Training and coaching courses can all be automated and scheduled directly into the agents' schedules to ensure work-at-home agents have the same development opportunities as those that are located in a regular call centre. There are also performance management applications and tools that help agents and managers understand how they are handling calls. Giving agents access to performance management tools helps them understand how they are doing and enables them to work with their supervisor to more efficiently address any performance issues (2).

Increased Customer Satisfaction
Distributed call centres ensure that callers are directed to an agent who is best able to handle their enquiry. Sophisticated high-speed server based call routing (eliminating the needs for

expensive PBX and ACDs) allows callers to connect with appropriately informed workers thereby providing an efficient, seamless customer experience.

Distributed Call Centres Applied to Telematics

Typically, the call center industry has introduced work-at-home in rural areas where costs are low. These areas are usually remote, and generally not in the high traffic density areas. Leveraging the same technology approach for telematics yields a different solution. The economies of scale for smaller distributed call centres, or work at home agents allow them to be placed specifically in urban areas with high traffic densities. In contrast to the industry move to locate agents in remote areas, locating telematics agents purposely in the same regions and cities where drivers ask for assistance provides a unique solution which enables sophisticated locally knowledgeable responses and reduced call times. The network of work-at-home agents is located where customers drive and live. These agents handle requests in native language with local knowledge of the roads, names and landmarks.

When a customer requires assistance, his GPS location and vehicle ID are transmitted to the service provider, which routes the call to the "most local" agent rather than an agent working in an office several thousands of miles away. When the call is answered, the agent is ready to provide the best local knowledge. For example, rather than selecting a restaurant recommendation from a list in the yellow pages, the agent can recommend local restaurants that have been in the news, or may fit more precisely with the customer's preferences. If a local work-at-home agent is not promptly available, the call will be routed to the nearest available work-at-home agent.

The real power of this approach comes as the number of distributed call centres and work-at-home agents grows, and their geographic coverage expands. The agent answering the customer's call will increasingly be geographically close to the customer's current location, a local person who has firsthand knowledge about the local area. When work-at-home agents in more metropolitan locations come online, callers are increasingly likely to reach a local agent who is very familiar with area traffic conditions, points of interest, events, etc. This has great advantages for knowledgeably providing routes, traffic, and POIs.

Work-at-home agents enable a fundamentally different value proposition than today's approach, where telematics service providers stick to centralized call centres that are not effective at providing locally knowledgeable information.

An example of a possible deployment structure for the U.S. market is shown below.

U.S. Example of Distributed Call Centre Structure for Telematics Applications

The proposed structure in Figure 4 illustrates how distributed call centres could be deployed to service a population of drivers across the United States of America.

This cluster structure combines traditional call centres (hubs) with small local call centres (satellite, storefront office) which extend to work-at-home agents.

This deployment would be carried out in three key phases.

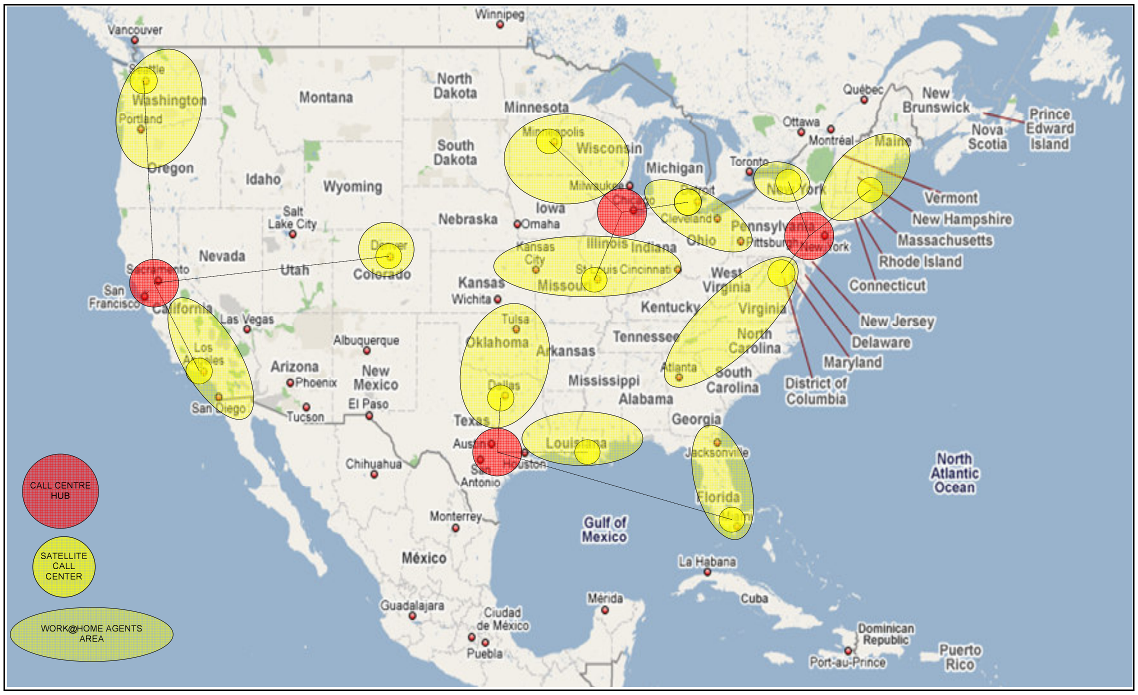

Figure 4: Central Hubs, Satellite Centres and work-at-home Deployment (example, U.S.A.)

Phase 1 – Start-up, Central Hubs
The deployment of distributed service delivery starts with central hubs located in key metropolitan area and housing the regional management. Additional central hubs are opened across the country to meet growing demand for localized knowledge. Initial call centre hubs are setup with a capacity of about fifteen to twenty seats. When more agents are required, other central market hubs can be opened progressively. Central hubs manage overall state/country performance.

Phase 2 – Opening Satellite Call Centres
As call volume grows, central hubs network to satellite call centres hosting five to ten agents, supporting vehicle drivers' local knowledge needs. Satellite call centres are small storefront offices or even a network of work-at-home agents grouped in small regional operating pods of approximately ten persons. Intelligent call routing provides the ability to smoothly transfer calls between central hubs and satellite call centres. Supervisory and managerial staff are hired for the operational hub, trained in a storefront call centre on tools and procedures, and given the responsibility to coordinate recruiting, hiring, and training efforts.

Phase 3 – Full Deployment with Work-at-Home Agents
Full deployment of call centre services provides detailed local coverage across each state/market with the expansion of work-at-home agents. These agents are supported by a set of customized, integrated applications running on a thin client architecture using Internet-based phones and a comprehensive and easy-to-use set of Web-based tools.

Combined with PACS™, the call centre structure becomes even more distributed since the automated step of PACS™ (SRE) acts as a virtual stand-alone call centre. This virtual call centre should succeed to handle about 70% of customers' voice requests, reducing significantly the staffing needs and their associated costs. The remaining requests are forwarded to the most knowledgeable and available work-at-home agents.

CONCLUSION

The spread of operator assisted telematics services has been impeded by technological and operational models that have proven inadequate and/or too costly to appeal to the majority of drivers. Yet advances in broadband access and IP telephony have provided an alternative solution with the potential to improve service while reducing operating costs. By combining speech recognition with human agents, PACS™ avoids the current dissatisfaction of man to machine dialogs, while still reducing considerably labor costs. Likewise, distributed call centers, and especially work-at-home agents, promise to lower facility costs, solve the problems of scheduling and turnover that currently challenge telematics call centers, while significantly improving service with local knowledge. Reductions in operation costs associated with more efficient and accurate service delivery, as well as improvements in service associated with agents located near the drivers they serve, open the way to innovative telematics business models that rely not on subscriptions but on market size and a high-quality customer experience to generate revenues on a per-use basis.

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