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Autonomous Vehicles and the Future of Private Vehicle Ownership

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Abstract. The world is changing very rapidly. All advanced economies, as well as some emerging ones are facing big demographic changes, with ever-increasing levels of automation and interconnectedness. One of the processes that are poised to have an enormous effect on transportation and labor markets is the availability of mobility on demand.

This article examines the attitudes of people towards mobility on demand provided by fully autonomous vehicles, corresponding to a level 5 automation according to the current SAE classification. The aim of the paper is to discover if there is a market for mobility on demand as well as its size. While the study was made in Slovenia, the results can be indicative for all similar OECD countries. In this paper, we will focus solely of personal transportation, ignoring commercial transportation.

Recent studies suggest that fully autonomous vehicles have an outstanding potential in reducing pollution, lowering congestion rates, increasing the frequency of transport, while at the same time making it cheaper and faster than ever before. While these dramatic improvements are possible with current internal combustion engine vehicles, only with a transition to fully electric automatic vehicles and the use of vehicles of different sizes according to the type of trip the full potential of these improvements can be achieved. For example, small one-person vehicles might be used for work commutes, hatchbacks for groceries, minivans for family trips, and so forth.

While for the foreseeable future personal vehicle ownership rates are likely to stay the same (or are set to rise in emerging economies), when fully autonomous vehicles become available starting in the 2030's, it is possible that private ownership rates will drop in favor of on-demand automated cab-like transportation or mobility on demand. Private or public enterprises might operate fleets of vehicles, which will use techniques such as cameras, radars, GPS, internet and other advanced control systems to operate safely on the road, as demonstrated recently by pioneers such as Tesla Motors. These smart, efficient and interconnected vehicles will offer the possibility of pick-up on demand and drop-off at any desired location with a vehicle specifically chosen for that trip.

Since the subject is very new, few studies have been made so far. Our study is based on a poll conducted in 2017 on over 100 individuals from Slovenia. The respondents were informed about autonomous vehicles (as the subject is still unknown to many) and asked whether they would use autonomous vehicles at all, and if so, would they use them exclusively or occasionally while retaining their own vehicles. The results suggest that while a significant minority of car owners would choose to retain their own vehicles, a majority would choose to abandon them in exchange for mobility on demand.

Keywords: autonomous vehicles, mobility on demand, transportation

1 Introduction

The world is changing ever rapidly. All over the world automated systems are being developed and adopted continuously. Most common uses are in industry, but its use in the service sector is booming and doesn't show any sign of stopping. In fact, as time marches on, it's expanding ever more.

Depending on how it is addressed, an increase in automation and interconnectedness might create both problems or solutions. Advances in technology such as smart phones, data connectivity and fast data processing are paving the way to profound changes in the transport sector which are driven by rapidly changing social and cultural trends.

Mobility on demand refers to an integrated interconnected on-demand transport system with autonomous vehicles ferrying passengers from point A to point B. This fleet could mostly be composed of small one-person vehicles for work commutes, hatchbacks for groceries, minivans for family trips, and so forth.

The aim of the paper is to discover if there is a market for mobility on demand as well as its size. While the study was made in Slovenia, the results can be indicative for all similar OECD countries. In this paper, we will focus solely of personal transportation, ignoring commercial transportation.

First, we will examine the importance of software-based automation and the effect it has on labor markets. Secondly, we will examine the concept and implications of autonomous driving. Finally, we will examine the results of the survey and the implications it brings.

2 Automation

Since the dawn of time, man has always strived to make life easier. One of the most important aspects of development has been the rise of automation. Parasuraman & Riley (1997) define automation as the execution of a function by a machine that was previously carried out by a person.

When thinking about automation, most people think of factories filled with robots or machines doing repetitive tasks. Certainly, this is the only way automation has been used until recently. Recently however, automation has expanded drastically in all walks of life thanks to advances in computerization. Countless sectors have switched to some level of computer-based automation. It has been used in production of food, utensils, tourism, online shopping and increasingly in sophisticated tasks once reserved for humans.

New algorithms are being developed which can recognize patterns from big amounts of data (see for example Gietelink *et al.* 2006) and can substitute human labor in a wide range of routine and non-routine cognitive tasks (Brynjolfsson & McAfee 2011). One of the surprising aspects of automation is the capability of computers to perform highly skilled tasks, even such as those made by managers, physicians or senior executives (Chui, Manyika & Miremadi 2015).

Adding to this is that computers can also be programmed to learn autonomously from data and teach themselves. Because of that we can perform many more tasks than before while employing far fewer people (Bessen 2016; Rotman 2013). If we add advanced sensory equipment from radar to GPS to lasers they can then be used for executing a wide variety of tasks, one of which is to control autonomous vehicles.

2.1 Examples of automation

One early use of an automated system is the management of large investment portfolios, with computers using algorithms to constantly sift through data and find useful patterns (Lupien, McCormack & Schulman 1992). Other successful newer methods hail from the medical sector, with systems being used for tasks as diverse as acquiring micrographs and in general to emulate all decisions and actions of highly trained microscopists (Carragher *et al.* 2000) or systems used to monitor and deliver medication (Day & Ruchti 2017). Uses in transportation include automated identification systems for ships (Balduzzi, Pasta & Wilhoit 2014) or automated satellites to classify ice-water from space (Leigh, Wang & Clausi 2014). Also, we must mention the ever-expanding use of autonomous vehicles in warehouses to manage all goods stored inside (Wurman, D'Andrea & Mountz 2008).

One of the biggest challenges of computer based automation is job destruction (Arntz, Gregory & Zierahn 2016). Usually with automation and development, better and often more numerous jobs were made. A great example is the invention of the automobile with the internal combustion engine. It created millions of jobs and literally transformed the world. Not only factory jobs for producing the cars, but also jobs in seemingly unrelated industries. Roads had to be constructed and maintained, traffic signals installed, there was a need for mechanic shops, roadside motels, restaurants, scenic routes, etc. With better mobility people started exploring previously difficult to reach locations and tourism boomed. Inevitably the oil industry boomed as well, with jobs from computing to engineering (Amatucci 2015). One relatively minor or simple innovation had a life-changing effect on the whole world.

Today the difference is that innovation and automation might destroy far more jobs than they create. An OECD analysis recently found that across the 21 OECD countries, on average, almost 1 in 10 jobs could already be automated (Arntz, Gregory & Zierahn 2016). The difference today is that computers can be, and often are, programmed to learn autonomously from data and teach themselves. The result is that we can perform many more tasks than before with far fewer people than before and as a result making many human jobs obsolete (Bessen 2016; Rotman 2013).

One of the main problems facing our future is the probable future unemployment of millions directly employed in the transport industry – specifically, drivers. This might be the case with many other jobs (Bessen 2016). For a company the math is very simple. Instead of paying high wages for the drivers it will very soon be able to invest in a relatively higher upfront cost of automatizing trucks and lorries (Sukkarieh 2000). The benefits are potentially enormous. Autonomous systems appear to be very safe, with very low maintenance. Also, while there might be stringent laws regarding the number of hours worked for drivers, computer work without stop. For example, if limited to 8-hour daily shifts, a truck delivery from Spain to Finland might take 6 days for a human driver. An autonomous truck could complete it in about just 42 hours. This translates to huge savings and increased competitiveness.

For small local companies the investments might be too big or useless, however for larger international companies it would make a lot of sense. Given the extent of international trade, we expect this trend to increase even further.

3 Automation and driving

The main requirement of modern industrial automation and production systems is to provide enough flexibility for automatic reconfiguration, able to respond promptly to changes in the environment and to users' demands (Mendes *et al.* 2009). Autonomous driving in a sense is an extension of automatization. It's quite a complex operation, because there are a lot of tasks that must occur simultaneously, such as environment perception, localization, vehicle operation, unpredictable traffic, planning etc. (see for example Levinson *et al.* 2011; Frazzoli, Dahleh & Feron 2002; Buehler, Iagnemma & Singh 2009).

3.1 Autonomous driving

The leading organization involved in developing standards for autonomous vehicle operations is SAE International. It has recently categorized the levels of autonomy a vehicle possesses. There are 6 levels of autonomy ranging from 0, with no autonomy and total human control to 5, complete autonomy and no human control necessary (*SAE International J3016* 2014).

In levels 0 – 2 the driver remains fully in control of the vehicle and is responsible for the driving. In case of faults (such as accidents, abnormal traffic conditions, etc.) the driver has less than one second to react, thus is not allowed to engage in other activities. Examples of a category 2 vehicle, the current most advanced option, includes adaptive cruise control, lane departure warning and traffic sign recognition. Most personal vehicles sold today fall in one of these categories.

The next level widely achieved will be level 3, where the driver doesn't need to constantly monitor the road, but is required for occasional control with a comfortable transition time to active driving – in fact, the reaction time for the driver increases to several seconds (Politis *et al.* 2015). An example of such a vehicle is the Tesla Model 3, a mid-range competitively-priced sedan, which can function autonomously most of the time ('*Model 3*' n.d.). Such vehicles are impressive as they allow the driver to safely focus on other activities while driving, albeit for a short period of time.

For higher levels of automation, including 4 and 5, many complicated driving decisions and processes will be adopted independently by the vehicle. Reaction times for the driver increase further from a couple of minutes to being unnecessary, allowing the driver to freely engage in other activities, such as read, work and even sleep (Dokic, Müller & Meyer 2015).

3.2 Mobility on demand

Mobility on demand refers to an integrated interconnected on-demand system of autonomous vehicles that can transport users from one place to another at the push of a button.

Such a system makes a lot of sense for many reasons, but we want to mention just three. The first reason is that cars typically tend to be parked at least 90 percent of the time, even if both actual driving and all surrounding activities such as repairs, servicing, etc. are included (Mitchell, Borroni-Bird & Burns 2010). If only driving is included, that percentage jumps to 95 percent – for the US it translates to about 465 hour/year in the car (*US Department of Transportation* 2011). The second reason is that all that time could be spent doing other more productive things, from work to sleep (Asgeirsdottir & Gylfi 2011). If we factor in sleeping, those 465 hours average to about 8 percent of wake time driving. Finally, cars are expensive to own and maintain, in fact they can be one of the costliest things we own (Jackson & Marks 1999). With mobility on demand, those costs could be lower and be spread across a longer timeframe.

Next, we examine in detail the benefits and issues with this system of transportation.

3.3 Benefits

Proponents of mobility on demand point out the many benefits it would bring. For example, an increase in safety, as automation is safer and reduces human errors, which are the leading cause of traffic accidents. It has been argued that since humans are responsible for 90% of accidents, by changing to autonomous vehicles, about the same amount of them could be avoided (Fagnant & Kockelman 2015).

A reduction of the environmental impact is widely expected (Fagnant & Kockelman 2014). This is true especially with a switch from fossil fuels to electric engines can be expected. Even if all electricity needed came from coal plants, the total amount of pollution (and therefore negative externalities) would be lower than current fossil fuel use – let alone a switch to green methods of production and pollution at one source is easier to manage (Valeri et al. 2013). One of the biggest critiques to electric vehicles has been their limited autonomy, however some recent studies suggest that even big increases of autonomy don't lead
to increases in the market share, rendering this argument somewhat mute (Valeri & Danielis 2015).

There isn't a need for all autonomous vehicles to be the same. A fleet owned by a taxi-like company could mostly be composed of small one-person vehicles for work commutes, hatchbacks for groceries, minivans for family trips and so on.

Other benefits include an increase in traffic efficiency and lower congestion rates, since automated vehicles could be interconnected and monitor each another's position, coordinating actions in a way that is impossible for human drivers, and an increase in convenience and productivity, since drivers wouldn't be involved in much or any of the driving being done (Spiegel *et al.* 2014). Autonomous vehicles could also relocate on their own to be closer to the next user with a faster arrival time and quicker overall service (Fagnant & Kockelman 2014).

Another potential benefit could be the emergence of widespread car sharing (Spiegel *et al.* 2014). Car-sharing services are growing worldwide and have many strengths, as well as some weaknesses, most notably the absence of one-way rentals. However, if the vehicles are autonomous, they could go back to a main station to wait for a next call, or even going to directly picking the next customer up, they would arguably be even more comfortable than private cars. Also, if vehicles were electric the station could also contain a charging installation, further improving the efficiency of the company (Spiegel *et al.* 2014).

Company-owned autonomous taxi-like services could be more appealing to many current drivers, as the cost of purchasing, maintaining, repairing and insuring of the vehicle could be spread across a large user-base, reducing the cost of personal mobility by leveraging economies of scale; it's simply a more economical and sustainable alternative than personal vehicle ownership (Chong *et al.* 2013).

Other authors have discovered other reasons to invest in mobility on demand. Spieser *et al.* (2014) for example argues that when returns on investment in existing technologies, such as road expansion, new bus services or subway lines begin to diminish, it is advisable to consider new solutions, such as mobility on demand.

Since this subject is relatively new, only recently have transportation officials at city, county or country level started exploring how autonomous vehicles will affect the urban environment, for example with new roadway design, parking costs and a different public transit (Fagnant and Kockelman 2013). A lot of the urban environment is meant and made for cars, so with fewer vehicles many roads and especially parking lots could be rebuilt in parks, stores, community centers and other uses (Grush 2016; Guerra 2015; Levinson 2015). Canada is actively planning for a future with autonomous vehicles and the implications they bring (*Preparing for Autonomous Vehicles in Canada* 2015).

Since autonomous vehicles are a newcomer in the transportation industry many people view them as potentially insecure (Fagnant & Kockelman 2015). As Parasuraman & Riley (1997) put it ‘automation use (or lack of use) reflects perceived reliability’. However, this perception will most certainly be proved wrong. Current autonomous vehicles, like the Tesla, are indeed very save, at about the same rate as human drivers. We must stress however, that these vehicles are the very first breed of autonomous cars with relatively very few wide-ranging tests. Very soon, with software and sensor improvements autonomous vehicles will certainly achieve a much lower danger level. A lot of work is indeed being done regarding safely (Althoff *et al.* 2010). In fact, as we will discuss shortly, with greater reliability the emission of driving licenses might be faded out and insurance premiums will also inevitably plummet.

Other benefits include the inclusion of women in public life and business, a change already happening in the second demographic transition (Goldscheider, Bernhardt & Lappegart 2015). Some conservative countries have been slow to give equal rights to women, for example Saudi Arabia only allowed women to apply for driving licenses in 2017 (*Saudi women to be allowed driving licenses* 2017). Handicapped people could also benefit from this technology (Lozano-Perez 2012).

3.4 Issues

One of the biggest issues that autonomous vehicles face regards safety. There are two points that stand out. The easier problem concerns the reliability, or rather perceived reliability of such systems, as we have mentioned earlier. The other, arguably much more important point, concerns the ethics involved in these vehicles’ accidents.

Many authors believe a traffic situation with solely traditional vehicles is relatively safe, one with solely autonomous vehicles is much safer, but one with a mix of both traditional and autonomous is potentially very unsafe (see for example Sivak and Schoettle 2015). The most common reasoning is that drivers and pedestrians start paying less attention if they know there is an autonomous vehicle driving around them, knowing that it is programmed to avoid them. We however disagree somewhat. We think this is mostly due to current test models, usually with obvious and noticeable sensors and systems protruding from the car. Normal commercial models of autonomous vehicles will certainly have hidden systems, such as the Tesla Model 3, for example. In short it would be impossible to tell the difference between a traditional and autonomous vehicle at a glimpse; let alone if this potentially autonomous vehicle is driven manually or autonomously unless there is physically nobody at the steering wheel.

Not all accidents can be avoided and crashes, both fatal and not, are going to happen. New kinds of regulation, especially in cases where harm cannot be avoided will have to be adopted and possibly conformed worldwide. Here, larger precocious nations that first adopt them might find that their laws are adopted by other countries.

It is important to adopt such systems as not to discourage potential buyers. Also, it is imperative to adopt ‘moral’ algorithms that will coincide with human moral attitudes, as to foster public acceptance to the use of autonomous vehicles. It is also important to avoid moral inconsistencies when trying to achieve both these goals simultaneously (Bonnefon, Shariff & Rahwan 2015).
A good example is given by Bonnefon, Shariff & Rahwan (2015) with three different traffic situations, which involve unavoidable harm. They imagine an autonomous vehicle driving on a road and an accident happens where:
a) the car can stay on course and kill several pedestrians, or swerve to a side and kill only one passer-by.
b) the car can stay on course and kill one pedestrian, or swerve to a side and kill its passenger.

c) the car can stay on course and kill several pedestrians, or swerve to a side and kill its passenger.

These are all ethically very difficult questions and represent a big obstacle to the adoption of autonomous vehicles that will have to be resolved (Deng 2015). The most common consensus is to adopt a utilitarian decision-making process, in which the best option is one that results in the greatest common good for society (Greene 2014; Bonnefon, Shariff & Rahwan 2015).

Vandalism is potentially also a problem, as public transit vehicles and, to a lesser degree, taxis frequently require cleaning and repairing when passengers litter, smoke, or spill food and drinks. To minimize these risks self-driving vehicles might be furnished with hardened surfaces and electronic surveillance. Assuming such vehicles make 200 weekly trips, 5-15% of passengers leave messes with $10-30 average cleanup costs, and 1-4% vandalize vehicles with $50-100 average repair costs, these costs would average between $200 and $1,700 per vehicle-week (Litman 2014).

If compared with conventional vehicles, autonomous vehicles in a taxi-like fleet will travel much greater distances within a given time period and will wear out much sooner; this will however accelerate vehicle turnover times and the adoption of cleaner technologies (Fagnant & Kockelman 2014).

Also, it has been argued that since autonomous vehicles don't need human intervention in driving, people might opt to live in a favored neighborhood, but to have a longer commute (Ohnsman 2014). This would result in an increase of external costs such as congestion, less parking space and pollution emissions.

Also, we mustn't forget that cars not only provide mobility, but are also reflect social status, personal power, affection and recreation and leisure by themselves (Jackson & Marks 1999). Mobility on demand isn't an answer to those needs or, to generalize, all needs.

Some researchers have suggested that pedestrians become less cautious and responsible around autonomous vehicles, which might lead to accidents or other related issues (see for example Millard-Ball 2016).

Autonomous driving raises the questions of insurance and liability as well. In case there is an accident, who will be responsible, the human driver or the car manufacturer (Douma & Palodichuk 2012)? Also, car insurance companies might need to change the way they operate, since with safer vehicles insurance premiums are poised to decline, which also translates to lower incomes for those companies. For example, in Europe alone there are 40.000 fatalities and 1.4 million injuries due to vehicle-related accidents every year (Gietelink *et al.* 2006). Car repair shops would also be affected with a much smaller volume of repairs, but this might be partially offset by the repair and maintenance of their technology.

We mustn't forget that for mobility on demand to be effective, we need to also have a system to exchange data between vehicles and the roadside infrastructure, so that they can effectively communicate among themselves (Antonelli & Chiaverini 2006; Cao *et al.* 2011). In Europe, some steps have been made in this direction, most notably with the introduction and standardization of a WIFI-based wireless system in 2015, offering ad hoc communication and message sets, along with management and security procedures (Festag 2014).

One last major problem is the predicted smaller need for professional drivers (Frey & Osborne 2017). In the US for example, more than 4 million people are employed in transportation and warehousing (*Employment Projections program* 2017). As many of these people are employed as professional drivers, over the next few decades they will slowly start to lose jobs to automated vehicles, contributing to a general rise in unemployment. It is even more pressing as advanced automation is rendering many other jobs obsolete as we have seen, and there are few new jobs on the horizon (Bessen 2016).

In conclusion, there are many benefits as well as some important problems with the adoption of autonomous vehicles. If these are addressed in a timely manner the transition should be smooth and fast.

4 Survey

We conducted a survey in 2017 to determine 2 key aspects regarding the adoption of autonomous vehicles. The first one was to determine the size of the market – specifically, the number of people interested in using autonomous vehicles. When talking about use, we referred to both the use of a privately owned autonomous vehicle, as well as one owned by a taxi-like company. The second question was to determine the number of people interested in continued (multiple) vehicle ownership as opposed to the sole use of an autonomous vehicle out of those who responded positively to the first question.

Important limitations in our study include the type of transport, the size of the group and a lack of similar studies. We focused exclusively on personal transport, excluding any type of commercial use, including, but not limited to trucks, vans or pick-up trucks. The size of the group amounting to 102 respondents is also a limiting factor, as for more precise studies a far larger group would be needed. Finally, while there are some similar studies, most focus solely on the potential market for autonomous vehicles, while few if any on the actual possible combination of use.

Also, it is important to note that we assumed a scenario where the availability of such vehicles is ubiquitous and that respondents don't need a vehicle to carry heavy or cumbersome tools for work or other activities for example.

Our results show that more than 80% of respondents (84 in total) would consider using an autonomous vehicle, i.e. are not worried about its use. This is a little inferior to our expectations. It is likely that skeptical respondents are worried about such vehicles' reliability (Parasuraman & Riley 1997). In time, as views change, and autonomous vehicle numbers grow, we are confident the number of such responders will lower significantly.

Regarding the second question, 29% (or 24 out of 84 respondents) stated that they would choose to use an autonomous vehicle while still retaining their own vehicle and 71% (or the remaining 60 respondents) stated that they would only use a rented or mobility on demand autonomous vehicle. This is in line with what we expected. Since costs are expected to be lower and various payment methods could be available – for example a monthly subscription like a mobile phone – we assumed correctly that most people would indeed choose not to own a personal vehicle anymore.

We must add a word of caution. It is not necessary for attitudes to be reflected in the behavior of consumers (Parasuraman & Riley 1997). Maybe a bigger percentage might switch to just autonomous. Shaheen and Cohen (2013) have estimated that 25% of carsharing members in North America have sold their vehicle and another 25% did choose not to buy a new one.

As mentioned before, similar studies are rare, but we can make a rough comparison with Singapore. Singapore, which currently has about 600.000 private vehicles and almost one million motor vehicles in total, could achieve a 90% average coverage and 50% on peak times of personal transports with 200.000 vehicles and 95% average and 72% on peak times with 300.000 vehicles (Spieser *et al.* 2014). Slovenia and Europe are vastly different from Singapore, an island/city/state. Slovenia has a little over 2 million inhabitants, less than half of Singapore's 5.7 million (*World Population Prospects: The 2017 Revision* 2017). Slovenia had 1.4 million vehicles in 2014 and just over 1 million personal vehicles (*Public scheduled road passenger transport*... 2016). Public transport use in Slovenia is markedly lower than Singapore's, given the non-existence of MRT systems or similar, weak bus and rail services and a smaller population, but averages at 2.5 million passengers/month for regional and international travel, plus another 4.3 million passengers/month in urban settings (*Public scheduled road passenger transport*... 2016). This translates to 6.8 million/month or about 226.000 passengers/day. Singapore on the other hand has 8.2 million daily rides on its public transport (*Public transport operation and ridership* 2017). The researchers however, estimated the numbers for the whole country, imagining there were no public or private transport options but autonomous vehicles.

If Singapore can cover on average 95% of its personal transportation with 300.000 vehicles with a population of 5.7 million people, Slovenia could do the same with approximately 105.000. That is about 10% of the current private vehicle ownership rate. A recent study has found a very similar value at 11% (Fagnant & Kockelman 2014).

Of course, a larger fleet might be needed to cover the whole population because of rush hour times and there are some people who, mostly because of work, will want to continue having a dedicated personal vehicle. While transportation requirements are ubiquitous across the board, we must consider that Singapore is very small with only about 716 square kilometers and a density of about 7.400 people per square kilometer, while Slovenia is quite larger at just over 20.000 and a density of 101 (*Demographic Yearbook* 2015). We could assume though that ride times might be similar as Slovenia might have longer distances to travel but less congestion times and Singapore the reverse situation.

Using the results of our study we can therefore calculate that 1.6 million people in the country would consider using autonomous vehicles and 600.000 out of the 1 million vehicle owners would choose not to own a personal vehicle anymore and rely instead on mobility on demand.

We must stress however once more that these calculations are based on assumptions and compare two very different studies of two very different countries. They do provide however, a rough idea of the preferences of Slovenia's population and the number of inhabitants interested in the idea of mobility on demand.

5 Conclusions

As we have seen, the development of automated systems is booming continuously all over the world. Most common uses are in industry and production; however, it is its use in the service sector that is booming because computers are slowly being programmed to learn on their own. Computers are getting capable of developing algorithms to describe the way specific and often complex tasks function. This has virtually endless applications, including the control of autonomous vehicles.

Autonomous vehicles are ordinary cars capable of functioning completely on their own. Even though currently they have achieved a low level of automation, requiring human drivers to be present and always monitoring the functioning of the system, it is expected that within years these vehicles will be able to function completely autonomously, without any kind of human intervention. Mobility on demand refers to an integrated interconnected on-demand transport system with autonomous vehicles ferrying passengers from point A to point B.

Depending on how it is addressed, an increase in automation and interconnectedness in vehicles might create both problems or solutions. It is imperative that this is addressed worldwide in a timely manner to create a unified system of laws and practices. Safety, insurance, liability, data exchange, infrastructure and the like will have to be sorted. As this transition will most likely eliminate many professional driver jobs, it is advisable to help former drivers to find a new occupation. Benefits include savings, increased participation in business and public life, more freedom of movement, traffic efficiency, lower congestion rates, rise in safety, etc. This will encourage and speed up their adoption.

The aim of the paper was to discover if there is a market for mobility on demand as well as its size. Our study suggests that most respondents (more than 80%) are confident in using autonomous vehicles, which amounts to about 1.6 million people. Out of those about 3 out of 4 would consider ditching their personal vehicles and using services provided by mobility on demand or taxi-like companies. This means that 600.000 out of 1 million vehicle owners would choose not to own a personal vehicle anymore. We would like to repeat, that in this paper we have focused solely on personal transportation, ignoring commercial transportation altogether.

We also estimate a fleet of about 105.000 vehicles providing mobility on demand would be sufficient to cover the needs of the great majority of the population of the country. We must stress however once more, that these calculations compare two very different countries and this number shouldn't be taken as an exact assessment. They do provide however, a rough idea of the preferences of Slovenia's population and the number of inhabitants interested in the idea of mobility on demand.

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