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The 14th Economic International Conference: *Strategies and Development Policies of Territories: International, Country, Region, City, Location Challenges* | May 10-11, 2018 | Ștefan cel Mare University of Suceava, Romania

IT&C under the Pressure of Economic Competition and Political Decision

Doru E. TILIUTE¹

Abstract

This paper presents a personal perspective on the most recent disclosures on how information technology was used to break laws, to change buyers' behaviour by making them buy new and more expensive products, or even risking the safety and the life of the consumers and other people.

Keywords:

IT&C, privacy, competition, misleading information, polices.

1. Introduction

It is clear that our lives today are governed by technology in which IT&C plays the most important role. Any person involved in activities, be they social, economic, or political, that wants to be connected to realities of everyday life interacts with technology. All advances in medicine, industry, art, entertainment and even education have benefited greatly from the achievements of information and communications technology. More or less we are dependent on this technology. All these impressive achievements are only one side of the coin. Many inventions that people have made for the progress of society have been used for less noble purposes: the gearwheel and electric light have been used for torture, and dynamite is used to destroy what people have built. Information technology makes no exception. Under various influences it is used to destroy, to deceive, to influence and for other obscure

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purposes. This article presents some of the latest cases reported in the press about the use of technology for purposes such as those mentioned above.

2. Dieselgate Scandal

2.1. Background

In order to reduce the global consequences of the greenhouse effect, consisting of major climate changes, an agreement known as the Kyoto Protocol was negotiated in December 1997 by representatives of 160 countries. The main goal of the Kyoto Protocol is to control emissions of the main greenhouse gases (GHG) according to the GHG emissions, wealth, and capacity of each country to make the reductions.

The politicians accepted, in principle, the conclusions of scientists but, under the pressure of particularly strong economic interests, the action remains rather at the declarative level [1]. Of all the participating countries, USA had the most defiant attitude, withdrawing from the agreement in 2001, before it became effective in 2004.

The Kyoto agreement aimed at reducing CO₂ emissions, which is considered as the main factor responsible for the greenhouse effect. An important share in the emission of this gas is transportation. In Europe, the share of transport-related carbon dioxide grew from 21% in 1990 to 27% in 2005 [2]. As a result, European car manufacturers have focused their efforts on improving engines to reduce their CO₂ emissions. At the same time, the European Union has encouraged the expansion of the use of diesel engines, which consume less carburant for the same power and their gas emission contains lower CO₂ concentrations.

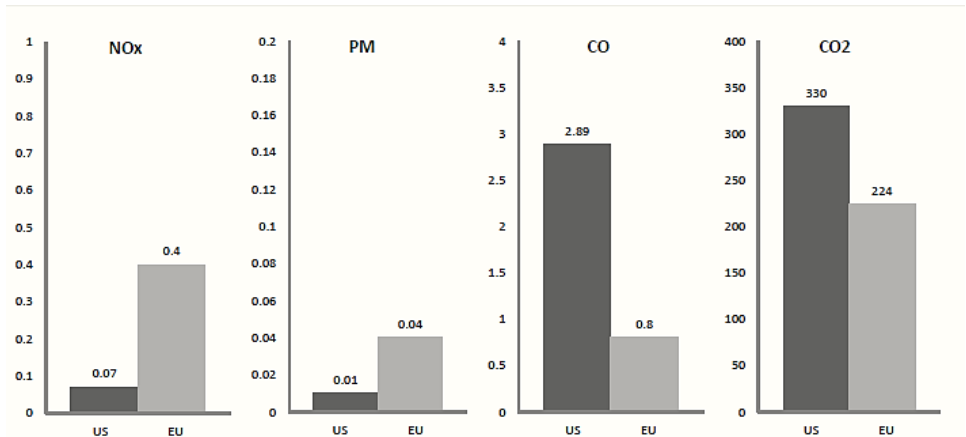


Figure 1. Differences in US and EU emissions standards.

SOURCE: David Herron Differences in US and EU emissions standard key cause of Dieselgate. The Long Tail Pipe, Oct. 2015

On the other side, USA had its own policy for reducing gas emission produced by vehicles, focused on reducing Nitrogen Oxides (NO_x) and Particulate Matter (PM), figure 1 [3]. These low concentrations of NO_x are difficult to obtain from Diesel engines so, compared to Europe, the USA market share of Diesel cars is much lower than that of cars with gasoline engines.

Even European Laws regarding pollution have tried to limit the emission of Nitrogen Oxides (NO_x), but on a smaller scale. Figure 2 shows how the European Nitrogen Oxides emission norms have evolved over time compared to real facts, measured in traffic [4].

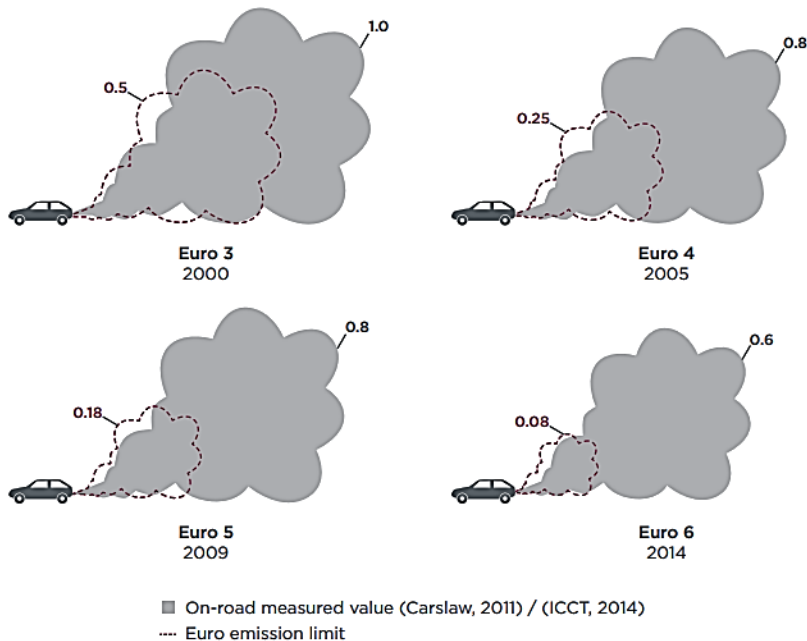


Figure 2. NO_x emission limits for diesel cars in the EU between 2000 (Euro 3) and 2014 (Euro 6). But over that period on-road emission levels decreased slower than the norms.

SOURCE: Vicente Franco et al. Real-world exhaust emissions from modern diesel cars

2.2. The Scandal

In their pursuit of conquering and maintaining markets outside Europe, German automobile manufacturers modified the on-board software of the exported diesel cars in an attempt to conceal the real amount of gas

emission. This led to gas emission to spike to over 40 times the accepted value.

The scandal started in 2015, when the United States Environmental Protection Agency (EPA) found that Volkswagen had equipped cars with specific software that might detect test conditions and, as consequence, reduce its emissions to improve the results.

Subsequently, other German carmakers, like Daimler - the maker of Mercedes-Benz cars [5], were suspected of having mastered the tests [6].

It is clear that toxic gas and greenhouse gas emission reduction programs are a political decision. What is less clear is whether these programs are realistic and if they are consistent with the technological progress in the automotive industry. The political decisions have put a lot pressure on car manufacturers and, in lacking substantial progress in engine construction, the idea of changing the engine behavior to trick the emission tests was very tempting.

Could we say that is the fault of IT for that situation? I would argue no.

3. Apple in Spotlight

Apple Inc. is one of the most exclusivist American technology company that designs, develops, and sells consumer electronics, computer software and online services. While Apple's computers are much more popular in the US, their iPhone (the cell phones) are spread all over the world and are highly regarded despite the very high price. Competing with not only other manufacturers, like Samsung, but also with itself and its previous models, Apple release a new iPhone product often twice a year. In these conditions it is very hard to bring innovative and useful features with every new model. However, new models must be sold, and they became more and more expensive with every new feature implemented.

3.1. Batteries' Achilles' heel

For all cell phone manufacturers, the batteries are a major challenge: they must be as small as possible, they should store as much energy and have a lifespan as long as possible. Small size and high storage capacity are contradictory requirements for a battery and it is very difficult to compromise between them. Without significant advances in materials and technology, any attempt to overcome the actual limits just for the sake of a competitive edge in the market has extremely unpleasant consequences, as the company is affected in both financial terms and in its brand image. This

was the case of the exploding batteries on Samsung Galaxy Note 7 cell phones, which cost the company at least \$5 billion [7].

3.2. Two birds, one stone

Apple is not exempt from these challenges and faces the same limitations. However, Apple focused on the third drawback of lithium-based batteries, which equips all mobile phones, namely the decreasing of performance with aging. Thus, the software engineers from Apple have chosen to manipulate the operating systems such that, with its upgrades on older phones, their performance slows down, resulting in a lower power consumption and a longer battery life. Guessing that users expect a newer operating system to reduce the speed of the phone, Apple actually concealed that the iPhone battery quality was not far from the others, but it seemed to have a higher durability. At the same time, lowering the performance of old phones has led their owners to buy new ones, helping the company to increase its profit in a way that is ethically questionable. The trick was discovered by John Poole of Primate Labs, Canada, who determined that the cause of the slowdown was introduced in iOS 10.2.1, late in 2016, but he didn't guess, at that time, the reason for its diminishing performance [8].

In the investigation of the Standing Committee on industry, science, and technology of Canada House of Commons, Apple's representatives denied that the change of battery power management software was made to force users to buy new phones but to keep phones running and prevent their unexpected shutdown. However, Apple decided to reduce the price for replacement batteries from \$79 to \$29 until December 31, 2018, which says a lot about the company's complicity.

As in the story of Dieselgate scandal, changing computer software is very convenient because it is a cheap solution and difficult to find, much harder than attaching additional devices which are easily detectable.

4. The Robots Hit the Roads

Information technology has quickly penetrated the automotive industry, first with small improvements of some specific issues such as ignition control or windscreen wipers, increased driver and passenger comfort, and now with the almost complete control of the car. What's next?

For many folks, driving cars is a pleasure. For others it's a way of earning a living. In both cases drivers have to demonstrate some skills and pass several tests, including a driving test. The driving license regulations vary quite a lot from one country to another, but nowhere is it allowed to

drive a car without a license. Those who have not the knowledge of road legislation and do not have the necessary skills have no right to drive the car. This can lead to great frustration, given that on the one hand holding a luxury car is an emblem of a certain social standard and on the other hand the feeling of inferiority towards colleagues, friends, relatives or even neighbours who own such vehicles.

The rhythm of life imposed by the society we live in requires great individual autonomy, including the possibility of quickly moving from one place to another, near or far. Without a personal driving license, the need for autonomous mobility becomes a problem without a solution.

Now, putting together the three aspects mentioned in the paragraphs above, we find that the need of innovation in the automotive industry, combined with the possible requests from those who don't or can't drive, but require mobility, leads to the idea of developing autonomous self-driving cars.

4. Behind the Scenes

Throughout the modern history of humanity, machines have partially, or in some cases totally, replaced those human activities that were either monotonous, repetitive or physically demanding, or demanded high concentration and precision over long periods of time. Replacing human work has been, despite concerns and criticism, a social and economic need that has brought progress and well-being by increasing the labor productivity and the lowering the price of products that have become more accessible. From this perspective, the idea of developing self-driving cars is different because it does not respond to an imminent economic and social need.

Actually, the story of self-driving cars is not so recent; it began in the early 60s of the previous century, as a concern for developing autonomous cars for moon missions. The most well-known project is *Stanford Cart*, developed at Stanford University in the early 60s by the graduate student James L. Adams within his research project on the problem of controlling a remote vehicle using video information, figure 3. Compared with current concepts in computer science, the algorithms used in Stanford Cart seem rudimentary, and traffic conditions on the moon do not compare to those in the big cities.

Significant advances in self-driving vehicles have been obtained in laboratory research and applied on model cars, few of them “escaping” out of the walls. Even Stanford Cart has been adapted and tested on road conditions in the late 60s.

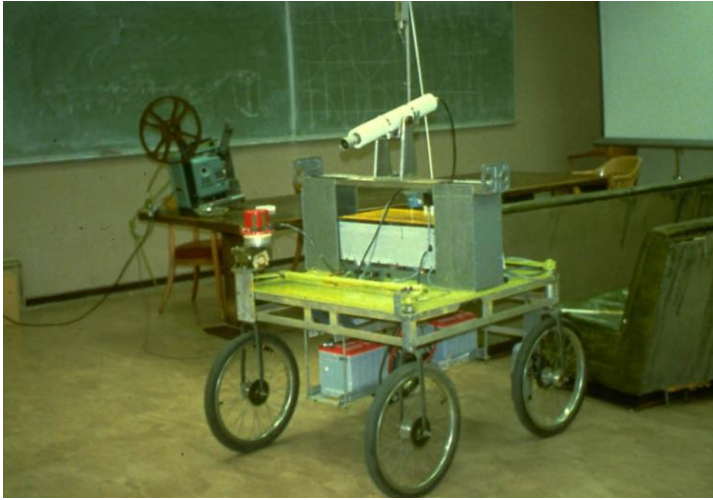


Figure 3. Stanford Cart, developed at Stanford University in the beginning 60s.

SOURCE: Archive of Field Robotics Center at the Carnegie Mellon Robotics Institute

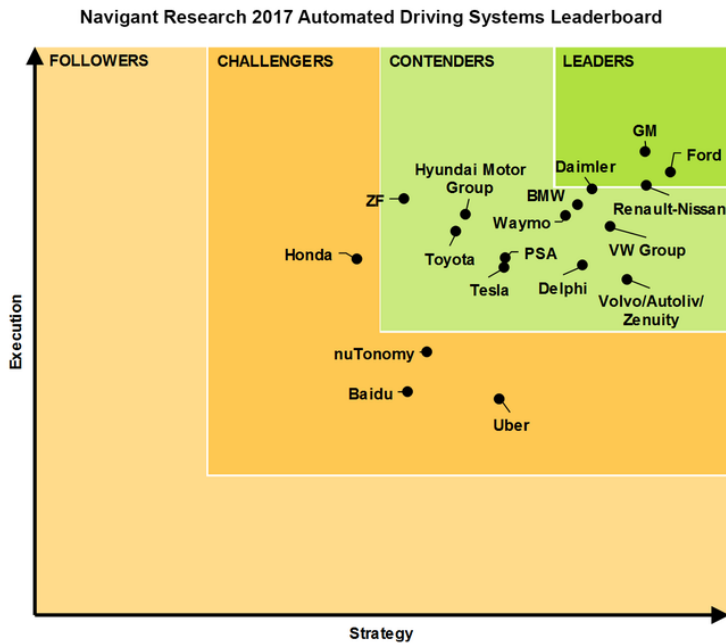


Figure 4. Companies which will most likely have the first self-driving cars on the road

SOURCE: Navigant Research.

<https://www.navigantresearch.com/research/navigant-research-leaderboard-automated-driving-vehicles>

Nowadays all major car manufacturers are involved in the development of self-driving cars [9]: Ford, General Motors, Renault-Nissan Alliance, Daimler, BMW, Volkswagen Group, Toyota etc., figure 4.

4.2. Who takes the responsibility?

Unlike other research programs, such as space exploration, oceanographic research, or even medical research, where subjects are volunteers aware of the risks they are exposed to, no matter how small they are, in the self-driving machines tests people who have nothing to do with the project are involved. Many states have no legal regulations regarding the access of self-driving cars on public roads, few approved tests in specific conditions (e.g. assisted by humans) and very few are ready to allow the full access of autonomous cars on public roads [10].

Figure 5 shows the top twenty countries which are most prepared to allow the access of self-driven cars on the public roads, based on four criteria: Policy and legislation, Technology & Innovation, Infrastructure and Consumer acceptance.

Very recently (March 2018) a self-driving Uber car killed a woman crossing the street in Arizona State, USA. Except for a Twitter statement expressing sympathy for the victim, Uber has not made any comments about the accident. However, Uber has suspended its self-driving car tests in Phoenix, Pittsburgh, San Francisco and Toronto for the time being.

In May 2016, a Tesla car put on self-driving mode was involved in an accident that killed the 40-year-old man behind the wheel. Tesla Motors disclosed that the sensors of the Model S driving in autopilot mode failed to detect a large white truck and trailer crossing the highway. In its statements after the accident, Tesla Motors repeatedly tried to excuse themselves by saying this was the first victim in almost 130 million kilometers driven by the company's customers, as opposed to one death in every 94 million kilometers driven in conventional cars.

In December 2017 and January 2018 two other cars, a Tesla Model S and a GM Chevy Bolt were involved in two accidents in California. The Model S car was trapped behind a fire truck and since the GM car collided with a motorcycle, the motorcycle rider was injured and was hospitalized.

In the same December of 2017, another Chevy Bolt, set on self-drive, was involved in a collision, after an unsuccessful attempt to change lanes. Merging back to the initial lane, it hit a conventional car that was

driving on the right side. Surprisingly, the police found the driver of the conventional car to be guilty of the accident.

Overall rank	Country	Total score	Policy and legislation		Technology & innovation		Infrastructure		Consumer acceptance	
			Rank	Score	Rank	Score	Rank	Score	Rank	Score
1	The Netherlands	27.73	3	7.89	4	5.46	1	7.89	2	6.49
2	Singapore	26.08	1	8.49	8	4.26	2	6.72	1	6.63
3	United States	24.75	10	6.38	1	6.97	7	5.84	4	5.56
4	Sweden	24.73	8	6.83	2	6.44	6	6.04	6	5.41
5	United Kingdom	23.99	4	7.55	5	5.28	10	5.31	3	5.84
6	Germany	22.74	5	7.33	3	6.15	12	5.17	12	4.09
7	Canada	22.61	7	7.12	6	4.97	11	5.22	7	5.30
8	United Arab Emirates	20.89	6	7.26	14	2.71	5	6.12	8	4.79
9	New Zealand	20.75	2	7.92	12	3.26	16	4.14	5	5.43
10	South Korea	20.71	14	5.78	9	4.24	4	6.32	11	4.38
11	Japan	20.28	12	5.93	7	4.79	3	6.55	16	3.01
12	Austria	20.00	9	6.73	11	3.69	8	5.66	13	3.91
13	France	19.44	13	5.92	10	4.03	13	4.94	10	4.55
14	Australia	19.40	11	6.01	13	3.18	9	5.43	9	4.78
15	Spain	14.58	15	4.95	16	2.21	14	4.69	17	2.72
16	China	13.94	16	4.38	15	2.25	15	4.18	15	3.13
17	Brazil	7.17	20	0.93	18	0.86	19	1.89	14	3.49
18	Russia	7.09	17	2.58	20	0.52	20	1.64	18	2.35
19	Mexico	6.51	19	1.16	17	1.01	17	2.34	19	2.00
20	India	6.14	18	1.41	19	0.54	18	2.28	20	1.91

Figure 1. KPMG's top autonomous vehicle ready countries

SOURCE: Geospatial World. <https://www.geospatialworld.net/blogs/top-autonomous-vehicle-ready-countries>

A quick Internet search shows a pretty high volume of accidents in which self-driving cars are involved. Their number is rising because the number of these type of cars found in traffic is also rising, but most of the times it is only later that we find out that one, or multiple, cars involved was in self-driving mode.

The amount of collisions has raised concerns with those criticizing the rate at which these types of cars are introduced on the road, given that the manufacturer's responsibility seems to be null.

5. Conclusions

No technology can be considered bad, given that its design does not preclude its use for good or ill-intended purposes – it is declared to be harmful after the fact depending on the circumstance of its use.

In all three presented topics, information technology, thought to be one of the cleanest technologies, is used for violating the law, or to bring profit or notoriety to the companies. Self-driving cars are probably the biggest innovation in recent automotive history. Maybe that is why, under the competitor's pressure, the big car manufacturers are always in a competition that defies the current limits of technology. The same situation is found in the cell phone industry, where the only element that prevents the most ingenious ideas from becoming reality, regarding the design and product performance, is the battery's life span.

The attempts to push technology's boundaries lead to huge financial and brand image losses for the companies. Not even trying to hide the battery's lack of performance by slowing down the device's processing speed has proven to be a good idea.

In conclusion, technology is doomed to be good or bad depending on the purpose it will serve, and people shouldn't fear IT, but use it cautiously

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