

Open Source is Driving IVI Development

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By Boris Geller, head of automotive market development, Black Duck Software

If you visit an auto showroom these days, one thing that's obvious is the new technology in cars. As with many other consumer products, automotive technology is increasingly influenced by the need to coexist, integrate with and/or compete with the pace of mobile technology, especially the Droid and iPhone. Open source software is a big enabler for what are becoming key features in car purchasing decisions.

Consumer demand for new and more powerful navigation, entertainment and communications systems in cars has been the main driver behind the transformation in automotive technology. This is having a significant effect on cost structures and value chains, ultimately shifting the basis of competition.

Already, Ford and Bug Labs, an open source software/hardware provider, are collaborating to allow developers to create modules for Ford's "Sync" in-vehicle infotainment (IVI) system. The car will have a plug-and-play platform in which interchangeable open source hardware and software modules can be quickly and easily customized to perform tasks.

Other carmakers, such as Toyota, also are ramping up their open source activities. Last year Toyota joined the Linux Foundation, commenting, "Linux gives us the flexibility and technology maturity we require to evolve our In-Vehicle-Infotainment and communications systems to address the expectations of our customers."

Most IVI systems are custom-developed within a supply chain, the last link of which is the Tier 1 suppliers to the automakers. IVI systems created for the automakers are based on specific requirements and require significant customization to deliver consumer-facing functionality. The cost of developing an IVI platform has been estimated to run as high as \$100 million. Software in the IVI system represents nearly 70 percent of the 100 million lines of code running in premium-class cars. Industry standards estimate each line of code costs US \$1-10 to develop. These costs, and the long development cycles they represent, can be difficult to recover.

In Accenture's 2011 report *Perspectives on In-Vehicle Infotainment Systems and Telematics*, the authors note "IVI penetration is very low in vehicles at medium and low price points...The cost of IVI systems and their availability at the time of a car purchase represent key concerns for buyers in Europe, Asia and the United States." This is not surprising given the price points for similar functionality in mobile devices. It's also the case that IVI technology that looked good last year may now appear "long in the tooth," as smartphones become so quickly smarter. Clearly, for the automotive ecosystem to recoup investments in IVI, speeding development while managing development costs has become imperative.

Playing a critical role in the development of IVI systems is the GENIVI Alliance. GENIVI is a non-profit industry alliance committed to driving broad adoption of an IVI platform via open-source development methods. GENIVI includes organizations engaged in the automotive, consumer electronics, communications, software, application development and related industries interested in the success of IVI systems and related products. Members run the gamut from top-tier automakers including BMW, Chrysler, GM and Volvo to software companies like WindRiver, Black Duck, Mentor Graphics, MontaVista and many others.

The GENIVI open source platform consists of Linux-based core services, middleware, and open application layer interfaces. These are the essential but non-differentiating core elements of the overall IVI solution set. Automobile manufacturers and their suppliers will use this platform as a common framework and add their differentiated products and services (consumer-facing applications and interfaces.) This allows the car companies to share the costs of developing "the plumbing" and to concentrate their resources on creating differentiating features.

Bringing it all together are the open source developers working on the GENIVI platform. These developers, like most today, leverage thousands of components freely available on the internet under 2,100 different licenses, each of which has obligations and varying levels of restriction. Legal obligations require at least one level of internal license review and typically involve accepting a disclaimer of warranty, limiting liability and protection of trademarks. While a code review may not affect a developer's work, if the code has not been reviewed for legal obligations, it can have implications for any organization using a developer's software.

To manage these challenges GENIVI created a Legal Working group to manage IP License compliance activities of the Alliance, ensuring technical work is legally sound and acceptable to the open source community. The group defines and manages licensing and copyright policies and creates essential legal guidance for code contribution and management, among other considerations.

To further improve the process, a separate, recently-formed License Review Team scans the code (disclaimer: the product used is Black Duck) and analyzes with the results.

Such best practices for the use and reuse of open source software require developers and development organizations to understand which licenses, components, copyrights and files are in the code and what obligations result from the mix of OSS, in-house and third-party software. Managing this requires a best practices-based strategy and tools to provide automated compliance, code scanning and reviews. Ecosystem partners benefit from increased efficiency among development organizations and reduce risk in an otherwise complex process. These efforts enable open source developers to more quickly and easily create infotainment systems to satisfy consumer demand, while helping automakers bring innovative systems to market quickly. This also creates savings in development time and other resources.

IVI Systems will undoubtedly evolve over the years. Using open source to fuel innovation will benefit customers and give auto manufacturers the chance to hold their own against the open source-powered mobile handset manufacturers creeping into their space. Look for GENIVI-based next generation IVI systems shipped in cars by BMW, Jaguar/Land Rover and other leading manufacturers coming to market as soon as the 2013 model year.

