



# WASHINGTON STATE

AUTOMOTIVE ICT

# THE CAR OF THE FUTURE: SOFTWARE ON WHEELS

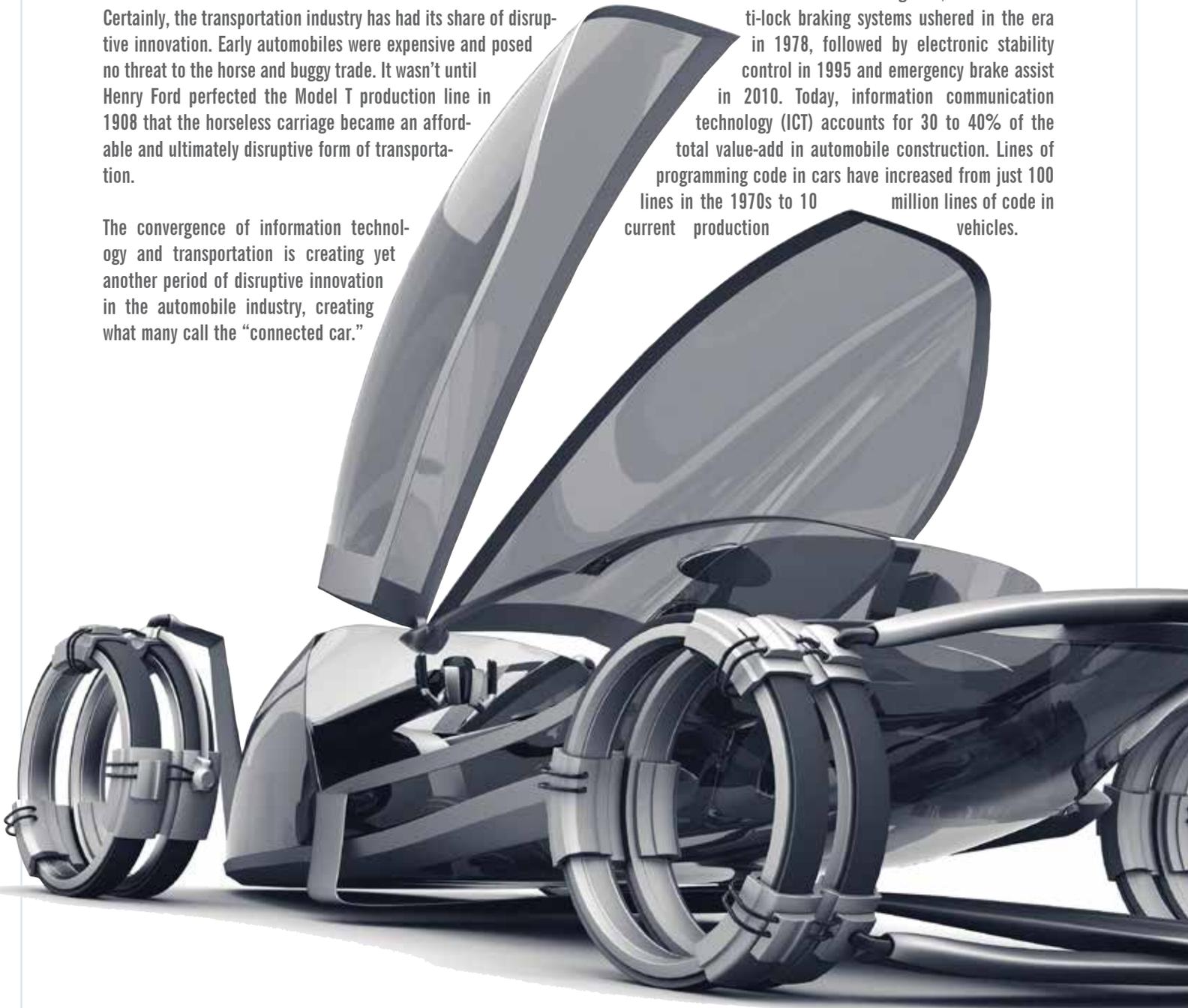
Disruptive innovation has the power to change entire markets in the blink of an eye. One only has to look at the photography industry to see this in action. Three hundred years of progress in film imaging was wiped away in just two decades by the arrival of low-cost, consumer-level digital cameras.

Certainly, the transportation industry has had its share of disruptive innovation. Early automobiles were expensive and posed no threat to the horse and buggy trade. It wasn't until Henry Ford perfected the Model T production line in 1908 that the horseless carriage became an affordable and ultimately disruptive form of transportation.

The convergence of information technology and transportation is creating yet another period of disruptive innovation in the automobile industry, creating what many call the "connected car."

Increasingly, cars and trucks are becoming as much software as hardware, redefining the marketplace and opening the door to new players who have the courage to challenge the status quo and play a role in reinventing the auto industry.

Automobile automation is nothing new, of course. Anti-lock braking systems ushered in the era in 1978, followed by electronic stability control in 1995 and emergency brake assist in 2010. Today, information communication technology (ICT) accounts for 30 to 40% of the total value-add in automobile construction. Lines of programming code in cars have increased from just 100 lines in the 1970s to 10 million lines of code in current production vehicles.

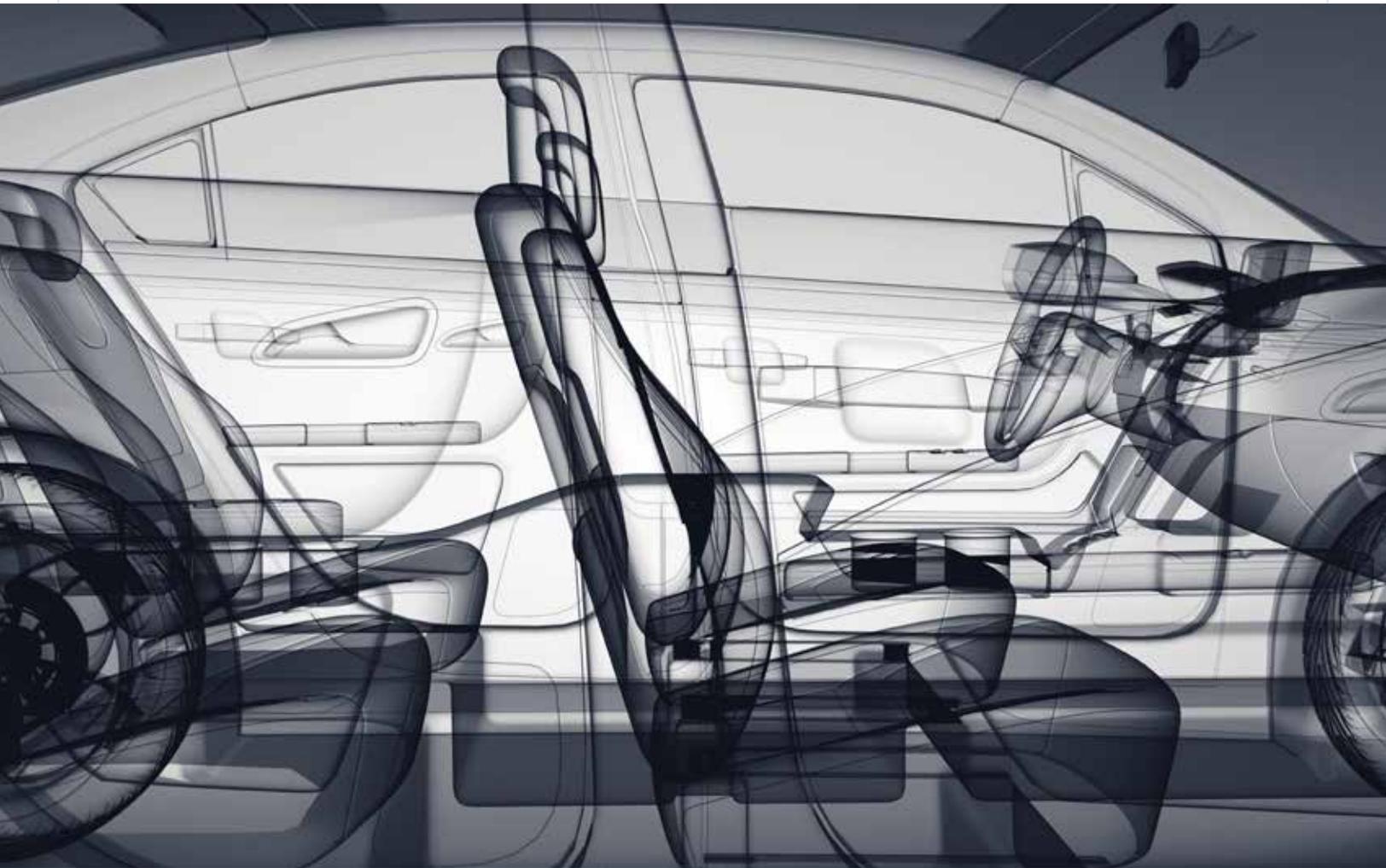


# THE INTELLIGENT VEHICLE

The need for smart cars is being driven by several social factors. The first is that the automobile itself is becoming less of a status symbol in developed countries, including the U.S. Instead, consumers are demanding thrifty vehicles that are more economical to operate and which can be customized to fit into a connected lifestyle where the automobile provides the same uninterrupted connectivity as the office or home. Car buyers also want safer cars, ones that can anticipate and analyze driving conditions and assist the driver in making informed decisions and even take evasive maneuvers automatically. Safety-embedded systems and Internet connectivity are making all this possible, and the growth of this market – thanks to innovations in the automobile industry as well as aerospace, clean tech and ICT is creating the perfect storm for disruptive innovation on a par with Henry Ford’s production line.

The industry is already developing new technologies that create a semi-autonomous vehicle, one where the driver is assisted with many of the ordinary driving tasks such as steering assistance to maintain a car’s position between lane markers, speed control to maintain proper vehicle separation, and road hazard awareness that allows the vehicle to predict and react to potential accident threats several cars ahead.

Completely autonomous vehicles have been in the testing stage since 2005, such as Google’s self-driving cars that have already logged 300,000 miles on test roads with only a single accident.



## POTENTIAL GLOBAL IMPACT

Intelligent vehicles will definitely have a disruptive effect on society and the economy at large. The McKinsey Global Institute estimates that 30,000 to 150,000 lives could be saved annually by 2025 through the adoption of semi-autonomous and self-driving vehicles. Fuel consumption could be reduced by as much as 15 to 20% with the ability to more accurately adjust speed and optimize separation on roads and highways. Additionally, CO2 emissions could be reduced by 300 million tons annually, equivalent to 50% of the total emissions generated by commercial aircraft.

For companies in the ICT automobile industry, these intelligent vehicles represent a \$100 billion to \$1.4 trillion market by 2025, according to McKinsey's study. Partially autonomous long-haul trucks could add another \$100 billion to \$500 billion to the market's potential.



## NEW SOFTWARE AND HARDWARE DRIVING CHANGE

Washington State's automobile ICT sector has been driving many of the changes in the marketplace. The state's leadership is due in part to the convergence of key state industries that are contributing to the reinvention of the automobile from the ground up, including ICT, aerospace, clean tech and composites.

Historically, car designs have relied on extensive hardwiring as the chief source of connectivity. But as the use of microcontrollers continues to rise, the cabling itself has become self-limiting, largely because of its complexity and vulnerability.

A solution can be found in Washington's aerospace industry. The concept of Integrated Modular Avionics (IMA) utilizes a network of computing modules that are capable of supporting numerous applications at different critical levels using a common API (application programming interface). New functionality is no longer based on hardwired controller devices but software, creating a new architecture where middleware distributes functions within the vehicle as well as outside of it, allowing the car to become part of a larger, connected transportation and communication ecosystem.

# OPPORTUNITIES AROUND FOR WASHINGTON FIRMS



This new approach to automobile design and ICT integration offers unlimited opportunities for companies that are looking to either enter or grow in the automotive ICT sector. Electrified drive trains will fundamentally alter the automobile manufacturing landscape, just as digital cameras eclipsed generations of know-how in photography. Electro-centric vehicles require new skills and knowledge, something that automotive manufacturers steeped in a mechanical tradition will find lacking in their own companies.

To compete effectively, manufacturers will increasingly need to rely on their supply chain to drive innovation. This is particularly true in automotive ICT where Tier 2 suppliers are already ahead of the curve when it comes to creating new solutions for connectivity, communication and vehicle operation.

Lacking the necessary expertise internally, automobile manufacturers are likely to expand their supply chains to hardware and software suppliers that can deliver these technologies. The market is also expected to offer new opportunities for after-market sales since the new ICT architecture will not only make vehicle functions easier to upgrade since they are software-based, but customizable as well.

Many Washington State companies have been at the forefront of reinventing transport vehicles for a decade or more. Microsoft's auto group has been working with manufacturers around the world on the connected car as it has evolved. From that work, companies such as INRIX and Glympse have emerged, marketing services that integrate mobile systems, analyze and predict traffic routes, share location information and manage wireless devices. Airbiquity offers Choreo, a cloud platform for connected vehicle programs that delivers the occupant's digital lifestyle into their car and manages a wide range of relationships between all the components. Companies partnered with Microsoft such as Electrobot, UIEvolution, BSquare and others are at the leading edge of developing infotainment systems for cars that improve usability of rapidly changing mobile technologies. Customer service benefits as well. Enprecis offers OEMs sophisticated customer feedback analysis tools that connect manufacturers and owners with transmitted performance data to improve vehicle quality, reliability, design and consumer loyalty.

## LEADING THE WAY IN ICT



Automotive ICT is still in its infancy and the market is wide open. This provides savvy companies as well as start-ups in Washington State with an ideal environment for disruptive innovation, allowing the best and brightest ideas to rise to the top. This not only includes innovation in the electronic architecture of vehicles of the future – from the computing modules and hardware to the software that adds functionality and customization to the cars of tomorrow – but the ability to influence the very standards the industry uses. Forward-thinking companies may also look to the day when drivers become passengers and a whole new market for infotainment or worker-productivity tools evolves to fill free time once used for driving. This singular disruptor has spillover effects into other industries, from auto insurance where fewer accidents reduce claims and impact insurance industry profit models to the trucking industry where 3.5 million drivers, displaced by automation, require new training programs so they can work in other fields.

No one is quite sure how this particular disruptive force in the automotive industry will ultimately play out. What is certain is that Washington State – with its critical mass of ICT, aerospace, clean tech and advanced materials companies and pool of top-tier talent – is well positioned to become a dominant player in the automotive ICT industry.

# LOOKING FOR SMART, INNOVATIVE SOLUTIONS?

Washington State companies can help solve issues facing the industry and work together to deliver incisive solutions to meet current and future needs.

For more information on the automotive IT sector in Washington State, contact Wistar Kay at 206.256.6141 or email her at: [automotiveICT@choosewashington.com](mailto:automotiveICT@choosewashington.com).

Or visit us at [www.choosewashington.com](http://www.choosewashington.com)



**CHOOSE**  **Washington**  
STATE



Department of Commerce  
Innovation is in our nature.