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The Dispatcher

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McLaren, the British car-maker who is not known for making your everyday car, says about this supercar that it was not built with usability in mind. At \$1 million a pop, it was not built with affordability in mind either—unless you don't have to worry about affordability. It is named for the late Brazilian Formula 1 driver Ayrton Senna (distant cousin) who won three world championships for the McLaren racing team in the '80s and '90s. The 800-horsepower V8, 7-speed dual-clutch automatic comes with a steering wheel. No need to try to pre-order; the 500 models McLaren will build are already sold.

Telematics Industry Insights by Michael L. Sena

Are We All on the Same Bus to Utopia?

ONCE AGAIN, SCRANTON, PENNSYLVANIA, my hometown, featured in THE ECONOMIST, and once again it was as an example of the negative effects of globalization and government attempts to dampen those effects. The attraction of Scranton for journalists is its famous former sons and daughters, including Joe Biden and Hillary Clinton. Joe was born in Scranton and Hillary's father was also born there. The Casey family gave the city its biggest hotel, the State a governor, a senator and the country a professional basketball coach. Bill Scranton ran in the Republican presidential primary in 1964 and was U.N. ambassador under Gerald Ford. The city has been a bastion of Democratic voters, and did give its native granddaughter, Hillary Clinton, more votes than her rival, but by a much lower margin than Obama's tally four years previously.

The title of THE ECONOMIST Leader article is *Left Behind*. P1 In a nutshell, the article says that Scranton, like Britain's Teesside and France's Pas-de-Calais, has been "left behind" because it has not found a way to thrive in a digitized, globalized economy. But it has not disappeared." The first problem, says THE ECONOMIST journalist, is of the city's own making. It should have reacted faster to find new growth drivers when its coal resource was no longer valuable enough to keep the city's engines running. The second problem, that it has not actively facilitated its own demise by forcing its populace to relocate to places where jobs are plentiful and where indigenous workers would be welcome, is caused by ill-conceived government policies that encourage people to stay put.

Like many of my friends and family, I did not return to the city after completing college. Nevertheless, I have visited often, even during the past twenty-five years since Sweden has been my home. I have watched the decline, but I can see that there is so much the article's writer missed. Scranton, along with other cities that look to disinterested outsiders to be flotsam and jetsam that should be gathered up and incinerated, has suffered through some very hard times, including a near-death experience when in 2012 it was close to declaring bankruptcy. There are many poor families that have moved from the go-go centers—helped by federal Title-8 money—into houses that residents have sold at very low prices because there are no buyers. Although the economy is not booming, the city is not wracked by drugs, crime and poverty. It has two excellent universities and a new school of medicine. It has a bustling airport and a semi-pro baseball team (NY Yankees farm team). It is a place where people get by, help each other, support whatever cultural activities that are on offer and live with the hope that eventually, things will improve. Miracles can happen.

Continued next page

Dispatch Central Making Sense

A car manufacturer's executive was giving a union leader a tour of his company's assembly line where there were only robots in sight. The executive quipped: "I'd like to see you organize them." The union leader replied: "I'd like to see you sell one of them a car."

It's difficult for a company to pay people low salaries, view them as costs that must be eliminated and at the same time expect that they are going to buy your products.

A sample from Tim O'Reilly's book, **WHAT'S THE FUTURE AND WHY IT'S UP TO US**

✂

How about a little Uniti

For as little of €14,900, you can be the proud owner of this little 2-seater electric car, and you can pre-order one now for €149. There will be 4- and 5-seater models as well. First cars are scheduled to be delivered in 2019. It looks a bit like a Smart. Steering controls are the 'feature'. Made in Sweden.



Continued on page 3

BMW to the Rescue**Two Cities Saved**

GREENVILLE AND SPARTANBURG, SOUTH CAROLINA combined were never as big as Scranton. While Scranton leveraged its low-wage labor supply into building its textile industry, the two SC cities leveraged their cotton to build theirs. In any case, both regions lost their competitive advantages around the same time and their economies went into their respective tailspins. In 1990, Greenville and Spartanburg had a total population of just over 100,000, while Scranton had 82,000, down from a high of 146,000 in 1930.

Then, in 1992, a miracle happened for the two southern cities. BMW decided to locate its new U.S. manufacturing plant smack dab in between both of them, and, as they say, the rest is history. It was not a bolt out of the blue. Greenville and South Carolina politicians began to lobby the Bavarian automaker in 1988 when BMW announced it would start to manufacture cars in the U.S., the same year VW decided to close its plant in Pennsylvania (which had been operational since 1978 and was the first European car assembly plant in the U.S.)

BMW looked at 250 sites before choosing Greenville/Spartanburg. It said the deciding factors were availability of an eager workforce, nearness to a port, Eastern Time Zone, a nearby airport and a large tract of land ready for development. BMW could have had all of that if they located in Scranton with one more advantage: closeness to their U.S. headquarters in New Jersey. Pennsylvania would have matched or bettered any of the financial incentives offered by South Carolina as well.

South Carolina had one big advantage that Pennsylvania could not match: It is a right-to-work state. That means it prohibits union security agreements between companies and workers' unions. Workers cannot be forced to join a union as a condition of employment, nor be compelled to pay union dues. It does not mean that workplaces cannot be unionized, but in the case of South Carolina, it actively discourages unionized businesses from locating there.¹

Today, BMW has 9,000 employees in the area and 70,000 additional new jobs are directly related to its location. The region's booming.

Are We All on the Same Bus to Utopia: (continued from p.1)**No IKEA stores or a Tesla Supercharger**

Our sojourning journalist missed a lot more as he hurried to rush back to his newspaper's new offices on Victoria Embankment in London or their Intelligence Unit in DC. Central City Scranton may appear depressed, but travel a few miles out to the surrounding suburbs like Clarks Summit and Dalton and you get a very different picture. They rival anything around Boston. Day-trippers searching for Utopia look for IKEA stores and traces of Tesla. You won't find either in or around Scranton. You're going to have to travel 300-to-500 kilometers away, to Philadelphia or Pittsburgh. There are no Mercedes-Benz or Volvo dealers in Scranton either. There is one Porsche dealer in the entire Northeastern Pennsylvania region, and it's not even in the same county in which Scranton is located.

Are cities and regions with similar demographics to Scranton's going to be taking part in the new wave of mobility that so many pundits are prophesizing? Will Uber be shipping a portion of those 25,000 Volvo XC90s that Volvo's CEO, Håkan Samuelsson, so proudly announced on the 21st of November would be delivered in 2019-2021? Uber says it will be fitting the Volvo's with its own hardware and software and putting them into traffic without human drivers? I think it is highly unlikely that any of those Volvo's will make it to Scranton or that self-driving taxis or buses are going to be an early hit in areas like Scranton where every job is a prize. It's one thing to lose the prize to someone who is competing on equal terms; it is quite another to lose to a robot.

There are already enormous differences between the have and the have-not regions within many countries, especially in the U.S., but also in Europe, as poorer countries (e.g. China) became the trading partners of the rich regions of rich countries (e.g. China teams up with San Francisco). At the start of the 20th century, Scranton benefitted from the move of the garment and textile industries from New England to take advantage of the pool of low-wage workers in the forms of wives and children of miners who flocked to the region from Wales, Ireland, Italy, Poland and Ukraine. My grandfather retired as a miner when the coal ran out in the early 50s, and my mother retired as a seamstress when the garment industry

twenty years later relocated to South Carolina (see sidebar) —where it had a brief stay on its way to Mexico and then Asia.

Prospects for obtaining an education, for securing a job with a stable income, or for obtaining health care are significantly lower in places like Scranton than in the top metro areas. The per capita GDP for Scranton in 2013 was \$35,659 and for Boston it was \$74,543. Per capita income for the same year was respectively \$18,229 versus \$37,311.

Which Utopia is the next stop?

Will politicians make decisions that may be appropriate for cities like San Francisco or Amsterdam, but which exacerbate the difficulties that people have in cities like Scranton to scrape together enough money to survive? I see evidence of such foolishness in Sweden, where even politicians who grew up on a farm in the north of the country encourage laws that make the price of fuel so high that farmers can't run their tractors. When your government travel allowance is paying for a taxi or chauffeur-driven limo every day in Stockholm, it's easy to lose track of what normal people have to do to fit all of life's puzzle together.

Spend a few weeks or a month in Scranton and the surrounding region and you will see why its residents are so dependent on cars and why talk of mobility-as-a-service is an oxymoron. The only public transportation is bus service, which is good, but extremely limited. Paying Uber \$15-\$20 for a five-mile taxi ride is out of the question for people on fixed incomes, which many of the predominantly elderly who live in the city are.¹

Cities like Scranton may not be utopia for cosmopolitan journalists and globalization gurus, but people living in these places are not all going to fold up their tents and move to the hip places. They cannot afford it, for one, and, as it must be clear from what has been happening in elections around the world, there would be a mutual antipathy between the new neighbors. If politicians continue to ignore this situation, it will only get worse. Poorer regions will become more marginalized as more resources are absorbed by the rich regions. The last thing people in the less rich regions need to be told is that they don't need their cars and taxi and bus driving jobs will disappear.

Car Insurers Are Not in the Carrot Business⁵

I OFTEN HEAR the question: Why aren't insurance companies providing more financial incentives to promote safe driving in general and automated driving systems in particular? The answer to this question began to be clear to me when I was working with Volvo Cars to roll out the Volvo On Call system, which offered security functions like theft notification, stolen vehicle tracking and remote door unlock, as well as post-crash emergency notification. We talked to the insurance companies in each country where the services were being introduced and asked if they could consider offering insurance discounts to new car buyers who installed the system. In a few countries, like Italy, automotive insurers offered some reductions in comprehensive coverage premiums for the theft notification feature, but there was little or no enthusiasm for reducing liability, collision or personal injury premiums.

Insurance companies are in the business of selling risk management. The idea of insurance has been around since ancient times when neighbors would help to rebuild a house that burned down. In the second century B.C. sailing merchants would pay an extra fee when they took a loan from a money lender to fund a shipment. This extra fee would guarantee that the loan would be cancelled if the ship were lost in a storm or if the goods were stolen by pirates. Shipping insurance became big business in the late 18th century, resulting in the establishment of some of the largest and most well-known companies like Lloyd's and Allianz.

Owners of motorized vehicles pay insurance companies to accept the eventual costs of the loss of life, injuries or material damage that would be incurred if their vehicle were involved in an accident. These costs are likely to be significantly higher than the total premiums paid by the insured. They are also likely to be much higher than an individual would be able to afford. Rather than the car owner taking the risk that either they will never have an accident, or, if they do have an accident they would be able to afford to pay the costs, they turn this risk over to an insurer and pay a premium.

Auto insurance companies make money in two ways: making sure they pay out less than they take in through premiums (called the 'technical result') and investing the money they receive

wisely. Investments are generally made in bonds with high yields and preferred stock where both capital appreciation and regular income in the form of dividends can be obtained.

How do they manage their risks? They employ people called 'actuaries' who are experts in the discipline of 'actuarial science' to help them set rates based on the analysis of lots of historical data (e.g. actual claims, running costs, commissions). They hire another group of experts called 'underwriters' who compare you to people like you, people with your sex (where allowed) age, income, education, place of residence, your car, how much you drive and where, your driving record (*bonus-malus* rate), and more. Then they set your rate based on where you land in the actuarial tables. After a period of years, when you have stayed with the same insurance company and showed that you are less of a risk than your original placement in the tables indicated, you can get a reduction in your premium. If you have accidents and make claims, your rate goes up.

If there were no risks in the world, there would be no need for insurance. As long as there is a possibility of material loss or personal injury, people or organizations will want to insulate themselves from the financial effects of those losses or injuries. How does an insurance company underwriter know that certain types of systems built into vehicles will actually reduce the risk that someone driving or riding in a vehicle equipped with those systems will suffer fewer losses or incur less serious injuries until there is enough historical data to prove that case? They cannot, because "the type and level of ADAS features in modern cars are not yet transparently communicated, and therefore no reliable ex-post correlation can be established by the actuaries."⁵ Discounts are offered for proven technology, like air bags and anti-lock brakes (e.g. New York requires insurers to give discounts for ABS). Adaptive cruise control, lane departure warning and collision avoidance systems are still too new to be given discounts, but some insurers do so (e.g., Liberty Mutual). Tests of self-driving cars have provided little data to indicate that they lower risks.² A lot more water will need to flow under the bridge before we know what the effects will be on premiums for the cars or their riders.

Dispatch Central (cont.)

Zhejiang Geely Flying High

Zhejiang Geely Holding Group, owner of Volvo Cars, Lynk&Co, London Taxi, Lotus and Malaysia's Proton, has just acquired **Terrafugia Inc.**, maker of a flying car. The sale was completed on the 13th of November. The company was formed in 2006 and is based in Woburn, Massachusetts, which was the home of many of the world's computer graphics companies in the 1970s.



The model pictured above is called The Transition and is billed by the company as "the world's first practical flying car." The company says it runs premium unleaded petrol, fits into a standard single-car garage and converts between flight and drive modes in under a minute. You'll need a Sport Pilot Certificate to lift off the ground, but you can drive it around town with a regular driver's license.



Pilotless Flying Taxis



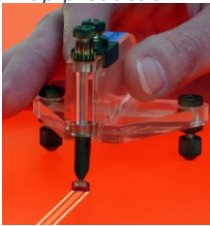
German **VOLOCOPTER** will shuttle passengers in its electric flying taxi before the end of 2017. The Volocopter 2X is equipped with sensors that allow for driverless flight, but a pilot will control the aircraft during the five-year testing period as regulations for a flying taxi service are set. **VOLOCOPTER**, has been working on its VTOL aircraft since 2011. Volocopter 2X, the company's second-generation vehicle, has been approved as an ultralight vehicle in Germany, can recharge in just 40 minutes using a DC fast charger, is designed to fit two and is powered by nine batteries that allow it to fly for 17 minutes at a cruising speed of 43 mph.

Map-making Tools

PEN AND INK were the tools used by cartographers for centuries to produce the original maps. When it was time to print the map, engravers took over with their styluses.



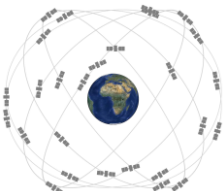
Advances in map-making were often driven by those seeking either economic or military advantages. The scribing tool and peel coat developed in the 1940s and revolutionized map production.



The term 'digitizing' described the process of capturing the coordinates of lines (e.g., centerline of a road) using a cursor.



The Global Positioning System allowed maps to be produced on-the-fly and objects to be positioned in real time.



LIDAR (Light Detection And Ranging) uses lasers to make 3D representations of images.



Subjective Perspective: Rudbeckius' Map

JOHANNES RUDBECKIUS WAS not a cartographer, as you might be able to tell from his rather crudely drawn world map below. He lived in Central Sweden between 1581 and 1646, at the start of the Enlightenment, and, as a man of the Enlightenment, he pursued simultaneously many complex goals. He was a bishop, chaplain to King Gustav II Adolphus, a professor of mathematics, Hebrew and Latin and is credited with founding the first schools for secondary education.

As the story is told, he needed a map for his mathematics lessons, so he drew one himself, undoubtedly using sources like Gerardus Mercator's world map of 1569. Rudbeckius gave his map the title *A World Map for Private Educational Use* (1626). Look closely and you will see that he has planted his feet firmly in Greenland in the north (*septentrie*) facing south. Extending his left hand out, he reaches over Asia and touches Japan. His outstretched right hand feels what one day will be called the Baja Peninsula. He gazes down to the waters of the Indian Ocean and the Strait of Magellan toward the vast expanse of *Terra Australis*. I can find nothing about what he was teaching, but perhaps we can guess that it had something to do with the position of objects being relative to the position of oneself.

I recall the first time I experienced seeing a map from the perspective of the bridge of my nose. It was on the screen of Etak's *Navigator*.

It was an early form of navigation system that allowed the user to enter a destination and follow the course of the vehicle while it drove toward that destination. The orientation of the map was always 'forward is up', so while the vehicle moved, the map rotated. This was supposedly based on an ancient Polynesian navigation principle called 'etak', in which the boat is stationary and the earth moves beneath it.³ The Etak maps were rudimentary stick figures produced in the best do-it-yourself fashion that characterized the first maps used in these new-fangled gadgets.

Many of the progeny of cartographer Mercator, like Bartholomew, Esselte Kartor and Kümmerly+Freymann, have disappeared, but the number of do-it-yourselfers, successors to Rudbeckius, seems to have dramatically increased. Everyone making a new system or component in a system for self-driving vehicles appears to need its own special type of map. The job is no longer portraying a three-dimensional world on a two-dimensional surface to help us understand relationships between objects. The job is producing an image like the one we humans see when we navigate 'by the seat of our pants'. There is a major difference between understanding that Chelsea is in the opposite direction from Brighton if I am in Cambridge, MA and actually getting to either place in a vehicle that is under my control.

What comes after LIDAR?



Calculating the Value of Humanless-Driven MRTVs

SAVING LIVES IS given as the main reason for making motorized road transport vehicles (MRTVs) humanless-driven. We have no proof this will be the case, but enough people believe it will be so that large investments are being made in developing the technology for eliminating the need for a human driver.

I've tried to look at the problem from the perspective of the private car owner. People like me buy a car because it offers us the most flexibility in time and place of travel. We can get into our cars at any time of day or night and drive them anywhere. On top of that, we can buy what we can afford, from a low-priced, second-hand car to a luxury vehicle, from a pick-up to a sports car. Will humanless-driven cars be less expensive than the cars we have today, or will they offer more time and route flexibility? I can't see that they will do either.

For me, a humanless-driven car is the same as a taxi or chauffeur-driven limo. If chauffeur-driven cars were the best option for private travel, why are people still buying their own cars? Surely, a highly trained, professional driver who is careful to follow all of the laws will have fewer accidents than most of the people behind the wheels of cars today. That helps to reduce accidents. Why not just eliminate private ownership and force everyone to take a taxi? No drunk driving or running red lights.

You sacrifice flexibility and add cost.

But maybe that's where the humanless-driven option comes in. It's the driver who adds the majority of the costs with taxis, isn't it? If you have humanless-driven cars running around everywhere so that one was there whenever you needed it, you would, in theory, have the same or lower costs as if you had your own car, and equal time and route flexibility. And think of all the other hassles and costs you would not have, like parking, cleaning, inspecting, insuring and much more.

What about the weekend trips to the country or the holiday trips to the family? It's not just getting myself somewhere; I have to haul around all the stuff that I need when I get to where I am going, not to mention having the rest of the family to consider.

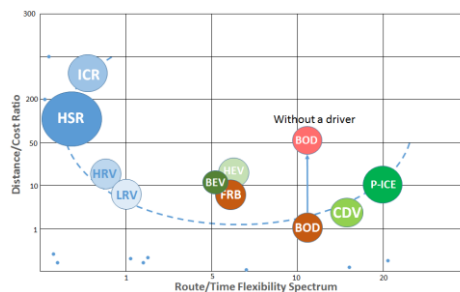
I suppose you would just order the type of

car you need for the job you have to do.

That means whoever is providing the cars will have to have enough of just the right models, or have a fleet of seven-seater SUVs—and that will be expensive.

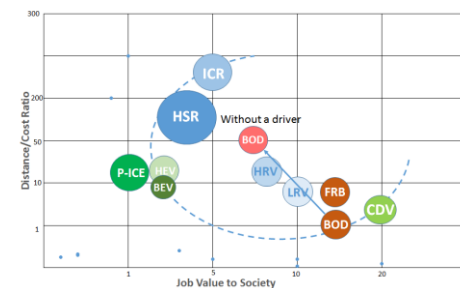
I've made a diagram to show the situation we have today with personal land transport, adding in rail and bus to complete the picture. On the Y-axis is the distance/cost ratio, and on the X-axis is the route/time flexibility. The size of the circle is based on the vehicle's range. If you take out the driver from the Bus-on-Demand, for example, the distance/cost ratio goes up, but route/time flexibility is the same.

Based on your diagram, we should get rid of trolleys and undergrounds, concentrate on converting all cars and buses to electric and hydrogen if we can increase their range and make them driverless.⁴



What about all the bus and taxi driver jobs that will be lost? That's not in your diagram.

I made another diagram to show the job value to society. This is based only on the number of jobs that each one of the categories generates. There are more taxi drivers than there are bus drivers. It gives a different picture.



It looks like there is a direct relationship between cost and value. No free lunch.

If we take the drivers out of this picture, we would presumably reduce the value to society while decreasing the cost, correct?

Maybe just in the short term, for all of the former bus and taxi drivers that are put out of work. But then after a few years people will know there are no jobs as bus and taxi drivers. Hopefully, new jobs will be found.

In some countries and cities within countries, 50% or more of the taxi and bus drivers are immigrants. Driving a bus or taxi has been a way for people to get a foothold in the job market, pay the rent on an apartment and settle the family. If these jobs disappear, there will need to be types of jobs that accomplish the same objectives. Otherwise, it would appear that countries should stop allowing immigration or find the money to subsidize new arrivals.

BEV – Battery Electric Vehicle
BOD – Bus on Demand
CDV – Chauffeur Driven Vehicle
HEV – Hydrogen Electric Vehicle
FRB – Fixed Route Bus
HRV – Underground City Rail
HSR – High Speed Rail
ICR – Intercity Rail
LRV – Light Rail Vehicle
P-ICE – Private - Internal Combustion Engine

It sounds like everyone would be better off if we forget the whole business with humanless-driven cars and buses and just work on improving car safety and car drivers. I'm also not so sure our cities would be better off without underground service. Imagine Tokyo, New York or London eliminating their undergrounds. All those people would be up on the street taking up space on roads in buses and driverless taxis.

Maybe the whole idea about cities is outdated. As I understood it from my history classes, cities came about to make possible communication among a large number of people and to reduce the friction of that communication by shortening the distance between people. Technology is solving both problems.

One thing I have gotten out of this conversation with both of you is that this is a lot more complicated than simply claiming lives or money will be saved. Let's keep this conversation going, o.k.?

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Footnotes:

1. In Scranton, 20% of the population is 65 years old or older; in Boston, the percentage of residents 65 or older is 10%.
2. A few insurers are offering discounts to owners of Teslas who have purchased Autopilot. This is not a reward, it is a way to learn what impact driver assistance technology has on safe driving.
3. Etak assumes that *palu*, the navigator, is in a canoe that is stationary, and that the islands move on the sea around him. This concept is hard for us to even imagine because we are sure that the canoe is moving. But with the same conviction, the *palu* is certain that his canoe is stationary and the world is moving around him. In his world view, islands come toward him and move away from him.
4. The EPA rated the 2017 90D Model S's energy consumption at 200.9 watt-hours per kilometer (32.33 kWh/100 mi or .201 kWh/km) for a combined fuel economy of 104 miles gallon gasoline equivalent (2.26 L/100 km or 125 mpg). If all four places are filled in the Tesla, the consumption is .05 kWh/km, compared to 0.0425 kWh/seat-kilometer for a high-speed train with 350 seats fully occupied).
5. Jacques Amselem, Director of IoT for Allianz Technology, pre-viewed the article and provided expert comments.

Driverless Cars are Old Hat

Driverless cars have been around for a long time, as the images below attest. Back in the 70s when bumper stickers were the rage, you drove your car up to New Hampshire's White Mountains, to the foot of Mt. Washington. While you hiked the trail to the top, your car drove itself on the 3-mile Auto Road and waited up top for you. As a reward, it got its own sticker to show off for its friends back home in Massachusetts.



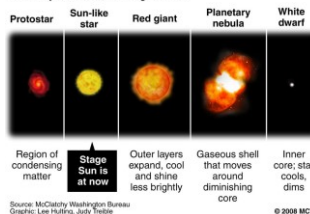
Musings of a Dispatcher: Finding Another Sun

STEPHEN HAWKING LIED to me. Actually, he lied to all of us who read his book, **A BRIEF HISTORY OF TIME**, first published in 1988. He told us our solar system, with Earth as one of its planets and the Sun at its center, was formed approximately 4.54 billion years ago. He said that the Sun was half way through its life and that it would start running out of fuel in about another 4.2 billion years, eventually burning out. If Earth had not already been demolished by a meteor or taken by eminent domain to make room for an intergalactic highway, and we humans were still occupying the planet, the end of the Sun would mean the end of us.

He gave all of his readers a good reason to support research on finding a suitable planet in another solar system to occupy. No need to rush, he said. Do what you can during your lifetimes and make sure you pass on your knowledge to the next generation.

The fate of the Sun

About 4 billion years from now, the Sun will slowly fade and burn out. The life cycle of stars, including the Sun:



A few years ago, Dr. Hawking began changing his tune. Maybe 10,000 years was the practical maximum, or it could be as little as 1,000. He said that overpopulation and extreme energy consumption would turn Earth into a

About Michael L. Sena

Michael Sena works hard for his clients to bring clarity to an often opaque world of vehicle telematics. He has not just studied the technologies and analyzed the services. He has developed and implemented them. He has shaped visions and followed through to delivering them. What drives him—why he does what he does—is his desire to move the industry forward: to see accident statistics fall because of safety improvements related to advanced driver assistance systems; to see congestion on all roads reduced because of better traffic information and improved route selection; to see global emissions from transport eliminated because of designing the most fuel efficient vehicles.

This newsletter touches on the principal themes of the industry, highlighting what is happening. Explaining and understanding the how and why, and developing your own strategies, are what we do together.

ball of fire. Then, in late 2017 while speaking in Beijing at the Tencent WE Summit, the outside limit had shrunk to a measly 600 years, and the last 100 of those 600 would be needed to execute the evacuation mission. Moving anywhere from 10-to-50 billion people, and whatever they would need when they arrived on **Earth II**, will take plenty of modern day equivalents of Noah's Arks. One hundred years to load them all up may not be enough.

With all due respect, Professor Hawking, this change from 4.2 billion to 600 is no small beer. We're talking about being off by a magnitude of seven! What happened? Does your invocation of the GLOBAL WARMING deity mean that you, the inveterate atheist, have gotten religion? I don't think so. I believe you tired of the *Bladerunner Scenario* (BS) receiving so much attention. *The BS* is when all the cosmopolitan Musketeers shuttle off to Mars to live in the equivalent of Saudi Arabian compounds for expatriates, and GANGES (the eventual successor to AMAZON) delivers monthly C.A.R.E. (China Americas Russia Enterprises) packages that include *foie gras* and *champagne* produced by the minions back here on Earth.

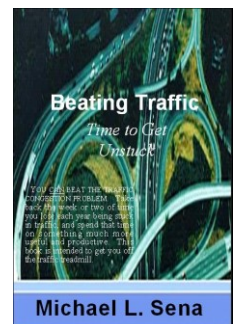
Professor Hawking is trying to give us a nudge, and he has figured out that using Environmentalism's bogeyman works on a large number of humans. He is a major supporter of **Breakthrough Starshot**, an effort to send laser-

propelled nanocraft to explore the nearest star system beyond our sun, Alpha Centauri. A nanocraft is small enough to hold in your hand. The thought is to use them for exploration, not transportation. That comes later. The idea is to propel the tiny ships across the 40 trillion kilometers of space using Earth-based lasers and have them collect data on the Alpha Centauri and its planets. The trip will take 20 years, a fraction of the time it would take a normal spacecraft. It took over nine years for New Horizons to make the 4.4 billion km trip to Pluto. Alpha C. is 10,000 times further away.

Honey, I won't shrink the kids

Let's face it. Twenty years would be a long time for the kids to sit still in the back of a 'nanobus'. As long as it's open season on making wild-ass guesses, I'm going to add mine. We are not going to miniaturize mankind. We humans are not going to make that trip, and it does not matter if it is 500 or 4.2 billion years to take-off day. We're going to send our DNA or whatever the equivalent is when we need to exit **Earth I**.

Just imagine if 600 years ago, in 1517, another professor, one living in Wittenberg, had extended his criticisms of the predominant religion in Europe at the time beyond indulgences and claimed that heaven was not enough, that we needed to find another Earth. He probably would have been drawn and quartered, the age of enlightenment never would have dawned and we would be just waiting for the lights to go out.



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