

**Mobility
of the
twenty first
century**

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Definition of the term “21st Century”

Before I go deeper into the topic of how mobility in the 21st century could look like, I would like to quickly define and most importantly frame this widely used, modern and from a personal point of view very exciting term “21st Century”. I would like to start with my own idea of this “whole thing”, free and untouched by official definitions, before I in fact switch over to the official definition.

Personal interpretation

To be perfectly honest I never really thought about this term in a deeper way until now - so, let's in fact think about it and see what happens. Please keep in mind that this is a highly subjective point of view – chances are that you might see some things differently.

For me this term “21st Century” was one thing for sure, a very general term for a rather undefined future and that's basically it – but if you take a closer look at it, it turns into a quite weird term as well.

On one side it has a very **symbolic meaning** to it (reminding me of the **10.000 years clock**) which allows its ideas to reach out into a sometimes even far future, easily surpassing the official boundaries of the 21st century by hundreds of years – while on the other hand the official definition itself and the pure number 21 are keeping it rather close to the present, maybe providing an idea of something that lies just around the corner and with a little bit of luck can be even witnessed within our own lifespan. In other words – if you ask people about the 21st Century you will probably get a wide variety of answers reaching from the new “iPhone 8”, to a world that is like the one in the movie “The Fifth Element”, not to mention all the surprising answers we don't even have on our radars.

Yet somehow all this crisscrossing and re-routing to the number 21, seems to make a lot of sense because in a way it keeps things relatable and approachable for us, therefore providing it with a certain identity and meaning that allows us to care, because

why would we care about something that happens in the 22nd, 23rd or specifically in the 25th century, just using these numbers feels plain odd and probably needs some education to get use to it, not to mention this small but important detail about the awareness of our own mortality that comes with it free of charge – BUT what we most likely DO care about is in fact the 21st century, because it is right there and affects us.

So out of a sudden this term “21st Century” also gets a certain importance – like a well defined business mission for humanity – relating things that otherwise wouldn’t be related and in addition to everything just mentioned, providing us with a reassuring frame, a perspective or path to a certain goal we all can join and follow, everybody on their own levels.

Yet again this seems to make a lot of sense, because some tasks (not for us as individuals but for humanity and life in general) are simply bigger than us and eventually will take longer than a single or even multiple lifespans (e.g. Mission to Mars). So, having a symbol or a framework that connects the future as well as the present and keeps it in rather small and easily manageable pieces, instead of throwing this whole, numbing, stupendously huge thing we call future at us, could be one way to deal with this.

Official Definition

Slowly retreating from this exhibit of how to make mountains out of molehills purely by using hot air I will now switch to the way more clarifying and substantial official definition. According to Wikipedia the 21st century is the current century. It began on **January 1, 2001** and will end on **December 31, 2100**. It is the first century of the 3rd millennium and distinct from the time span known as the 2000s, which began on January 1, 2000 and will end on December 31, 2099 (Wikipedia, 2017).

In conclusion and for the sake of this essay I will solely focus on the official definition – so, basically on everything from now on until the end of 2100.

Overview

In this part I would like to introduce a small selection of relatively new and future oriented technologies, trying to assess their importance and degree of relevance over the next 80 years. The main purpose for that is to give an idea of what already exists and is possible today, because chances are that technologies, which are going to significantly change and shape the world of the 21st century, are already in the making today – aside from all these little surprising technological incidents or breakthroughs that might will emerge down that path every now and then. Over the course of this essay I am going to solely focus on commuting- and people-transportation-systems. These kinds of systems become even more important due to the rising number of people in urban areas, which is expected to grow by 80% until 2050 – from 3.5 billion to 6.3 billion (Moss & O’Neill, 2012).

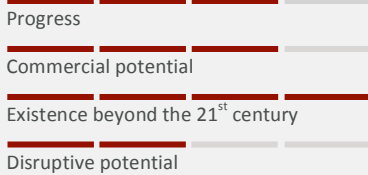
There are a few factors on why I believe that major technologies in 80 years from now are already in the making today. All these factors have one thing in common, they usually take time, sometimes even a lot of time and if you add them all up it is very likely that there are going to stick around for quite a while. For me the five most important factors are:

1. Political & Economical intentions
2. Research & Development
3. Standardizing & Scaling
4. Resources
5. Education

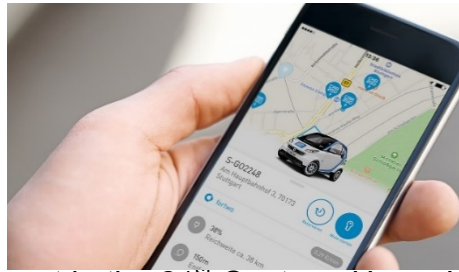
Examples

It is very likely that (revolutionary-) changes concerning a whole infrastructure (e.g. streets and railroads) tend to happen in very long intervals and are going to stick around for quite some time – while (evolutionary-) changes and modifications within these




infrastructures itself concerning for example vehicles and other technologies can happen relatively fast - but let`s see what happens, since we are living in a fast-moving world where even space programs are getting privatized.



Hyperloop



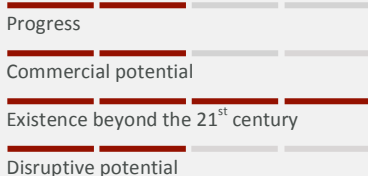
Only one of many projects connected to the name **Elon Musk** that could play an important

part in the 21st Century. Hyper Loop is basically about traveling through a **vacuum tube** which reduces drag to a minimum. Driven by an **electromagnetic engine**   

the vehicle than will be elevated and guided over the magnetic track within the tube – both **above land** and **underground**. The lack of air and physical contact between the vehicle and the track itself will allow speeds up to 670 mph (1070 km/h) by using relatively small amounts of energy. While all the technological components on its own are nothing new at all and even the general idea of traveling at high speeds through low-pressure tubes originates all the way back to 1909, hyperloop combines these components in a new way and puts them in a highly automated environment. Being more of a fictional idea just a few years ago, **Hyperloop 1.0** is well alive and successfully testing its first full scale prototype today (Hyperloop, 2017). Additionally, to the **USA** several governments (e.g. **Dubai, Finland, Netherlands, UK, Sweden** or **Russia**) already showed their interest and are conducting feasibility and viability studies for certain routes together with Hyperloop (Hawkins, 2017).



SPEED
200 km/h
124 mph



Boring Company

Yet another invention running under **Elon Musk's** name. This technology is all about using underground tunneling systems (up to 30 levels) to tackle today's traffic jams and congestion issues which a lot of major cities face. Cars will be transported by automated sleds with speeds up to 120 mph (200 km/h). At the moment, the main focus is on making the

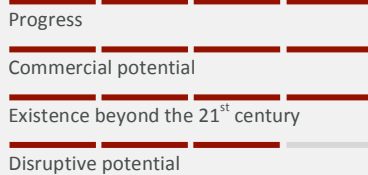


tunnel-building process more cost-efficient, which is the biggest issue right now and key factor for the success of this project (TED, 2017).



Shared mobility

Shared mobility is one of these technologies that already exists (e.g. **Drive Now**, **Coup**, **Car2Go**) and probably will be even more supported by technologies like autonomous driving and E-mobility (IDEO, 2017). Elon Musk is a 100% sure that the idea of buying your own car, using it on your way to work and from there letting it autonomously drive throughout the city picking up other passengers that booked your car, is

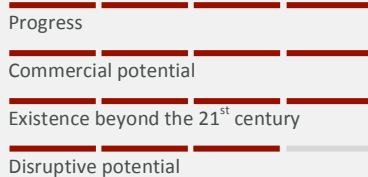


going to come eventually. You will basically be able to refinance your car while you are at work (TED, 2017).

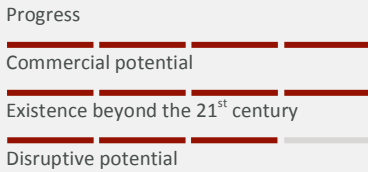


E- mobility (battery based)

Electric cars, bikes and scooters are also a part of today's traffic environment and surely will continue to do so, even though this technology is still quite expensive and has some major practicality issues that need to be solved – especially concerning electric cars. But there is another important factor nobody really seems to talk about, which is the amount of **available resources** connected to the



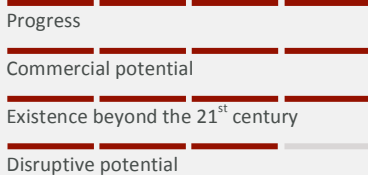
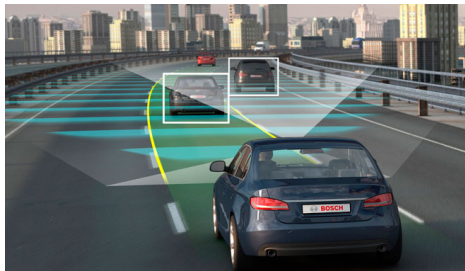
lithium ion batteries that are used for all of these vehicles. Suggestions are that we will be out of the necessary minerals within about 20 years (including the recycling process), especially when we continue to scale as big and fast, as intended by certain companies (Wanger, 2011). I can't imagine that batteries in general are going to disappear someday, the importance of having (mobile-) energy storage is just too high. So, I simply assume that there already are some blueprints for new battery technologies somewhere in the drawers of some engineers. Facing the resource situation, one could understand why certain car manufacturers continue to research **alternative propellants** like e.g. hydrogen.



Driverless shuttles

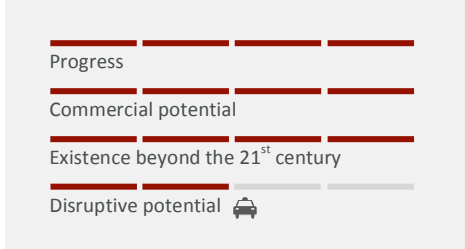
Driverless electric shuttles are another way of public commuting in the 21st century. Companies like **NEXT** from **Dubai** and the French startup **NAVYA** developed very concrete Projects. NEXT follows the principle of modular cabins and is still in the prototyping phase while NAVYA is already rolling out their **ARMA vehicles** – one testing sight is the area of **Berlin`s Charite** (BVG, 2017). But these companies

are by far not the only ones – Dubai is already testing autonomous shuttles and follows its plans declared by **Shaikh Mohammad Bin Rashid Al Maktoum** (Prime Minister of the UAE and Ruler of Dubai) that by 2030, 25% of all transportation trips in Dubai will be smart and driverless (Achkhaniyan, 2017). It is in fact a very interesting scenario having these shuttles instead of the for example Berlin S-Bahn and multilane tracks instead of railroads.



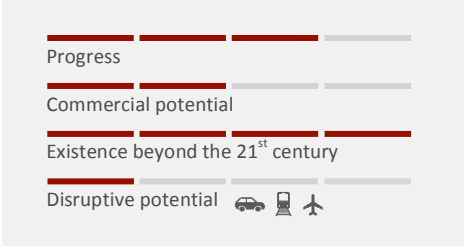
Self-driving cars

A technology that surely and most certainly will play a major part in the 21st century and beyond. Basically all major car manufacturers are not only developing these technologies but using them in their cars already. Companies like e.g. **Tesla**, **Mercedes**, **BMW** or **AUDI** sell cars that can drive autonomously to a certain degree – even **Google** is developing their own autonomous car.



Drone shuttles

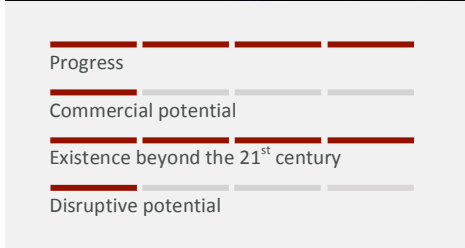
When I read about flying (shuttle-) drones I was very impressed. I picked two out of a few very interesting projects connected to this topic. One is the Airbus



project **Pop.Up**, which is more of a hybrid between a car and a drone and is a slick,

polished and conceptual vision of the (near-) future having no specific release date – while on the other hand **drone 184** from the Chinese manufacturer **Ehang** already completed their first testing flights in Dubai. Ehang’s 184 drone, like the driverless shuttles, are part of Dubai’s already mentioned 2030 agenda. Even though I am no engineer or specialist in this field I would go as far and say no matter how conceptual ideas like Pop.Up appear to be – it is no rocket science at all and could be easily build by today’s standards. It just seems to be a matter of decision.

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Flying cars

If I had to differentiate flying drones from flying cars I would say that flying drones are vertical accelerators and more like copters, while these particular flying cars are horizontal accelerators and more like airplanes. There are some companies already building fully functional (often spartanic) prototypes but for me the most “promising” is the **Aeromobil 3.0** – even though I don’t believe that it’ll have a big

commercial impact because of its price tag (USD 1.5M) and the horizontal acceleration, which requires some sort of runway or area to start of. It is just not mass compatible and will probably stay a (legit) niche product for quite some time – but to be honest I would

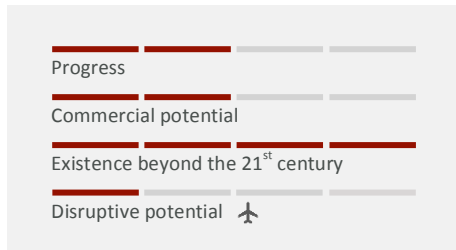
love them to prove me wrong because this company seems to do a really good job in pushing and developing this product even further.



Supersonic flight

development of supersonic small private companies are their own prototypes – for **Aerion** (Airbus-Partner).

After the Concorde, supersonic flight is very likely to experience a commercial revival. **Airbus** and **Boeing** both announced very specific plans for the



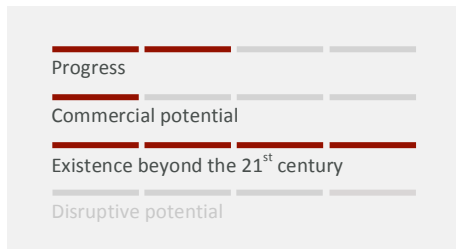
airplanes – while already developing example **Boom** and



Space X – Mission to Mars

human mankind in general. deadline for traveling and living somewhere in the 2030`s **Musk** and his SpaceX project saying humans are going to be species by 2023 (Space X, 2017).

A project that has by far the smallest commercial potential in terms of being a daily driver for everybody, but has by far the biggest importance for



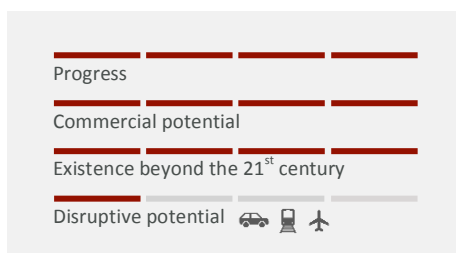
While **NASA** sets a on Mars (NASA, 2017), **Elon** goes even further a multiplanetary



By Foot

emission free and solely relies Even though it is a little slow has an enormous potential

Another technology, where I hope and feel like it has a chance to survive the 21st century, is commuting by foot. This so called `walking` is almost entirely



on biomechanics. and inefficient it since it only

requires our body, is completely free of charge, benefits your health if applied properly and is available to almost everybody.

Résumé

If I only had a few buzz-words to summarize how mobility in the 21st century could look like (at least from the perspective of this essay) I would say that words like **digital**, **connected**, **autonomous**, **shared**, **electric**, **(relatively) green** and **multi planetary species** ultimately describe best all the introduced technologies connecting most of them.

Additionally, there are two names that appeared repeatedly over the course of this essay – one of which is Elon Musk and the other one is Dubai. The name Elon Musk alone unites almost half of the presented ideas under his roof and is a significant driver for these technologies in general. On the other hand, Dubai turned out to be a hotspot and calls out on itself to be on the cutting edge and a leading hub in the fields of innovative transportation technologies (Parasie, 2017). A place like Dubai is in fact a very good environment for that – the U.A.E region in general has a lot of financial power and the cities itself are relatively new (in terms of size and technological standards) having a lot of space and vast desert lands to try things out and to grow into – but most importantly Dubai has a leadership that supports and engages on these kind of ambitious projects, even though there are some examples where construction was put on hold or were significantly delayed due to the absence of financing.

Talking about the introduced technologies itself – I highly believe that all of these technologies will be part of our near future, some of them will continue to be a niche product and some will be part of a significant transformation – but I also believe that none of them will be disruptive enough to completely replace present infrastructural systems, at least within the 21st century (even though I am very aware that it is basically just a matter of decision on how fast this transformation will be). I am sure that even by the end of the 21st century, we will continue to have railroads, airplanes, ships, and four wheeled cars and the Hyperloop or flying shuttles are not going to replace all that – just

try to imagine what it would take to completely dismantle and replace Berlin's S- and U-Bahn system alone. All of that doesn't mean that there won't be a lot of change, believe me there will be – all fore signs point towards it and I am really looking forward to it, maybe even hoping for some innovations that are not even born yet.

Personally, I believe that technologies like **driverless shuttles**, **E-mobility**, **shared-mobility** and **self-driving cars**, will have by far the biggest commercial impact within the next 83 years and are going to significantly change our world. The reason I believe this is – first because they already exist and are being used commercially – second, there seems to be a broad consent within the industry, basically all major companies are going towards this direction – third, these technologies are relatively easy to implement and apply into already existing infrastructures.

I also believe that technologies like **drone shuttles** and **supersonic flight** will also be a part of our near future but probably not as widely spread – staying rather exclusive to whether certain regions or relatively small groups of people.

Hyperloop and the **Boring Company project** are both technologies that seem to be very promising but also require significant infrastructural changes or setups. I personally believe that they will be part of our future but again not as widely spread – taking factors like costs, time, decision and usefulness in account. I think that 80 years are just not enough to replace all or most of our railroads, airlines, or highways with tunnels and tubes.

Talking about the **flying car** – again I am highly convinced that these projects will continue to exist. There will always be people and enthusiast striving for things like that. But when we talk about its role in the 21st century, the flying car will probably stay a super niche product. Everything has their timeframe in history, maybe it's not theirs yet – but let's see how this idea is going to develop over time.

And finally, **Mission to Mars** – a project standing on its own, being anything but a technology that we are going to use on a daily base like airplanes, trains or cars (at least within the next 80 years) but it will surely be the most important one for all of us – by far. We will only be able to leave earth together and in times of peace not in times of war.

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