In the emerging “collaborative intelligent transport” strategic segment, vehicles will interact with “everything.” They will interact with one another and with diverse types of infrastructure within and alongside the road or available by wireless communication. Through these interactions, the vehicles can share data about location, speed, direction, road conditions, traffic, weather, and much else.

For Croatian firms, opportunities lie in designing innovative applications that take advantage of the advances in this strategic segment’s emerging “vehicle-to-everything” technology.
“Intelligent transport” systems include planning, operations management, and customer service applications that use information and communications technology to make transport networks safer and more efficient.

The estimated size of the intelligent transport industry worldwide is EUR 18 billion. The United States, the European Union, Japan, and the Republic of Korea are in the lead—and China is growing quickly.

In Croatia, 19 firms have production of intelligent transport technologies or applications as their core business. They reported revenues of EUR 39 million in 2016.

Global trends are reshaping the competitive landscape for intelligent transport:

- **Urbanization.** By 2030, rapid urbanization, rising density, and growing wealth could double the 1.2 billion cars on the road today, increasing traffic and congestion.

- **Climate change.** The push to reduce carbon emissions is resulting in ever more stringent (and more costly) environmental regulations for manufacturers.

Emerging fields like big data, artificial intelligence (AI), and machine learning are changing the intelligent transport industry. As network connectivity and bandwidth improves, vehicles will be able to stream rich data continuously.

Industry trends are changing in response:

- **Technology.** Emerging fields like big data, artificial intelligence (AI), and machine learning are changing the intelligent transport industry. As network connectivity and bandwidth improves, vehicles will be able to stream rich data continuously.

- **Electrification.** Changing regulations and advancing battery technology are encouraging a switch to electric vehicles. China, France, and the United Kingdom have announced plans to ban sales of conventional cars by 2040.

- **Autonomous vehicles.** By 2030, 15 percent of cars could be autonomous, with 50 percent having advanced driver assistance.

- **Smart mobility.** With advances in technology and connectivity, cars have evolved into sophisticated mobile software platforms. Software will account for 30 percent of the overall value of cars by 2030.

- **Shared mobility.** By 2030, one out of 10 cars sold could be a shared vehicle. Ride-hailing services like Uber will be early adopters of autonomous vehicles.

- **Integrated intelligent transport platforms.** Smart mobility, AVs, and streaming data will open the door for large-scale integrated intelligent transport platforms. They will organize and direct traffic, minimize time spent idling, reduce congestion, and decrease accidents.
Strategic segments that target urban (rather than rural) transport offer opportunities for Croatian firms developing intelligent transport systems and logistics.

- Global trends toward urbanization mean that road traffic networks in cities will become denser. This trend will create significant business opportunities for intelligent transport firms.
- The newness of the sector offers a window of opportunity for Croatia’s smaller, innovative firms to establish themselves.
- The “collaborative intelligent transport” strategic segment offers salient opportunities for Croatian firms.

### ITS Applications in Road Transport

**(In-)Vehicle Safety Systems**
- Collision avoidance systems
- Lane departure warning systems
- Drowsy driver warning systems

**Roadway Safety Systems**
- Intersection collision avoidance systems
- Dynamic curve warning systems
- Wildlife detection systems

**Incident and Emergency Response**
- Automatic crash notification systems
- Emergency vehicle preemption
- Real-time data sharing

Source: based on United States Department of Transportation (USDOT).
“Collaborative Intelligent Transport”

Intelligent, networked vehicles collaborate to smooth traffic flows, reduce environmental impact and minimize fatalities

In “collaborative intelligent transport,” networks of connected vehicles continuously interact with one another and roadside infrastructure to get passengers to their destinations quickly and safely. Each car is a node in a network where all nodes collaborate to smooth the flow of traffic, reduce environmental impact, minimize fatalities, and manage other outcomes.

“Collaborative intelligent transport” is tied to the emergence of autonomous vehicles. It is only with the implementation of “collaborative intelligent transport” that autonomous vehicles can fulfill their promise of drastically reducing accidents and congestion.

The emerging “collaborative intelligent transport” strategic segment has a unique value chain that reflects technological innovation required to be competitive globally. It requires:

- **Collaborative, connected, and automated mobility.** Advanced buyers will call for “collaborative intelligent transport” networks that revolve around an integrated and interconnected transportation ecosystem. All elements will communicate with one another to supply dynamic traffic information.

- **Enhanced communication networks.** To reap the benefits of “collaborative intelligent transport,” localities must have enhanced communication networks—especially 5G wireless technology—to transmit the enormous amounts of data produced by legions of interconnected vehicles.

- **Data protection.** Networks of connected vehicles transmitting large volumes of data raise serious issues about data privacy and security. In the EU, such data falls under the strict requirements of the General Data Protection Regulation (GDPR).

- **Cybersecurity.** Public acceptance of “collaborative intelligent transport” will hinge on confidence that hackers cannot interfere with vehicles. Local authorities will demand top-notch cybersecurity systems.

- **Interoperability.** A Croatian “collaborative intelligent transport” solution will need to interoperate with the wider European network. A vehicle traveling through the EU needs to communicate with roadside infrastructure and other vehicles across the entire length of the trip. Croatian firms will need to adhere to EU requirements strictly.

By 2030, one out of 10 cars sold could be a shared vehicle. Ride-hailing services like Uber will be early adopters of autonomous vehicles.
Where Is the Value Chain Weak?

Croatian companies’ ability to enter the emerging “collaborative intelligent transport” strategic segment will depend on their ability to evolve their offerings to meet buyers’ demands. Croatia lags in:

- **Wireless network infrastructure.** “Collaborative intelligent transport” can advance only if Croatian providers keep pace with upgrading wireless communications networks to the next-generation 5G standard.

- **Data science skills.** Participating in the “collaborative intelligent transport” strategic segment requires collecting, managing, processing, analyzing, interpreting, and distributing ‘big data.’

- **Research, trial, and testing facilities.** These facilities are essential given the EC’s goal to begin deploying “collaborative intelligent transport” in the EU by 2019. They are also necessary to meet the stiff competition the sector faces from the United States and East Asia.

- **Croatia has no established industry around “vehicle to anything” technology.** “Vehicle to anything” communications devices are necessary for participating in a “collaborative intelligent transport” network. The number of personal vehicles capable of “connecting to anything” will rise dramatically from 150,000 in 2017 to 35 million in 2022. By then, over 50 percent of all new vehicles will have “vehicle to anything” devices.

“Collaborative intelligent transport” can advance only if Croatian providers keep pace with upgrading wireless communications networks to the next-generation 5G standard.
Areas for Reform

Certain aspects of the industry ecosystem limit Croatia’s competitiveness in the emerging “collaborative intelligent transport” strategic segments.

Factor Conditions

Labor productivity is low. From 2000 to 2014, productivity increased by only 20 percent while real wages increased by over 70 percent. The fact that wage increases are outpacing productivity gains gives cause for concern about the long-term cost-competitiveness of the Croatian workforce.

Access to finance is limited. Typical short-term loans have interest rates of 4.7 percent in Croatia, compared with an average of 2.3 percent in the Eurozone.

Vocational education and training could be better targeted. Croatian universities could better target skills in new but important industry areas like data science, machine learning, AI, and cybersecurity.

Strategy, Structure, and Rivalry

There has been little collaboration among Croatian intelligent transport firms. Croatian intelligent transport firms are highly complementary. However, companies in the intelligent transport sector have only recently recognized their common interests.

Related and Supporting Industries

Croatia has limited systematic research collaboration between the public and private sectors. Cooperation on specific projects between the private sector and academia depends on private contacts and individual efforts.

Companies in Croatia are less innovative than their neighbors. The R&D intensity of small firms in Croatia is in 16th place in the EU; for medium-sized firms, it is in 21st place. A few multinational companies account for most business investment in R&D.

There is a tight link between “collaborative intelligent transport” strategic segment and the automotive industry more generally. However:

- The Croatian automotive industry is fragmented. It focuses on small-batch production and export of traditional auto components (leather, plastic, and metal parts). No international automobile maker is present in Croatia, unlike in most of the neighboring countries.

- Croatian auto parts manufacturers have not been at the leading edge of the transformative technologies or trends that threaten to upend the transportation sector. (Rimac Automobili, which has produced several electric vehicle prototypes, is a notable exception.)
Recommendations

Croatia could improve its position in emerging urban mobility strategic segments by:

1. Create a first integrated “collaborative intelligent transport” city. The City of Zadar wants to create an integrated intelligent transport platform to improve the efficiency of its transportation network. The platform would also enhance the experiences of the thousands of visitors who travel the road, rail and ferry networks of the city and the surrounding region each tourist season. Implementation of this recommendation would be supported by a comprehensive financial support scheme for public procurement of innovative goods and services (as a technical assistance program for line ministries).

   Estimated timeframe: 3–5 years.

2. Ensuring open access to publicly held mobility data while protecting privacy is crucial. It will encourage the innovation of new applications that can monetize that data while respecting individual rights. MoEEC and other relevant agencies could implement appropriate regulatory reforms through public institutions and government agencies.

   Estimated timeframe: 3 years.

3. Technology scouting would help find new firms in the “collaborative intelligent transport” strategic segment that could partner with Croatian firms. MoEEC could implement this recommendation (through a technical assistance program) as a matching grants scheme.

   Estimated timeframe: 3 years.

4. Develop a pilot to introduce 5G technology. Since the functionality of ITS is heavily tied to 5G wireless technology, the MoEEC and other relevant agencies could develop pilots for multimodal intelligent transport solutions and for testing the interoperability of firm technologies in a 5G network environment. Such pilots could be managed through an innovative public procurement in cities such as Osijek.

   Estimated timeframe: 3–5 years.

5. Big data initiatives—especially open data initiatives—could play a catalytic role in the “collaborative intelligent transport” strategic segment. MoEEC and other relevant agencies could spur such initiatives through public procurement.

   Estimated timeframe: 5 years.

6. A technical center in the intelligent transport sector could help Croatian firms face the challenges of the “collaborative intelligent transport” strategic segment, including the onset of 5G wireless technology. The Ministry of Economy Entrepreneurship and Crafts (MoEEC), the Ministry of Science and Education, the Ministry of Labor and Pension Systems, and other line ministries could implement this recommendation.

   Estimated timeframe: 10 years.

NOTE
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