Chapter 4.4
Applying Semantic Web Technologies to Car Repairs

Martin Bryan
CSW Group Ltd., UK

Jay Cousins
CSW Group Ltd., UK

ABSTRACT

Vehicle repair organizations, especially those involved in providing roadside assistance, have to be able to handle a wide range of vehicles produced by different manufacturers. Each manufacturer has its own vocabulary for describing components, faults, symptoms, etc, which is maintained in multiple languages. To search online resources to find repair information on vehicles anywhere within the European Single Market, the vocabularies used to describe different makes and models of vehicles need to be integrated. The European Commission MYCAREVENT research project brought together European vehicle manufacturers, vehicle repair organisations, diagnostic tool manufacturers and IT specialists, including Semantic Web technologists, to study how to link together the wide range of information sets they use to identify faults and repair vehicles. MYCAREVENT has shown that information sets can be integrated and accessed through a service portal by using an integrated vocabulary. The integrated vocabulary provides a 'shared language' for the project, a reference terminology to which the disparate terminologies of organisations participating in the project can be mapped. This lingua franca facilitates a single point of access to disparate sets of information.

CURRENT SITUATION

Repair scenarios for resolving a vehicle breakdown are varied, and can take place in a garage (repair by a qualified mechanic in a franchised or independent workshop) or by the roadside (repair by a qualified mechanic working for a Road Side Assistance (RSA) organisation, or a repair by a vehicle driver). For legal liability reasons, 'driver-assisted' repair scenarios only cover minor or temporary repairs of the type covered in owner's manuals, such as changing a vehicle wheel or a fuse.

In workshop scenarios, access to repair information may be provided through online access to repair information systems. Information may be provided publicly by a manufacturer for all users, or specifically to franchised dealers who are provided with

access to information systems that are specific to the makes and models they retail.

Access to repair information in roadside scenarios is more complicated. A vehicle driver may not have access to the vehicle's owner's manual. In the context of a roadside repair by a mechanic working for an RSA, the mechanic might have access to repair information through a computer located in their van. RSA organisations, however, rely heavily on the detailed knowledge of their highly trained staff to diagnose faults without the aid of documentation. RSA mechanics aim to repair as many vehicles as possible at the roadside, but need to identify as early as possible if a car will need to be taken to a garage for repair. If the repair requires specialist equipment the RSA must be able to identify the nearest garage with suitable equipment that the car may be taken to for repair.

Fault diagnosis precedes vehicle repair in both repair scenarios. Details of the type of fault are ascertained at the point of contact with the customer, be this through direct conversation with the vehicle owner at a service centre, or by conversation through a call centre operator when a motorist initially reports a problem. When contact is made through a phone call it is important that call centre operators analyze the customer's situation in as much detail as possible. They have to be able to identify whether the problem is one that might be repairable at the roadside or whether a recovery vehicle is likely to be needed from the responses received to an ordered set of questions.

Customer contacts rarely lead to a detailed fault diagnosis because vehicle owners typically have insufficient knowledge of their vehicles to identify the cause of a problem. At best they can describe the symptoms produced by the fault and the conditions in which the symptoms manifest themselves (e.g. won't start when it is too cold). In many cases these descriptions can be used to identify the type of diagnostic tests that may have

to be carried out before the cause of the problem can be identified.

PROBLEM STATEMENT

With the ever increasing use of electronics in vehicle components, identifying and correcting faults at the roadside or in an independent workshop is becoming a challenge. While the use of on-board diagnostic tools to report faults electronically via dashboard messages can assist mechanics, identifying the cause of a fault from such messages is not always a simple process. When faults are reported over the phone from remote locations sufficient diagnostic information may only be obtainable if the vehicle can be connected directly to the call centre information centre using tools such as personal digital assistants (PDAs) or mobile phones that can be connected to the vehicle's diagnostic ports.

A roadside assistance vehicle cannot contain the wiring schematics for all models of vehicles. Although, under European Union Block Exemption Regulation (European Commission, 2002), manufacturers provide access to all their repair information, repairers at the roadside are not always easily able to find the repair information that they need, particularly if this is related to a previously unreported fault, while physical and business constraints impose restrictions on the set of spare parts, tools, etc, that can be available in the workshop or repair van at any one time. Consequently, the following problem areas can be identified:

- Practical limitations exist on the level of information that can be provided in any repair context. There is variability in the amount and quality of information that is available to describe a fault and its associated symptoms and conditions in order to support fault diagnosis.

Related Content

Probabilistic Models for Social Media Mining
Flora S. Tsai (2013). *Network and Communication Technology Innovations for Web and IT Advancement (pp. 95-105).*
www.irma-international.org/chapter/probabilistic-models-social-media-mining/72755

Enabling Distributed Cognitive Collaborations on the Semantic Web
Amna Basharatand Gabriella Spinelli (2010). *Web Technologies: Concepts, Methodologies, Tools, and Applications (pp. 517-603).*
www.irma-international.org/chapter/enabling-distributed-cognitive-collaborations-semantic/37650

A Theoretical Framework Measuring the Usability of Retail Sites
Konstantina Vassilopoulou, Kathy K. Keelingand Linda A. Macaulay (2010). *Integrating Usability Engineering for Designing the Web Experience: Methodologies and Principles (pp. 243-263).*
www.irma-international.org/chapter/theoretical-framework-measuring-usability-retail/40502

SWAMI: A Multiagent, Active Representation of a User's Browsing Interests
Mark Kilfoiland Ali Ghorbani (2009). *International Journal of Information Technology and Web Engineering (pp. 1-24).*
www.irma-international.org/article/swami-multiagent-active-representation-user/37586

An Experimental Study for the Effect of Stop Words Elimination for Arabic Text Classification Algorithms
Bassam Al-Shargabi, Fekry Olayahand Waseem AL Romimah (2011). *International Journal of Information Technology and Web Engineering (pp. 68-75).*
www.irma-international.org/article/experimental-study-effect-stop-words/55385