#SMARTer2030

ICT Solutions for 21st Century Challenges

GeSI
GLOBAL e-SUSTAINABILITY INITIATIVE

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3.5 Mobility – Reaching your destination, not a dead end

Smart Mobility and Logistics – The Context

Transportation and logistics are vital drivers of economic activity in developed and emerging markets alike, but existing infrastructure is increasingly proving to be insufficient to cater to the growing demand for the transportation of people, goods and materials.

By 2030, there will be about 2 billion vehicles on the road and a need for an additional 15 billion km of paved roads.

Across the globe today, there are one billion vehicles on the road. As a result of globalization and of a rapidly rising middle class this number is expected to double by 2035. To support growth of this kind, we would need roughly 15 million km of extra roads[1]. This means, more vehicles, more roads, more miles traveled – resulting in additional congestion, fuel consumption, pollution and emissions. Likewise, rail capacity is going to rise. By 2030, about 100,000 kilometers of additional rail track will be needed[1].

Although growth in mobility is desirable, it may lead to negative environmental or social consequences if done in an irresponsible way. At the moment, global logistics operations are highly fragmented and inefficient, with unused or redundant capacity across supply chains. These inefficiencies are expected to worsen as the number of people and products transported increases, resulting in significant waste of fuel, energy and materials. Therefore, businesses are looking for ways to improve efficiency across entire logistics chains.

There are opportunities to create a mobility and logistics sector that is much more sustainable. Enhanced connectivity through ICT could significantly increase efficiency while reducing congestion, emissions, and resource consumption. Innovative technologies like electric vehicles and driverless transportation could make personal mobility more sustainable and efficient. In addition, intermodal transportation and vehicle sharing could help reduce congestion and miles traveled. Through the Internet of Things, any product, vehicle or load unit can be connected to another, creating a system that enables products to be transported in the safest and most efficient way.

Smart Mobility means the use of ICT to reduce the need for travel or, where unavoidable, reduce its impact. Smart Mobility can apply to both people and freight.

[1] IEA Report on Global Land Transport Infrastructure Requirements (2013): https://www.iea.org/publications/freepublications/publication/TransportInfrastructureInsights_FINAL_WEB.pdf

What is Smart Mobility and Logistics?

Smart Mobility and Logistics fall into three categories: *Connected Private Transportation*, *Traffic Control and Optimization* and *Smart Logistics*. Each of the three areas have separate applications, but all three can help make transport more sustainable and efficient.

Traffic Control & Optimization is facilitated through connected smart sensors, location-based applications and intelligent infrastructure, all working together to make traffic, driving and parking more efficient.

Connected Private Transportation means connecting people and vehicles that have similar origins or destinations. For example, smartphone enabled car-sharing or car-pool platforms can help travelers meet each other at designated spots to travel together.

Smart Logistics is about connecting vehicles, products and load units, thereby improving route and load optimization and reducing the amount of waste in the system.

Smarter transportation is important because of the embedded convenience, reliability and efficiency it brings to travel and logistics

The Future of Smart Mobility and Logistics

Smart Mobility and Logistics Solutions will be an important part of the solution to global mobility challenges. The ICT solutions that will optimize private mobility, traffic control and logistics, for example, are also likely to have a disruptive effect on the industry, challenging incumbents to change their ways while new actors play a growing role.

According to Gartner and Accenture Strategy research, the role of disruptive ICT in transportation will mature in about a decade. While the common use of less advanced technologies like location sensing is likely to become commercially viable by 2017, complex solutions like public telematics, connected infrastructure and connected or driverless vehicles may take a decade before becoming widely available. More specifically, we foresee the following developments in the three main categories of Smart Mobility and Logistics:

Connected Private Transportation

ICT-enabled car and ride sharing will allow for much better utilization of the existing fleet of cars, lowering overall fuel consumption and emissions. Car sharing can also reduce the need for vehicle ownership, providing additional benefits like saving time and money.

‘Driverless vehicles’, where all vehicle driving functions are taken care of by an onboard computer, are also likely to significantly impact private transport, disrupting the personal transport industry in the process. Furthermore, drivers and passengers are likely to have increasing access to connected services in their vehicles – enabling enhanced communication, navigation and entertainment capabilities, and contributing to individual safety as well as to traffic control and route optimization (see below).

Traffic Control & Optimization

ICT solutions can significantly support the controlling and optimization of traffic. They can contribute to safety and convenience through, for example, collision alarm and lane-keeping-systems, but also connect private vehicles to smart roads, lights and traffic control systems.

Connectivity between cars, roads, lights and control systems allows for the gathering of *real-time* information on traffic conditions. Traffic control and optimization platforms can use this data to generate insights for drivers, such as the optimal driving speed to avoid congestion, the best route to avoid a traffic jam or the nearest available parking spot. Improved information, prediction and planning will allow for more efficient driving, routing and parking, leading to fewer accidents and, of course, a reduction in congestion and emissions.

Smart Logistics

ICT-enabled solutions like advanced data analytics, telematics and sensor technology allow logistics companies to increase both the flexibility and the efficiency of road, air, train and marine freight by connecting the dispatching office with entire fleets, individual vehicles, roads, load units or even specific products.

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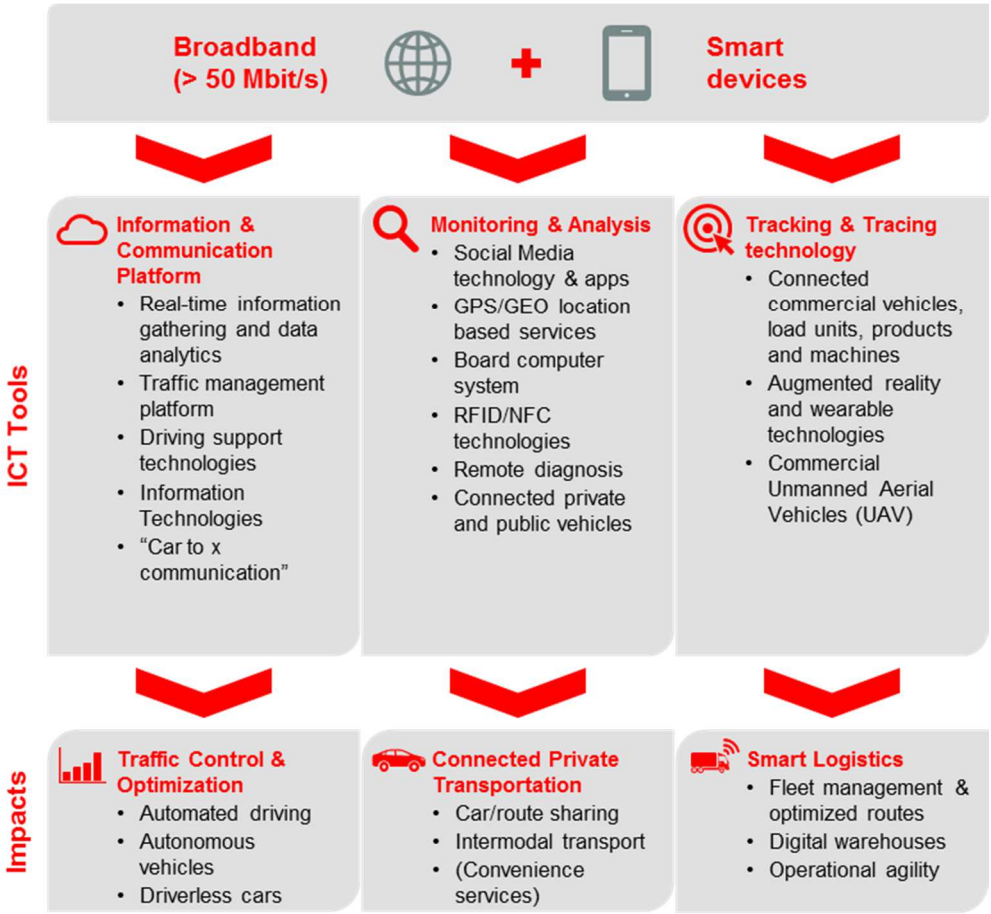
Tools like fleet management and route optimization systems can increase operational efficiency and planning while reducing costly redundancies, empty runs, outages, accidents, or damage to goods. Connected devices can also support the tracking and monitoring of items' location and status, even allowing for flexible and individual rerouting during a particular journey.

Figure 24 summarizes the potential of ICT to lead to a faster and greener logistics sector.

Figure 1: Mobility - Future of Smart Mobility and Logistics: Technology Vision for 2030



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Sustainability Impacts of Smart Mobility and Logistics

The transition to smart, sustainable mobility brings a number of sustainability benefits. Efficient public and intermodal transport systems save commuters' time, generate economic benefits, and reduce emissions. For example, Mexico City is estimated to recover $141 million in economic productivity from just one of six lines of its Metrobús BRT system.[2]

Our research shows that the emissions savings from the three use cases analyzed, comprising Connected Private Transportation, Traffic Control & Optimization and Smart Logistics could abate 2.6Gt CO_{2e}, representing 21.5% of total ICT-enabled abatement potential by 2030. Furthermore, if we consider the reduced need to travel arising from changing practices across other sectors such as health, learning, work and commerce we can add another 1.0Gt CO_{2e} emissions reduction from the mobility sector.[3]

The US, China and India are the countries with the highest abatement potential for traffic control & optimization, with China accounting for almost 50% of the abatement potential for Smart Logistics.

ICT-enabled mobility solutions provide significant benefits, as illustrated here:

750 billion liters of fuel savings: 236 billion liters of fuel could be saved in 2030 through traffic control and optimization, and 220 billion liters of fuel through connected private transportation. By 2030, smart logistics solutions could generate savings of 267 billion liters of fuel and 3.8 billion kg of wood.

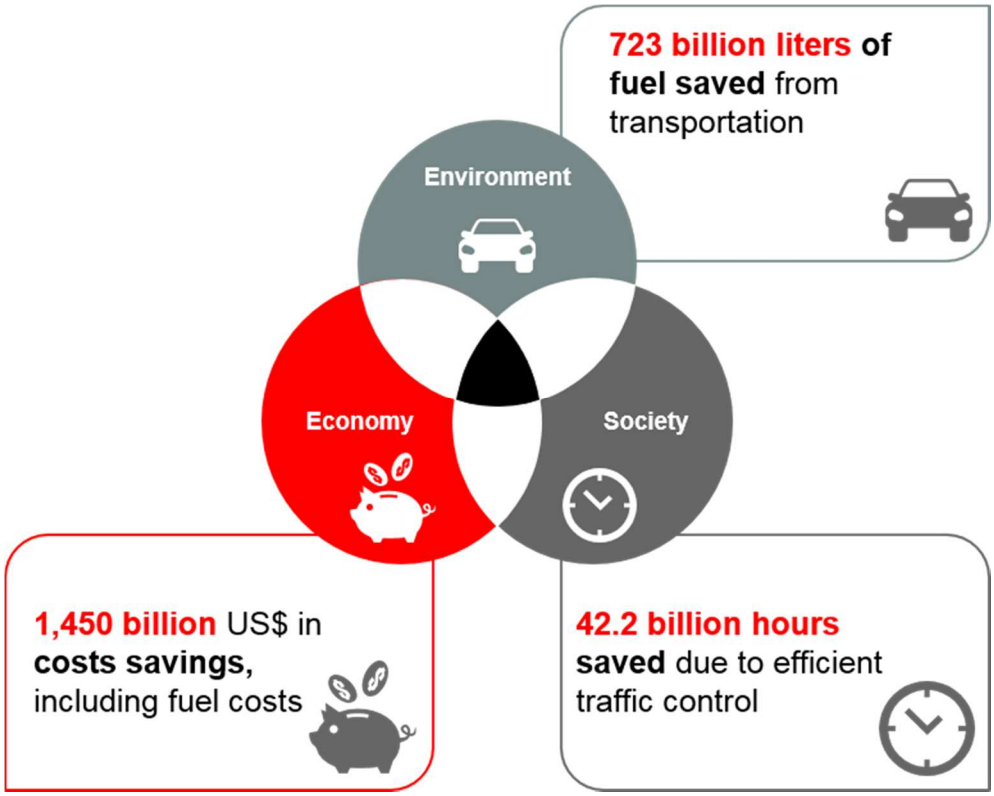
$1 trillion of avoided costs: In economic terms, traffic control and optimization could translate into $409 billion of avoided costs and connected private transport to around $611 billion of avoided costs. Various smart logistics processes and methods could also add an additional value of around $174 billion by 2030 to the economy as a whole.

Around 42 billion hours saved in 2030: Efficient traffic management solutions and high quality navigation systems could save around 42 billion hours by 2030. As a result of car sharing, 135 million cars could be taken of the road by 2030. And for society at large, the various Smart Logistics solutions we have modelled could significantly reduce negative externalities like noise, traffic congestion, and health and safety risks, leading to a safer, cleaner and more peaceful urban environment.

[2] World Resource Institute (2015), Who Needs Cars? Smart Mobility Can Make Cities Sustainable

[3] In our report we have highlighted the emission reduction where they first occur, e.g., the reduced emissions from fewer trips to healthcare facilities are covered in the report chapter on health.

Figure 2: Mobility - Benefits of Smart Mobility and Logistics



Networkfleet – BLS puts the brakes on rising fleet management costs with Networkfleet

BLS Trucking, one of the largest independent delivery services companies in the Midwestern US, was struggling with rising fuel expenses, vehicle theft, outages and logistical inefficiencies. In order to address these challenges, BLS adopted Verizon's Networkfleet, a wireless fleet management system that merges diagnostic monitoring with GPS-based automatic vehicle location technologies. The system provided BLS with an effective way of tracking and monitoring every single vehicle in their fleet and collecting information on location, idle time, odd-hour usage and fuel consumption.

By making the entire fleet visible and more transparent, Networkfleet helped BLS save an estimated $188,000 in fuel costs during the first year by eliminating unauthorized usage and unnecessary idle time. In addition, it enabled the company to perform predictive maintenance, reduce breakdowns and repair costs, prevent theft, and protect drivers from wrongful claims.

CityNext - A strong transit system for a livable and sustainable city

More than 50% of the world's population now lives in urban areas and this share is expected to grow. Traffic congestion already is a major challenge and as urban populations increase, this problem is set to get worse. Public transport systems are key in addressing this challenge and help to reduce urban air pollution and CO2 emissions. Cities increasingly rely on public transportation systems to help citizens and visitors to get where they need to go. Working with Microsoft, city-owned bus operator Helsingin Bus-siliikenne Oy (HelB) in Helsinki, Finland, expanded its data warehouse solution to collect and analyze data from bus sensors to reduce fuel consumption, improve driver performance and make bus rides smoother and safer. The installed bus sensors generated more than 4 million lines of data every day, reporting on fuel usage, acceleration, speed, engine temperature, brake performance and GPD location for each driver, route and vehicle. The ICT-enabled system combined data across all of the operator's 400 buses.
Careful analysis of bus data helped HelB to reduce its fuel consumption across its entire fleet by 5%, helping the city reduce its carbon footprint. In addition, using this public transport data solution, companies can monitor driving behavior and incidents and can share this information with drivers in order to improve comfort and safety of them and their passengers. In the case of HelB, driver satisfaction was increased by

7%. The solution also allowed the company to monitor mechanical conditions, identify issues and problems and even allows for predictive maintenance of vehicles.

Smart Parking – Innovative parking space optimization pilot project

Together with partner BT and the Open University, Milton Keynes Council in the UK decided to accelerate its development into a smart city by initiating a pilot project aimed at citywide parking space optimization. Hosted by BT, the established Milton Keynes Data Hub collects and analyzes parking sensor data sent to receivers on lampposts via innovative wireless technologies. As one of the fastest growing cities in the UK, Milton Keynes is now able to expand within local infrastructure constraints by identifying free parking spaces and sending information to roadside displays and smartphone apps to guide vehicles towards them.

In addition to real-time information on parking availability, the sensors also provide data on average parking duration, allowing the city to adjust parking restrictions and better meet customer needs. At any point in time there are about 7000 free parking spaces available, but without smart parking guiding people to them, at least 12, 000 more spaces will be needed by 2020. Fully deploying this ICT-enabled smart parking solution could provide capital savings of least £105 million to this city alone. In addition to economic benefits, the solution also contributes to 50% less traffic congestion and reduced fuel use and vehicle emissions.





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Major conclusions independently reviewed by

- John A. “Skip” Laitner, Economic and Human Dimensions Research Associates, and President, the Association for Environmental Studies and Sciences
- Mike Berners-Lee, Director, Small World Consulting

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Contact information
Global e-Sustainability Initiative (GeSI)
c/o Scotland House
Rond Point Schuman 6
B-1040 Brussels
Belgium

Tel: +32 2 282 84 42
Fax: +32 2 282 84 14

General enquiries: info@gesi.org
Press enquiries: press@gesi.org

About GeSI

The Global e-Sustainability Initiative (GeSI) is a strategic partnership of Information and Communication Technology (ICT) companies and organizations committed to creating and promoting technologies and practices to foster economic, environmental and social sustainability. Formed in 2001, GeSI's vision is a sustainable world through responsible, ICT-enabled transformation. GeSI fosters global and open cooperation, informs the public of its members' activities to improve their sustainability performance, and promotes innovative technologies for sustainable development. GeSI's membership includes over 30 of the world's leading ICT companies; the organization also collaborates with a range of international stakeholders committed to ICT sustainability objectives. These partnerships include the United Nations Environment Program (UNEP), the United Nations Framework Convention on Climate Change (UNFCCC), the International Telecommunications Union (ITU), and the World Business Council for Sustainable Development (WBCSD). Such collaborations help shape GeSI's global vision on evolution of the ICT sector, and how it can best meet the challenges of sustainable development. For more information, see www.gesi.org.

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