D.O.D

Doctor on demand

Product design for innovation
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Abstract

During the last years we've seen a fast expansion of the cities and we noticed how, year after year, always more people moved to this urban areas. By some estimates in the 2050 the 2/3 of the population will live in big cities.
This brought to the saturation of the available areas where to build structures and anything could be necessary to give a service to the always increasing number of people living the cities.
From here the necessity to create new alternative spaces that can help people to simplify their lives and guarantee a good service to the population in every kind of situation.
Analyzing different societies of the world, we can notice that some populations, nowadays mainly located in Asia are already facing this problem of overpopulation in some big cities and in the next years the problem will increase even more.
To contrast this problem in Japan and some other areas, for example, in the past years was born the concept of capsule hotels where people can spend the night in a small space with only the necessary things for them; a single person for every capsule, in this way there is more space for everyone who needs a place to sleep and this is necessary in those areas where the amount of people is so elevated that with a normal bedroom for every single person there wouldn't be enough space for everyone.
The work of this thesis is based on this situation, starting analyzing the problem and the evolution of the society.
This thesis is divided in three fundamental parts: a research part, a description of the context where the projet is based, and the last part about the project itself.
The research starts with an analysis of the scenario, so the analysis of the world of the future with a moving society, overcrowded cities, and the opportunities given by new technologies.
The second part tells about the starting point of the project so the concept of space in different cultures and the perception of space for the human being.
In the third and final part there is expained ...

1. Scenario

1.1 A moving society

Why can we define our society a "dinamic" one? It's probably common to talk about globalization, but after all it's one of the basic factors that since the nineties brought to an evolution of the society in different ways: the communication between different areas of the world became easier thank to internet and the informations exchange is in real time now; in many countries of the world the life style is improved comparing it to the old century one; and so many other changes who we're noticing in first person are

still occuring.

In this years we're having a demographical increasing of world population, especially in the urban areas.

In the 2014, the world population resident in the urban areas was the 54%, way more compared with the 30% of the 1950.

The estimated percentage for the 2050 is around 66%.

Nowadays the most urbanized areas are in the North (82%), Latin America and Caribbeans

(80%), and Europe (73%).

Asia and Africa are still pretty rural, with between the 40% and 48% of population living in the urban areas.

The prediction for the next years is, for every area of the world, a big growth of urbanized areas, especially for Asia and Africa predicted to arrive respectively to 64% and 58%.

The urbanization process in history had been associated to other important economic and social events who determined more mobility, less fertility and longer expectation of life.

The most part of national economy activities, governments and transport are concentrated in cities, this because they're a strategical connection with rural realities, with other cities and internetionally.

The urban life supports higher levels of literacy and a better education, better sanitary assistance and access to social services, and more opportunities to participate to the cultural and political life.

Almost half of the inhabitants of the whole world's cities lives in small villages of less than 500.000 people and only one on eight lives in 28 metropolis with more than 10 millions of inhabitants.

Tokio is the biggest city of the world with 38 million of people, followed by Delhi with 25 million, Shanghai with 23 million, Mexico City, Mumbai and Sao Paulo with around 21 million
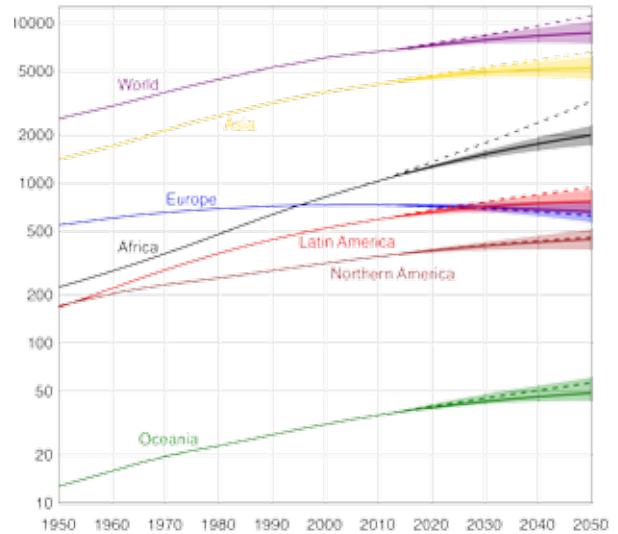
of inhabitants each.

In the 2030 the world is predicted to have 41 metropolis with more than 10 million of people each.

Tokio will still be the biggest city of the world but with 37 million of inhabitants, followed with Delhi who should reach 36 million of people.

Some decades ago the most part of the biggest urbanized regions of the world were in the most developed areas, but nowadays the bigger cities are in the southern part of the world.

The medium urban areas with less than 1 million of inhabitants in Asia and Africa are the ones with the faster growth.

In the last years some cities had a demographic stop.

The most part of this cities are located in the countries with lower fertility level, some in Asia and some in Europe where the population level is stuck or is decreasing.

The economic situation (crisis) and natural disasters are some of the factors who contribute to decrease the population level.

While the world keeps getting urbanized, the challenge for a sustainable development will be concentrated in the cities, especially in the ones located in countries with low-mid wealth, where the urbanization is faster.

1.2 Crowded Cities

For the first time in the human history more people are living in urban areas than rural areas, as previously said, this has been observed since the end of 2008 and this trend keeps increasing. In 2015 about 3.5 million people were living in cities and with the time passing this number will probably increase expecting to arrive to 5.2 million in 2050.

By 2030, the world's urban population is expected to rise to 60%.

Many factors are contributing to this situation like population aging, expected to be even more rapid than the past centuries during the next years, and migrations from rural areas as always happened in the human history.

It's also due to the economic opportunities present in the city and rural production increasingly under pressure from upscaling and industrialization.

Marginalized rural populations flock to the city around the world, where there is inevitably a lack of employment opportunities for them.

The main effect from this situation is the massive growth of urban areas, but not of high quality.

With smarter technology systems in transport

and parking combined with car-sharing, could be readjusted the use of public space and greenery in cities.

Car ownership has determined or even dominated infrastructure and urban planning in the 20th century.

Suburbs grew by push factors (expensive or dangerous urban cores) and pull factors (green space, a ordable transport and land).

The suburbs lead to a causal loop of new roads, more congestion, more road capacity, etc.

1.3 Technology Revolution

Parallelly to the automatization, the phenomenon of digitization is reaching an inflection point.
The effects of an increasingly digitized world are reaching into every corner of our lives: computers, the Internet, mobile phones, texting and social networking are already transforming the way we work, communicate and consume. The world is always more digital and the fourth revolution is almost here.
Millennials' class, the first generation of digital natives, will be the next leading class.

Web's power is increasing year after year and online shopping will grant accessibility to goods and services for the big and fast increasing markets as China and India.
People are buying more stuff on-line.
More and more we try to buy at the producer and make the supply chain as short as possible. Highly automated manufacturing is nothing new, but the level of automation is now rapidly increasing in the distribution channel. Decreased retail space demand, lowering prices,

empty stores city centers, more drop-off points for products, higher demand for showrooms and 'embedded' product display are the effects of this situation.

E-commerce is enabling the rise of new concepts and ideas within the supply chain, but also new companies are popping up to address logistical challenges.

For the logistics industry, the rise of e-commerce combined with the incoming autonomous vehicles technology is a ground breaking change. Crowd-sourced business and autonomous driving technology are joining forces to deliver new solutions for more demanding customers.

1.4 New Digital Opportunities

Creativity will be more and more a spread attitude and a shared value.

Smartphones, web, digital media will help people to exchange they experience and to spread they vision, careating creative communities at a global scale.

Design will be a practice in a scenario where everybody designs, an co-autorship, co-design and co-production will be the new pathways.

Crowdsourcing or coworking spaces will become the natural environment to grow new business and to manage transformation in a more aware and partecipative way.

The relationship between government and society is changing and generating new forms of interactions.

Bottom-up initiatives are booming.

Many people feel a sense of commitment to their neighborhood and city and are actively involved in it to improve the life quality.

Citizens already prefer a tailor-made approach now that they have the right tools thanks to the digital opportunities and authorities started to think along with them rather than simply providing standard solutions for everything,

the governments are adapting and taking in a greater account the initiatives in the community.

The decentralization of the societal functions is leading to 'servitization' where the services are increasingly replacing the goods and products and this is bringing to more complex business models, better control over products in the life cycle, more on-demand and tailored user experience.

2. Self Driving Society

2.1 Characteristics

Self driving cars are becoming a reality. In 2017 live projects involving autonomous cars are being carried out in different cities all around the world, including San Francisco, Boston, Pittsburgh, Gothenburg and Singapore.

For the moment these projects are all trials, but this fact shows that a future with self-driving cars is a reality that can be closer than we think. The technology is complete and improving but needs some more years to come to adulthood on an influential scale, while it waits for legal and regulatory frameworks to deal with inevitable questions of responsibility and accountability.

Tesla is already offering some autonomous drive functionality with future improvements through software updates on its cars. They are even promising coast-to-coast fully autonomous cars in the US during the 2018.

Technological breakthroughs such as 5G connectivity and artifcial intelligence (AI) are behind the phenomenon, and are making possible for cars to drive by themselves.

This change the actual relationship between drivers and cars.

In the 2030 the society should be completely self driving, this means that cars will be autonomous under all circumstances.

A car will be able to go on every kind of road where a car goes nowadays, so on public roads, school pickup zone and mall parking lots. It will have to drive in different road conditions like today, so on difficult roads, roads with worn out marking, with bad weather conditions. Technologic sensors will help to deal with snow, ice and other kinds of obstacles on the road.

2.2 Living the City

Analysis forecasts that 8 million semi and highly automated vehicles will enter the market in the next ten years. Once the commercialisation of autonomous driving kicks in, it will have far-reaching impacts.

The entire landscape, as well as the future of cities, will change as a result of this technology shift. Related areas such as parking, road design and thus the urban landscape will be heavily impacted. The shift in parking places, a reduction of parking areas due to automatic compacting combined with the servitization and reduction of desire for ownership, new sharing and on-demand models will overtake current family ownership and control of cars, as well as replace lease models for businesses. Traffic always had a high impact on satisfaction levels in a city by its population.

Freeing the driver, autonomous cars will ease the pain of commuting and improve the experience of traffic. From the pedestrian view, in a survey, one on four pedestrians declared that would feel safer if all cars were fully autonomous.

Being the society completely self driving in the

2030 the percentage of accidents for human error would be close to 0% and wouldn't be anymore any accident case related to a drunk person driving. The speed limit could be increased and cars, thanks to new sensors could drive closer the one to to the other allowing more cars to travel on the same street with actually less traffic. Elderly people will be able to keep driving automously in a car longer than now and people in general wouldn't need a specialized driving license to operate cars.

Also police officers' focus could be shifted from pulling over, writing tickets and handling accidents to managing other, more serious crimes.

Car insurance may eventually become extinct, or at least not billed to the consumer, since eventually the computer will be making all the decisions. Perhaps the premium will be paid by the car manufacturer instead of the driver.

2.3 The Negative Side

Unfortunately driverless cars won't just bring pros but also some cons, in fact just having the ability to operate a self-driving car would require an education on the driver's part because he would still be required to maintain some knowledge about how to operate it safely. The cost of implementing the new technology to allow cars to drive by themselves could be way out of reach for the most part of the people.
The security behind self-driving cars would be a major obstacle, especially because the technology would be of very high interest to hackers because the computer, to operate a vehicle, needs to store a lot of information on the software.
Some people are worried about the opportunity for a computer built into the self driving car to collect personal data.
Others are also concerned about leave all the power to drive them around to a computer that
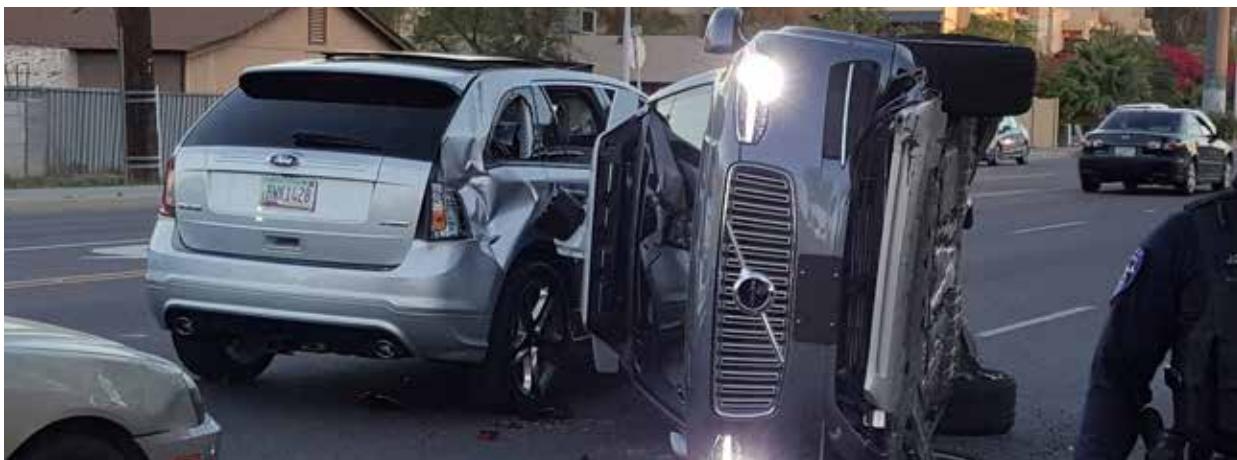
could malfunction and so put them in danger.
In case of other technology failure, for example traffic lights, the driverless car could react in an unexpected way.

Self-driving cars would eliminate many jobs in the transportation sector like taxi and truck drivers. This could have a negative impact on the unemployment rate and the economy.

Also, if driverless cars won't be widely adopted, accidents can and will still happen because on the street there is going to be a mix of self driving cars and cars driven by human people; these last ones can cause accidents also involving at the same time the autonomous ones.

ONLINE
CONNECTED

DRIVERLESS

ELECTRIC
AND SILENT
ENERGY

LONG
BATTERY LIFE

LOW CO2 LEVEL

RENEWABLE ENERGY

PARKING SPACES RETURNED TO LAND

FEWER LANES NEEDED

WIRELESS CONTENT PROVIDED TO THE USER

ZERO ACCIDENTS

UNIVERSAL ACCESS AND HIGHER AFFORDABILITY

BASED ON INDIVIDUAL PREFERENCIES
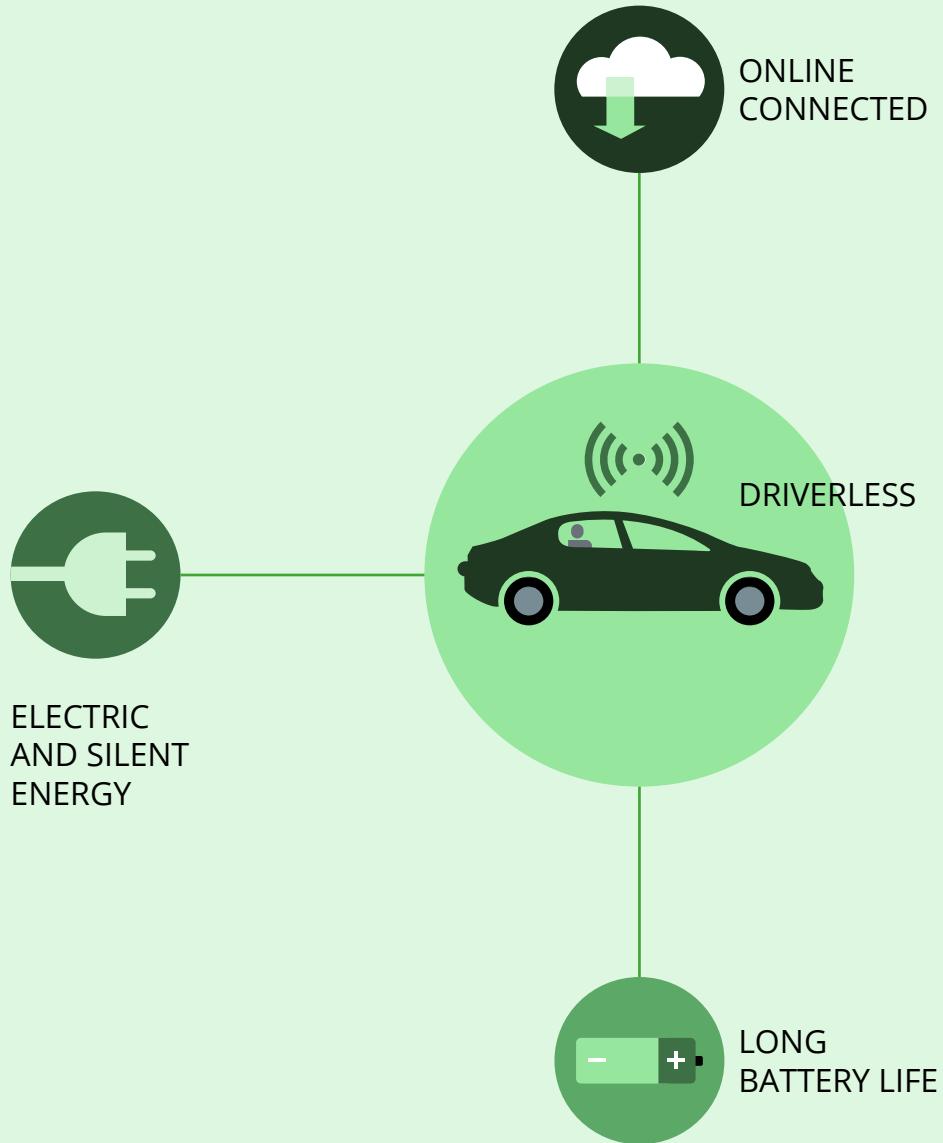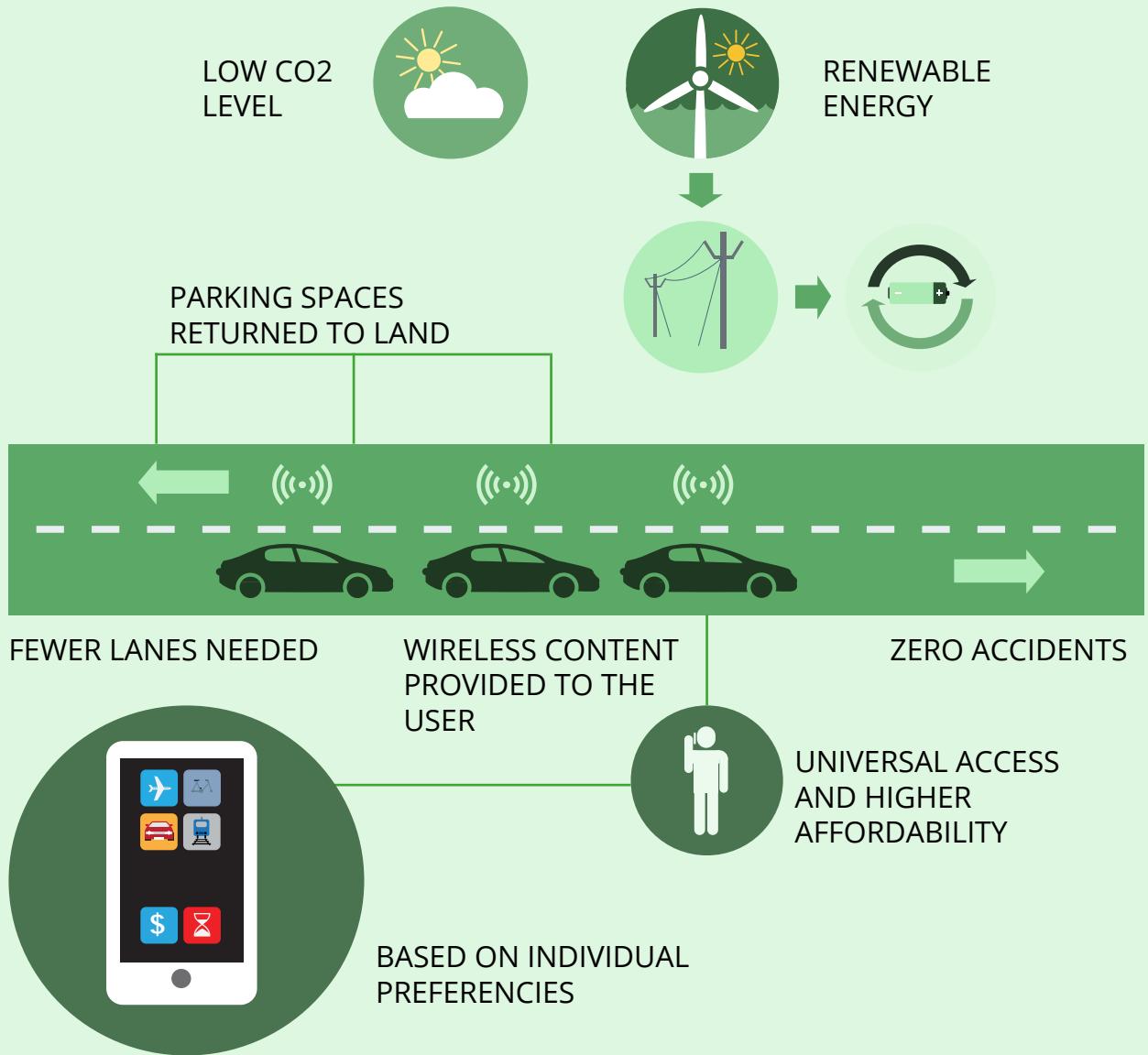
3. Space and problems in the modern society

3.1 The concept of space

What's the space?

When we usually talk about space we mean the size of a location or a room, the emptiness who constitutes it, big or small, narrow or uninhabitable.

So the space is what gives sensations and feelings who change and condition people's mood and their way to think and behave.

Space and perception represent two important concepts in human's life: in the space a human being exists and moves and thanks to perception he can have an idea of the space itself.

The common perception is that every single thing is "full", and the empty space is just due to a lack of something.

Analysing everything with this knowledge can help us to have a "perceptive consciousness" that can help us to design any open and free space in the ambient, or also any determined and limited space, so an interior.

When we talk about space we consider a thing who needs three different elements to exist: emptyness, fullness and a man, generally considered as observer. This three elements define the space, without them it doesn't exist.

3.2 The perception of space

The feelings of comfort or discomfort that a space can generate in a person depend by the perception and the chemical reactions that occur in the person itself. Every person has them, even if everyone feels them with a different energy.
So starting from this immediate and out of control reactions we can modify the shape of a certain space to create good sensations in other people or at least to don't create any bad ones.
It is studied that the way we feel affects the way we think and the way we think affects the way we feel.

We can't change public spaces in our cities or in our buildings but we can at least change our private spaces, through furnitures or in other ways, to make them more comfortable for us.
If the space is more relaxing, not only do we feel better, but we can also have more opportunities to find solutions to our problems, to learn faster and to don't accumulate stress.
To make our space more comfortable for us there aren't specific rules because rules themselves are part of the rational world while comfort is all about an intuition.

3.3 Real problems of the modern society

One of the biggest problems of the modern society is chronical stress.

It is increasing and it is influencing health, and the quality of life of every person living in the industrialized world.

Already in 1986 a poll on the medical magazine "Prevention" found symptoms of negative stress in the 89% of the American adult population, with a 59% of those people suffering of it every week.

The consequences are so many and various from psichic and physic pathologies.

The most common ones are chronical tiredness, interpersonal problems, self isolation, memory problems, emotional disturbances, migraines, spastic colon.

Stress can also bring to very serious problems, like heart diseases, asthma, obesity, diabethes, headaches, depression, gastrointestinal problems, Alzheimer's disease, accelerated aging and premature death.

Everyday's factors that bring to a stress situation are noise, pollution, overcrowding and busy life.

In 1983 the newspaper "Time" revealed that in the U.S.A. the most sold pharmaceutical

products after aspirin were tranquilizers, some medicines for gastric ulcer and some others for treating hypertension.

During the last years those percentages are for sure increased and for many people stress is a negative experience more than a souce of positive and healty energies.

So in the modern era a number always increasing of people are living in a stressful condition, and they have to learn to live with stress, so they have to strengthen their minds and their bodies to find a way to relax even if sometimes it looks there isn't any reason to do it.

A so big effort could compromise our ealth and influence the quality of our life going to modify our social and emotional relationships.

To manage a long period of stress we need a high level of energy and our vital functions have to be perfect, our brain have to find solutions for every situations and doesn't have to go hayware.

4. Analysis and medicine

4.1 Mobile laboratories

A clinical laboratory is a laboratory where tests are usually done on clinical specimens to obtain information about the health of a patient as pertaining to the diagnosis, treatment, and prevention of a disease.

Sometimes, due to different reasons a clinical laboratory can be mobile.

Mobile laboratories are designed to provide onsite medical laboratory services including providing rapid laboratory and pharmacy services to hospitals, clinics and everywhere else where no infrastructure exists, including during emergency situations and natural disasters.

They can be transported quickly and easily via tractor, train, or ship, and are most effective in supporting international and humanitarian medical missions.

Almost every examination can be conducted in a mobile laboratory, it depends by the tools they have.

The benefits of a mobile laboratory are various: it allows medical facilities to add additional lab services quickly and cost effectively it helps medical facilities address over capacity

constraints, such as overflow and backlog issues, it offers patients exceptional lab services without the medical facility incurring a major capital expense, it provides a "bridge service" during construction, renovation, or upgrade of your current facility.

Mobile medical labs are built to serve patient populations as independent operating vehicles or vehicles incorporated into an existing facility.

4.2 Mobile diagnosis tools

Sample processing usually starts with a set of samples and a request form.

Typically, the analysis is done on a set of vacutainer tubes containing blood, or any other specimen.

The specimens will usually all receive the same number, often as a sticker that can be placed on the tubes and form.

This label has a barcode that can be scanned by automated analysers and test requests uploaded from the laboratory information system.

Entry of requests onto a laboratory management system involves typing, or scanning (where barcodes are used) in the laboratory number, and entering the patient identification, as well as any tests requested.

This allows laboratory machines, computers and staff to know what tests are pending, and gives a place (such as a hospital department, doctor or other customer) for results to go.

For biochemistry samples, blood is usually centrifuged and serum is separated.

If the serum needs to go on more than one
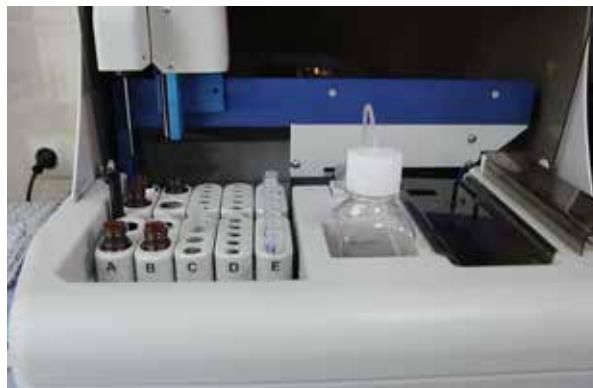
machine, it can be divided into separate tubes.

Many specimens end up in one or more sophisticated automated analysers, that process a fraction of the sample and return one or more "results".

Some laboratories use robotic sample handlers to optimize the workflow and reduce contamination risk and sample handling of the staff.

Generally, in a mobile laboratory the basis kit of tools consists, other than glass and microscopes, of few machineries that let conduct different examinations crossing the results of them to let have a final result.

An automated analyser is a medical laboratory instrument designed to measure different chemicals and other characteristics in many biological samples quickly, with minimal human assistance.

These measured properties of blood and other fluids may be useful in the diagnosis of disease.

These are machines that process a large portion of the samples going into a hospital or private medical laboratory.

Automation of the testing process has reduced testing time for many analyses from days to minutes.

There are haematological analysers that allow to automatically count and differentiate blood cells and Reticulocytes with a 3d laser technology.

Then there are completely automatic tools for electrophoresis that can do a test based on the analytic method of haemoglobins.

The selective ions based analyser can help to determine the quantity of electrolytes in the organism of a person.

The last tool that can be found on almost every mobile laboratory or hospital is the HPLC analyser that allows to determinate the HBA1C parameters.

4.3 Functions of mobile labs

Mobile laboratories provide a variety of on-site services, traveling to places where outbreaks can occur, serving as agricultural testing labs, educational class rooms, and even archaeological laboratories.

Mobile labs can serve a variety of functions including science education, science research, and on-site environmental analysis and monitoring. These laboratories on wheels are also used by and for public health laboratories, environmental agencies, departments of agriculture, first responders, geochemistry, military, law enforcement and other security agencies.

Depending on the specific goal, mobile units are outfitted with equipment and technology for a variety of specific requirements.

Mobile laboratories serve to fulfill many needs in local communities, states and throughout the world. The highest quality lab vehicles are built on truck chassis, rather than RVs or buses which do not have durability and maximum interior space to adequately fulfil specific needs or services of most organizations.

4.4 Kinds of mobile medical labs

Anthropometry assessments

Blood chemistry measurements

Fitness assessments

Repair highly customized equipment

Mental health screenings

Nutritional analysis
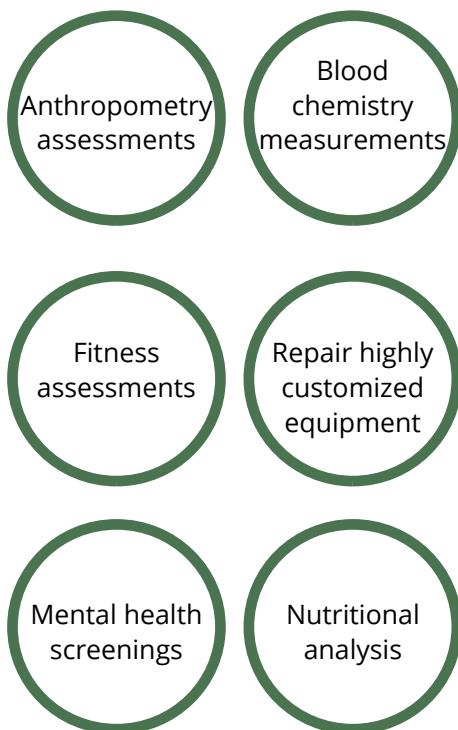
Mobile medical laboratories provide sophisticated testing for avian flu or other potentially deadly outbreaks.

These units house sophisticated laboratory equipment that can be shared across many cities or counties where outbreaks can occur. They can also be designed to provide veterinary services for livestock and even pets.

Mobile medical labs deliver specific health services, such as:

.Anthropometry assessments, which is the study of the measurements and proportions of the human body

.Blood chemistry measurements.

.Fitness assessments like mask-fitting and pulmonary function testing.

.Make repairs to highly customized equipment like prosthetics.

.Mental health screenings.

.Nutritional analysis, often including macro and micro nutrient analysis, obesity and diabetes prevention programs.

4.5 Analysis and therapies

4.5.1 Blood test

A blood test is a laboratory analysis performed on a blood sample that is usually extracted from a vein in the arm using a hypodermic needle, or via fingerprick.

Multiple tests for specific blood components, such as a glucose test or a cholesterol test, are often grouped together into one test panel called a blood panel or blood work.

Blood tests are often used in health care to determine physiological and biochemical states, such as disease, mineral content, pharmaceutical drug effectiveness, and organ function.

Typical clinical blood panels include a basic metabolic panel or a complete blood count.

Venipuncture is useful as it is a minimally invasive way to obtain cells and extracellular fluid (plasma) from the body for analysis.

Blood flows throughout the body, acting as a medium which provides oxygen and nutrients to tissues and carries waste products back to the excretory systems for disposal.
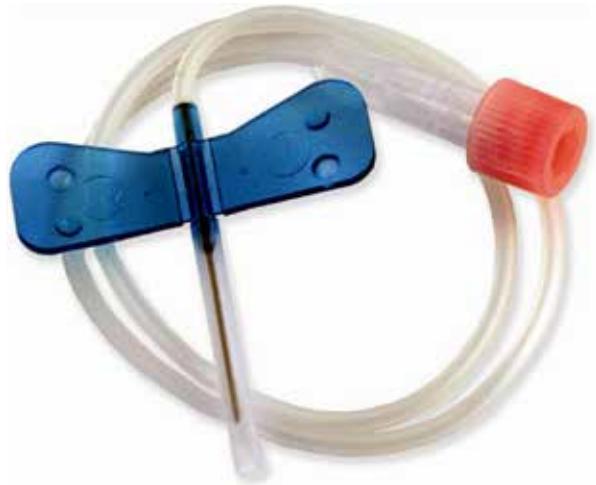
4.5.2 Saliva test

Saliva testing is a diagnostic technique that involves laboratory analysis of saliva to identify markers of endocrine, immunologic, inflammatory, infectious, and other types of conditions. Proponents of saliva testing cite its ease of collection, safety, non-invasiveness, affordability, accuracy, and capacity to circumvent venipuncture as the primary advantages when compared to blood testing and other types of diagnostic testing.

Since multiple samples can be readily obtained, saliva testing is particularly useful for performing chronobiological assessments that span hours, days, or weeks.

Saliva testing is used to screen for or diagnose numerous conditions and disease states, including Cushing's disease, anovulation, HIV, cancer, parasites, hypogonadism, and allergies.

This type of testing typically involves collection of a small amount of saliva into a sterile tube followed by processing it in a laboratory.

Some methods of testing involve collecting saliva using an absorbent pad, applying a chemical solution, and monitoring for color change to indicate a positive or negative result. This method is commonly used as a point-of-care (POC) technique to screen for HIV.

4.5.3 Injection therapy

Injection is the act of putting a liquid, especially a drug, into a person's body using a needle and a syringe. Injection is a technique for delivering drugs by parenteral administration via a route other than through the digestive tract. Injections are the most common health care procedures.

Parenteral injection includes subcutaneous, intramuscular, intravenous, intraperitoneal, intracardiac, intraarticular and intracavernous injection.

Intravenous injections involve needle insertion directly into the vein and the substance is directly delivered into the bloodstream.

Intramuscular injections deliver a substance deep into a muscle, where they are quickly absorbed by blood vessels.

In a subcutaneous injection, the medication is delivered to the tissues between the skin and the muscle.

In an Intradermal Injection, medication is delivered directly into the dermis, the layer just below the epidermis of the skin.

A depot injection is an injection, usually subcutaneous, intradermal, or intramuscular, that deposits a drug in a localized mass, called a depot, from which it is gradually absorbed by surrounding tissue.

4.6 New not invasive therapies

4.6.1 Fingersticks for blood test

In medicine, if only a few drops of blood are needed, some blood tests are conducted on venous blood obtained by fingerstick (or fingerprick).

With this method, the site, free of surface arterial flow, where the blood is to be collected, is sterilized with a topical germicide, and the skin pierced with a sterile lancet.

After a droplet has formed, venous blood is captured in a capillary tube.

Blood cells drawn from fingersticks have a tendency to undergo hemolysis, especially if the finger is "milked" to obtain more blood.

Some tests commonly conducted on the capillary blood collected are: glucose levels, Mononucleosis, Hemoglobin levels, genetic testing.

Fingersticks are routine for adults, and are generally performed on children and elderly people only if a small amount of blood is necessary for needed tests.

4.6.2 Safety syringes for injection therapy

Safety syringes have a safety mechanism built into the syringe.

On some models, a sheath is placed over the needle or the needle retracts into the barrel following injection to protect healthcare workers and others from accidental needlestick injuries.

Auto Disable syringes are designed as a single use syringe, with an internal mechanism blocking the barrel once depressed so it cannot be depressed again.

An internal mechanism cracks the syringe when the plunger is fully depressed to prevent further use.

The more effective safety syringes have reuse and needlestick prevention features.

A sheath or hood slides over the needle after the injection is completed with a Needlestick Prevention Syringe, which also has a re-use prevention feature (either an auto disable mechanism or breaking plunger).

Retractable syringes use either manual or spring-loaded retraction to withdraw the needle into the barrel of the syringe.

Manual retraction syringes are generally easier to depress because there is no resistance from a spring.

5. The starting point

5.1 Pop.Up concept

During the 87th Geneva International Motor Show, Italdesign and Airbus world-premiered PopUp, the first modular, fully electric, zero emission concept vehicle system designed to relieve traffic congestion in crowded megacities. Pop.Up envisages a modular system for multi-modal transportation that makes full use of both ground and airspace.

The feasible concept is the result of Italdesign and Airbus' joint reflection on how to address the mobility challenges of megacities achievable for a majority, which has become one of the most pressing issues for commuters in megacities worldwide.

With traffic congestion projected to hugely increase by 2030, the companies decided to combine their engineering expertise to tackle how to best achieve a sustainable, modular and multimodal urban mobility system giving rise to the Pop.Up concept.
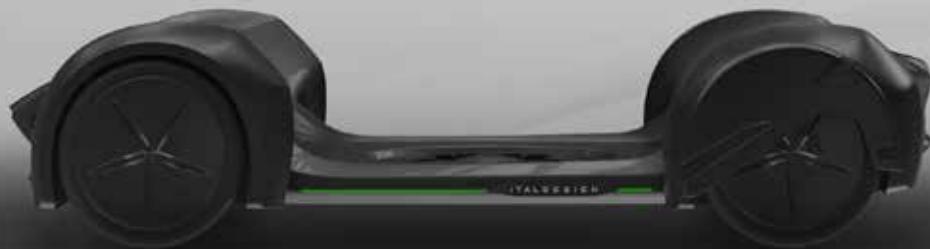
5.2 Functions

Pop.Up System consists of a three layers concept:

– an Artificial Intelligence platform that, based on its user knowledge, manages the travel complexity offering alternative usage scenarios and assuring a seamless travel experience;

– a vehicle shaped as a passenger capsule designed to be coupled with two different and independent electric propelled modules, the ground module and the air module. Other public means of transportation (e.g. trains or hyperloops) could also integrate the Pop.Up capsule;

– an interface module that dialogues with users in a fully virtual environment.

The Pop.Up vehicle combines the flexibility of a small two seater ground vehicle with the freedom and speed of a vertical take-off and landing (VTOL) air vehicle, thus bridging the automotive and aerospace domains.

At the heart of the concept it is a capsule designed to accommodate passengers.

This high-tech, monocoque carbon-fibre cocoon measures 2.6 metres long, 1.4 metres high, and

1.5 metres wide.

The capsule transforms itself into a city car by simply coupling to the ground module, which features a carbon-fibre chassis and is battery powered.

For megacity journeys with high congested traffic, the capsule disconnects from the ground module and is carried by a 5 by 4.4 metre air module propelled by eight counter-rotating rotors.

In this configuration Pop.Up becomes a urban self-piloted air vehicle, taking advantage of the third dimension to get from A to B efficiently whilst avoiding traffic congestion on the ground. Once passengers reach their destination, the air and ground modules with the capsule autonomously return to dedicated recharge stations to wait for their next customers.

6. Final product

6.1 Who are the users

This project is thought to be in a metropolitan context: crowded places, where there are contacts between different cultures, where there are people with the same culture but different lifestyles, tall and big buildings. The difficulty to define a precise and ideal target of user is so due to the availability of so many kinds of probable users that could find useful the product.

The users so are people who want or need a specific examination from a doctor but at the same time they can't go to an hospital or a medical office. This could be due to different situations, like for example to physical conditions in case of elderly people, but also younger and working people could prefer to skip the long waiting time they would spend at the hospital or in the doctor's studio.

All the users need a reliable and accessible way to get their examination, check up or medication done.

They also need someone that can show them how to do it or a way to teach them how to be independent to do it, especially the first times.

So a doctor, will help them but from a distance through screens and cameras.

Every kind of person, depending by the age has different needs, so if the user is a young person, will have different necessities than an older person.

John

Autonomy level
●
Free time
● ● ●
Family
● ● ● ● ●

Elementary school student.
9 years old.
He lives close to the city center with his family composed by his mum, dad and a younger sister.
He is at school every day from Monday to Friday since 8.30 am to 4 pm.
He eats at the school's cafeteria every day because all his friends have lunch there and both his parents work far from the school.
He goes to swim twice a week in the swimming pool close to his house.
He loves during his free time to play at home with a Playstation.

Rachel

Autonomy level
● ● ● ● ●
Free time
● ●
Family
●

Employed of an insurance company.
39 years old.
She lives in an area far from the city center by herself, her family doesn't live in the same city.
She works every day from Monday to Friday since 9.00 am to 6.00 pm and on Saturday morning she attends a course at the university.
She every day has a lunch break since 12.00 to 1.00 pm and eats with some colleagues in a bar close to the company she works for.
She goes to practice crossfit and yoga once a week and she has diabetes.
She loves during her free time to go shopping with friends or to buy products online.

Alfred

Autonomy level
● ● ●
Free time
● ● ● ● ●
Family
● ●

Retired, before he used to be a workman for an industrial company.
86 years old.
He lives in an area far from the city center with his wife, he doesn't have sons or daughters.
He goes to the grocery store near the house and then he watches TV with his wife.
He has lunch with his wife every day at 12.00 and by 1.00 pm he's done and takes a half an hour nap.
During his free time he loves to walk by himself in his neighbourhood and meet friends at the bar.
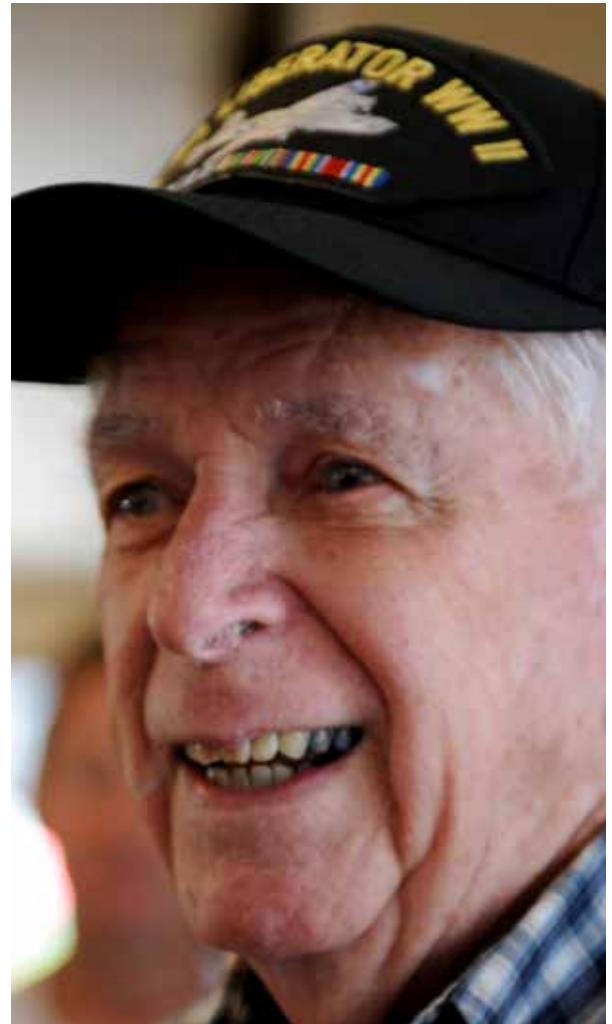
6.2 Project path

6.2.1 Analysis

In the next pages will be described in detail the product itself. The concept stage is extremely important because it lets specify its characteristics after analyzing the context where it will be used in and the targeted users who will need to use its functions. In this case with A.O.D. was necessary to start considering the main problems that nowadays people find when they go for an analysis in a clinic or at the hospital. Then had been analyzed the possible scenario in the future with a situation of overpopulation in cities that will go to create even more problems in this sector. The research stage had been important to clarify some problems that the users occur in while they wait for their visit and the problems in the future, like the excessive waiting time that people will have to challenge. Added to the modern problems, there will be considered also the very high percentage of stress level in the society who's known it's going to increase.

6.2.2 D.O.D

D.O.D. is an interior setup for the Pop.Up concept by Italdesign and Airbus. It equips it with all the necessary tools to take analysis and supply easy medications to people who need it. Different categories of people can have different reasons to need to book a service offered by D.O.D. The main reasons could be the lack of time during the day so the impossibility to wait in line in a doctor's studio or at the hospital. Because of the overpopulation, the waiting time will increase and sometimes it will be impossible to reach those places in autonomy, especially for elderly people if they don't have any sons or daughters that can take them there by car. Pop.Up's interiors had been thought to don't stress out the person who gets on it. On board there is a screen to let the person communicate live with a doctor and to let him directly ask any question he has. The doctor will also be able to guide the patient showing him how to behave once he got in the car, especially if it's the first time a person gets on it and doesn't know what to do. On board there are two seats available, so in this way, a minor can take a parent on board with him and an elderly person in case of necessity can take an assistent.

6.3 Interaction

The service is provided through an app for phones and tablets. It is available for different platforms like Android and iOs so on iPhones, iPads and many other different devices. Opening this app a person will find himself in front of a general menu, so a screen showing different links: one that takes to the booking page who will let book a personal visit or a visit for someone else, one that shows the medical ID so all the medical informations of the person which account is registered in the app. The third link sends to a page that shows all the future reservations made with the account for himself and the other future reservations made for other people. The last link sends to a page which contains some informations like addresses and phone numbers of the own doctor and other important sanitary places like hospitals and clinics around the location where the user is.

The medical ID page between the informations of the person has a link to the medical conditions, medical notes, allergies and reactions and medications.
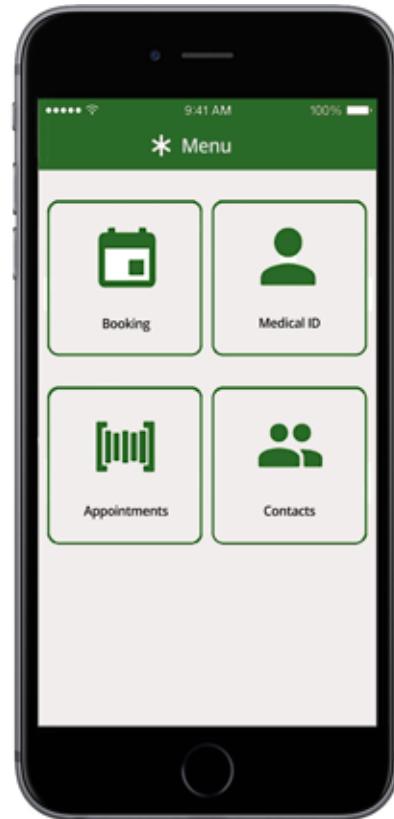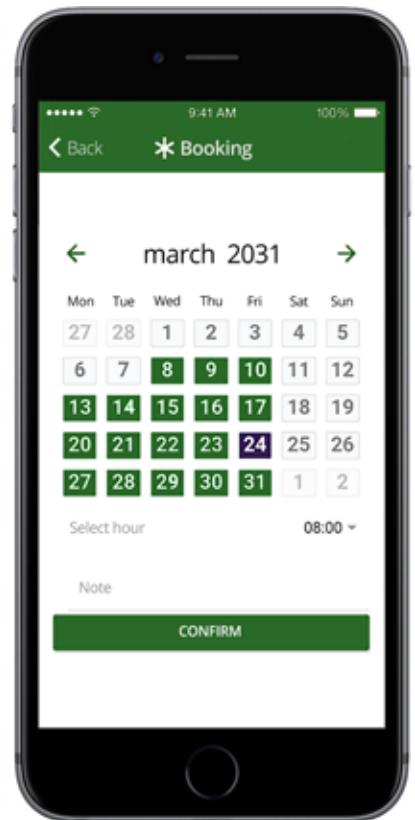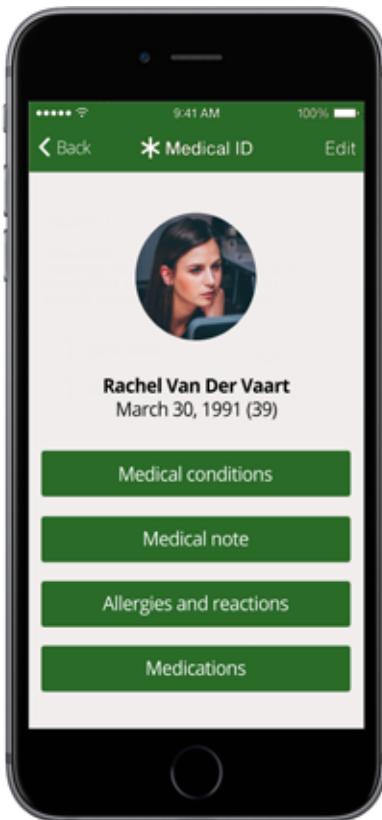
# 6.4 Technologies

Health informations and doctor on the screen

Biometric sensors integrated in the seats

Corian (antibacterial solid surfaces)

Medical tools integrated in the middle console

Sinterama (antibacterial fabric)

Health sensors

6.5 The experience

The users' approach with autonomous vehicles and the self driving society in general is pretty various, being them from different social classes and with different ages.
Someone is already a digital native and won't find any difficulty to adapt to the new conception of viability, others like older people will be less trustfully at the first launch of these kind of cars but in the 2030 after years from the first time they see this tipology of vehicles, they will believe more in them. Someone of them isn't born yet and will grow up getting used to

1

The person who needs or wants to take an exam, check-up or medication that "PopUp" can do has to book it with his own medical account throught an app on the smartphone looking for the preferred free hour on the app's schedule and specifying the kind of service he needs and if he needs physical assistence.

3

PopUp will arrive close to his house or, if chosen a different place like at work or somewhere else, to the place selected.

2

Once booked it he will receive a notification 30 minutes earlier the time he chose so he can get ready in time.

this self driving society, so the life in 2030 will be normal for them.
The way this healthcare service works is pretty easy, this is the whole process.

4

Once the car is arrived the patient will get on it and will have to follow the indications on the screen where he can select if he needs assistence or he's able to do everything autonomously.

5

In case he needs assistence the webcam will switch on and he will be connected to the doctor that from his own office will lead him throught the whole process and in case he doesn't he will just have to follow the simplified explanation on the screen and a video tutorial.

6

Once the exam had been taken, it depends by the exam, he will know the result or he will have more informations about how and when he will be able to check it.

7

Then, at the end, the patient will get off the car and will go back home.

6.6 Customer's journey difference

Customers of different ages:	Book the service:	Reach and get on "PopUp":	On "PopUp":	Get off "PopUp" and go back home:
	A parent	With a parent	With a parent	With a parent
	Autonomously	Autonomously	Alone	Autonomously
	Autonomously	Helped by a required assistent	With the assistent	Helped by the assistent

The experience with D.O.D. will be different and personalized for every kind of person because we've seen that someone has different necessities than someone else.

In the first case, a young kid like John, will need one of the parents to book the service for him. When he will use the service a parent will get in the Pop.Up with him. This because the assistance of a parent is important during the visit, even if the doctor will be on the screen. It will be important also because the kid is a minor. The parent will help the kid to stay calm and follow the doctor's directions so the visit will be done in the most relaxed way especially if the kid is trying this service for the first time.

In the second situation, a young lady like Rachel could be more used to the service, because for example in this case she has diabetes and she uses it regularly once every two/three weeks for a fast check up visit. She's totally autonomous with it, she books it autonomously and for the whole time she's in the Pop.Up she knows what to do even if the doctor will anyway be on the screen to assist her.

In our third situation, with an older person like Alfred, after he autonomously booked the service, in the Pop.Up there will be with him an assistent as he previously required. With him and the doctor's explanation he will feel comfortable for the whole time of the visit.

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