

The Collider 2020

Sectorial Challenges

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Healthcare

The health sector faces major challenges in relation to improving R&D+i for new solutions, optimising the health system and exploring new distribution channels. Furthermore, using technology, changes are being sought throughout the chain: improving diagnostics, managing treatments and solutions, monitoring and supporting patients.

Principal challenges for the healthcare sector

Improving the management of clinical trials for new medicines, in order to reduce investigation times and increase the likelihood of success

One of the greatest challenges faced by healthcare service providers is to improve the efficiency of both the development and the clinical investigation of medicines and medical devices. Clinical trials are a fundamental tool for demonstrating the efficacy and safety of treatments for which developers are seeking approval from health authorities to bring them to market.

Psychological and emotional support for the patient throughout the cycle of the illness

The importance of offering effective solutions both for treating the pathology of the patient and for keeping the patient informed has been demonstrated. However, more and more importance is being placed on supporting the patient psychologically and emotionally. Science is finding more and more evidence regarding the relationship between optimism and health. A positive attitude does not only prevent illness, it also helps with recovery and healing. Positivity becomes the invisible medicine which every patient needs to obtain.

Improving the diagnosis of diseases and the appearance of complications in patients

The effectiveness of health treatments and services is closely linked to what stage of the pathology the patient is at. Thus, one of the key challenges is to improve the diagnosis of patients in the early phases of the pathology or to detect, as early as possible, the potential appearance of complications in patients who have already been diagnosed.

Access by patients to their health data and communication with health workers

Health is a universal good for the benefit of everyone and, regrettably, there are many health systems which do not allow patients to access their medical records. The problem is not one of technology, but rather that there are numerous barriers (data security, accessibility, integration, platforms, etc.) preventing patients from gaining access to their medical records, containing the most important information and in an aggregated form. Accessing their records does not only allow them to find out how their health is progressing and the health outcomes of their treatments, it also allows them to share them with and show them to all the health professionals they interact with.

Furthermore, numerous studies have shown that patients who are well informed and engaged with their pathology (empowered patients) use health resources in a more intelligent manner and make better decisions. We must, therefore, inform and train patients with regard to their pathology, from how it progresses to the process to be followed and the treatments available.

Tools for the continuous monitoring of the patient's condition and the health outcomes of the actions taken

It is important to have the patient as an ally in the battle for their health and one of the ways in which we can get them engaged is by showing them the health outcomes they are achieving and the good work they are doing with the decisions they are taking. But it is not only the patient who needs to know about their condition; all health professionals and healthcare providers must be aware of the true data which show the patient's progress.

One of the areas which are going to see the most development is the continuous monitoring of the patient. The development of technology allowing us to capture information from the patient, or to be in contact with them, is going to open up an infinite range of benefits, as we will be able to make decisions which are better adapted to the real circumstances of the patient.

Expanding healthcare services ('beyond the pill') which complement pharmaceuticals and respond to the real needs of patients, as well as optimising treatments

There is a need to optimise services so that they provide the best outcomes and performance. One way of achieving that is to expand the characteristics of the service in order to be able to meet the patient's needs. There are many pharmaceutical companies which have committed themselves to 'beyond the pill' strategies. That is, offering healthcare technologies to accompany a treatment, in order to improve its functionalities and be able to manage the patient's needs in a comprehensive manner.

Those companies, which include pharmaceutical companies, medical device manufacturers, private insurers and diagnostic test manufacturers, face a great challenge in order to optimise their healthcare services and they are working in various fields.

Improving the management of the information which health professionals have about the patient, in order to improve decision-making

The health system is characterised by the large amount of data it has at its disposal and has to manage. One of the key challenges is the rational use of that data and improving management, in order to improve decision-making. The health system is characterised by the large amount of data it has at its disposal and has to manage. One of the key challenges is the rational use of that data and improving management, in order to improve decision-making. However, there is more and more data available to us: telemedicine, sensors, apps, medical records and human genome sequencing.

Prevention strategies to reduce the incidence and prevalence of some pathologies

Up to now, all of the challenges we have looked at relate to better management of the pathologies suffered by patients, but, without doubt, one of the discussions now starting to be had is about whether we can change from a treatment model to a prevention model. Can we put in place programmes which prevent the potential appearance of future diseases?

Bringing health systems closer to patients in order to improve the medication prescription-dispensation-administration value chain

Whether by means of new distribution channels, teleconsultations or community pharmacies.

Appearance of new digital sales channels and new distribution models (e.g. Amazon)

In relation to available market solutions, there is a great deal of debate about how to purchase them and how to get them to patients. In other markets, sales and distribution channels are being completely transformed. The sale and distribution of healthcare solutions is not an exception. What is it possible to work on?

Other challenges for the health sector

Improving coordination between key health system actors:

- Expediting decisions by health authorities in order to accelerate the approval of, and access by patients to, the most innovative therapies, without any kind of restriction
 - Encouraging open innovation and collaboration between healthcare companies (pharmaceutical, insurance, diagnostics and medical device companies) and other healthcare actors
 - Improving communication between healthcare companies (pharmaceutical companies, medical device companies, diagnostics companies, etc.) and health professionals and other key actors
- **Ensuring the sustainability of the health system given constantly increasing demand and the use of health resources**
 - **Greater cover for new health conditions to be treated without financing**
 - **Improving the reputation of and the relationship with the pharmaceutical sector**
 - **Ensuring the financing of new medicines and other healthcare solutions/services**
 - **Having the relevant information to improve the strategic decision-making of healthcare companies**
 - **Innovating in the continuing training we offer to health professionals. They are saturated with undifferentiated training.**

Industry 4.0

Industry 4.0 faces various challenges in order to continue robotising and integrating new technologies into the chain, but in balance with its profitability, pursuing sustainability with clean and recycling solutions, and also managing to use the vast quantity of data which is generated, to improve processes, scalability and personalisation.

Principal challenges for industry 4.0

Robotising processes

The robotisation of production processes can make possible the concept of the 'smart factory', which is one of the pillars of industry 4.0. However, total robotisation is yet to arrive and many processes continue to be done manually. How can we speed up the change?

Using 5G in production processes

5G technology is about to be implemented as standard in many sectors. Notable among its many benefits is the ability to send a large amount of data with a latency of milliseconds and a very efficient use of energy. How can 5G transform the production processes of industry 4.0?

Technological integration of the value chain

Industry 4.0 offers enormous potential for optimisation, if the different production processes of the value chain are coordinated in an intelligent manner. However, that requires collaboration between different companies and countries and presents challenges relating to security, trust and coordination between different legal frameworks. How can we overcome these barriers to drive greater integration in the value chain?

Maintaining the efficiency of production at scale with personalised products

The demands of the end consumer require production processes to adapt to customisation, which, with current capacities, means a reduction in efficiency and a possible increase in costs. How can industry 4.0 allow such personalisation in an efficient manner?

Optimizar la extracción y uso de los datos adecuados (el dato por el dato vs dato útil)

The proliferation of 'big data' has created mechanisms for compiling data which, in some cases, are not properly analysed or interpreted. The challenge is to focus on the data which are relevant to the most important challenges. How can we determine what data and challenges are most important?

Alternative, sustainable, solutions to the use of plastic for transporting and storing the finished product

Assessing waste in order to build a circular production process

Defining predictive models for production processes in the field of industry

Use and creation of self-cleaning materials and materials which can be rapidly disinfected

AI solutions applied to the management of 5G networks, specifically to manage traffic peaks and interruptions in the network infrastructure.

Other challenges for industry 4.0

- **How can we make our IOT platforms profitable?**

The creation of 'Internet of Things' platforms may generate efficiencies in the deployment and management of a fleet of connected devices. However, its development requires an investment which, in some cases, has not been recuperated, made worse by the fact that the market is saturated with platforms and also that most manufacturers create their own systems.

- **What do we do with the people that 'we will no longer need'? How do we adapt the workforce to the use of digital tools?**

The advent of artificial intelligence is replacing qualified manual work which previously allowed the development of a middle class. One option could be to adapt the current workforce to the new scenario. If not, what alternatives could be offered? How can we minimise the potential social cost of the disruption of the labour market by new technologies?

- **What decisions do we leave to machines and which ones do we entrust to people?**

Certain ethical and speed-related criteria can lead to a hybrid decision-making process, involving people and machines, being considered. The combination of machines and people may offer an advantage in the form of certain complementary skills; the challenge is to find out what they are.

- **How can we know whether the technology we are committing ourselves to is the one that will end up becoming established?**

In some cases, the convergence of technologies imposes industry standards which could make industry 4.0 more efficient and bring with them greater integration of the value chain. On the other hand, the digitalisation of production processes requires a considerable investment and it is a question of knowing whether the technology opted for is the one that will end up becoming established as standard.

- **How can the whole process of digitalising an industry be financed?**
- **How can we automate 100% of an industrial laundry?**

Energy

The energy sector faces economic and environmental challenges. The appearance of new production technologies is accompanied by a certain degree of liberalisation of the sector, allowing the creation of new consumption models. New possibilities present themselves for empowering people and all of that will be accompanied by new business, production, distribution and marketing models.

Principal challenges for the energy sector

Using excess waste/refuse to generate energy

Waste from everyday life and certain production processes contains energy which could be made use of, but which is currently wasted due a lack of certain incentives, logistical capacity, etc. How can we ensure that 100% of waste is made use of?

Optimising the processes for producing biofuels

Biofuel processes are not currently an ideal alternative to the energy model due to the major impact they continue to have on the environment and on food prices. How can we optimise the process in order to minimise that impact?

Achieving a 100% renewable energy system

The current energy system entails the consumption of limited resources and generates externalities which are harmful to the environment. How can we accelerate the change to a 100% renewable model?

Applying VR/AR to manage electrical hazards, device autonomy, ergonomics, privacy in public spaces, etc.

Energy system operatives are exposed to certain risks in their daily work. Augmented and virtual reality technologies (among others) could reduce or eliminate that risk. However, its use is limited at present. How can we make it a reality?

Maximising self-consumption and local generation in an efficient manner

Own use and local energy generation (integrating the sources and uses of energy within a single area or neighbourhood) may be a solution for speeding up the reduction of greenhouse gas emissions. Positive energy districts (PEDs), energy communities, etc., are some examples of new energy models. How can this change be speeded up?

Mobilising the public to manage the network and how to make city platforms among sectors (water, etc.)

One of the barriers to communities for local energy generation and consumption is the mobilisation of the public itself. The public has to understand that it plays, and will play, an important role, and it must have the tools available to it to be able to influence the management of the supplies. How can we make it possible?

Balancing the uptake of new technologies with the amortisation of current energy assets (generation, distribution and transport)

The energy model leaves a legacy of energy generation, distribution and transport assets. The profitability of that infrastructure could make the change to a new energy model difficult, as there is an interest in maintaining them and recovering the investment made. How can we make use of that infrastructure in a new energy model?

Maximising the personalisation of the service/product, improving the contracting service and reducing times

Introducing new economic models based on technologies which make it possible to provide the network flexibility

Reconciling the digitalisation of strategic processes with data protection and cybersecurity

The digitalisation of production processes creates vulnerabilities to cyberattacks, which put the viability of business models and the security of the company and the country at risk. Opening production processes to new protocols also exposes them to new threats. How can we mitigate that risk?

Other challenges for the energy sector

- **How can we harmonise and give effect to European and global energy policy using market tools?**

Una solución para reducir las emisiones e incentivar el cambio a fuentes de energía renovables puede ser la creación de un mercado de emisiones. Sin embargo, estos mercados se ven limitados por la falta de integración global entre distintos estados, marcos legales, etc. ¿Cómo podemos hacerlos efectivos?

- **How could we improve the experience of customers and/or reduce costs for services and products involving digital transactions?**
- **How can we keep up the development of new technologies in the long term: hydrogen, nuclear fusion, etc.?**
- **How can we denuclearise the energy system?**
- **Is it possible to maintain the energy supply without relying on nuclear energy?**
- **How can we make use of ICT (IoT, AI, comms., etc.) to create a more efficient, cheaper and cleaner energy system?**
- **How can we introduce a BIM model throughout the value chain of the sector?**
- **Improving and optimising the energy system of the different sites of a company.**
- **How can we improve the refrigeration of tanks of liquids?**

Mobility

Mobility faces challenges in relation to bringing down the cost of technologies, such as the lithium battery, and the appearance of new business models likely to have a major impact on cities, which are more and more congested on account of the rapid process of urbanisation. Also, increased public awareness requires changes to a sector which generates 20% of global CO2 emissions.

Furthermore, in the rail mobility and multimodal logistics sector, we believe that this digital transformation is taking place along four axes: transformation of the customer experience, transformation of the operating processes, training of employees and transformation of the business model. To put it another way, digital mobility, the digitalisation of operations and on-demand logistics.

Principal challenges for mobility

Facilitar la eficiencia, trazabilidad automática de la huella de carbono y nuevos productos para enriquecer la propuesta de valor del coche conectado

Automatic traceability of the carbon footprint is an aspect which could clearly enhance the value proposition of the connected car. What products or services related to the automatic traceability of the carbon footprint could improve the value proposition of the connected car?

Optimising the infrastructure for autonomous mobility

The autonomous vehicle promises to be a solution for road safety, congestion in cities, environmental impact, etc. However, there are many factors which limit its development and implementation, including the design of the cities itself. How can the design and adoption of autonomous vehicles be speeded up?

Reducing the carbon footprint of transport

According to the World Health Organisation, transport makes up more than 20% of the CO2 emissions generated globally. How can we reduce that?

Changing the paradigm from a vehicle with an energy source (battery, fuel cell, gas, etc.) to a vehicle capable of making use of energy (e.g. solar)

The current mobility model depends on the deployment of charging points, whether for hydrocarbons or electricity. How can we make cars make use of energy sources within their reach, in order to ensure their autonomy and change the mobility model?

Adapting or constructing buildings for charging electric vehicles

One obstacle to the adoption of electric vehicles is the limited charging network. The option of making use of buildings to expand the network would be a viable alternative. However, current buildings are not properly designed for that. How should they be designed?

Ensuring that shared vehicles are properly sanitised

Shared vehicles, by definition, are used by different people and, in the case of a pandemic such as the present one, could become a means of transmission for diseases. How can we properly sanitise the vehicle between uses?

Facilitating a 'marketplace' platform for sustainable logistics

Transport and logistics need greater integration of the different modes of transport available at any given time, in order to offer flexible and efficient solutions to loaders/logistics operators/end customers. That would make it possible to optimise flows of goods and reduce the impact of traffic in terms of CO2 emissions, congestion on roads, accidents, illnesses related to environmental pollution, etc. A platform would allow open access to multimodality and in a manner which would add value (in relation to environmental and economic aspects and the competitiveness of the supply chain, etc.). At the same time, it would offer the possibility of creating new transport units which were modular, interchangeable, adapted from origin to final delivery (last mile), etc.

Automating and digitalising rolling stock and rail systems

Automation and artificial intelligence may allow the control systems of trains to be interoperable and more advanced, offering greater operational flexibility and, therefore, better real-time adaptation to demand and economic competitiveness through greater capacity. All of those elements together will support an increase in the capacity and recovery resilience of the system, without major investments in infrastructure.

Digital asset management

This system will be the point A-point B mobility platform for passengers and loading, supported by a powerful and capable telecommunications network. Meanwhile, the maintenance of the vehicles is still largely manual and only carried out with digital support. In a future digital system, digitalisation will allow us to carry out maintenance based on condition, with online data and with self-diagnosis, reducing the costs, the risks and the waiting time prior to actual repair.

Developing digital twin systems: simulation and virtualisation of rail sector assets

The digital twin concept combines the visualisation of an asset or the behaviour of the system in operation, along with the simulation of its performance and expected lifespan, in order to operate the system better and anticipate possible faults, with real-time and future-oriented prediction of operational aspects.

Door-to-door mobility solutions

The use of real-time information and the exchange of data will provide knowledge of the exact state of the whole, comprehensive, transport system and will allow for the general optimisation of the solutions offered.

Environmental sustainability and mobility without the use of fossil fuels

Railways will implement new light materials and new technological solutions for non-electrified lines and they will increase their energy efficiency even further. Currently, the use of rail infrastructure for the transport of goods is only 5% in Spain and 17% in Europe. It is estimated that if 50% of the interurban journeys of an average distance, by passengers or freight, transitioned from road transport to rail, it could reduce current emissions by 60%.

Improving safety in the rail sector

Interoperability and safety improve and ensure the smooth and safe movement of passengers and goods in rail vehicles throughout the European Union and even beyond its borders. The aim is to ensure that all European rail transport networks are adequately secured and can detect safety incidents in an efficient manner.

Other challenges for mobility

- **How could we achieve access to the information for the whole logistics chain in order to make it possible to optimise flows of goods and routes?**

Currently, most road transport fleets have satellite monitoring systems which make it possible to track the goods. The rail and maritime sectors, on the other hand, in general do not meet that need to the same extent.

- **How can the flight of drones in cities be regulated and managed?**

Drone technology holds enormous potential for mobility and logistics, among many other applications. Governments, however, are regulating cautiously, faced with doubts about safety, privacy, etc.

- **How can we standardise the type of battery pack used for electric mobility in order to make it easier to process?**

The current manufacturers of electric vehicles design battery packs according to their own needs and criteria, without there being an industry standard, which makes their assembly and subsequent recycling more difficult and expensive. How can we coordinate the industry to adopt a standard?

- **How can we increase the collection and recycling of lithium batteries?**

Electric mobility has led to an increase in the use of lithium batteries, which in 70% of cases are not being recycled. How can we ensure the collection and recycling of this technology?

- **How can vehicle-sharing platforms be integrated?**

There is a proliferation of mobility platforms (cars, electric mopeds, bicycles, etc.), with vehicles scattered around the cities and with little coordination between them. How can we make it possible for the user to use all of the systems without having to download a large number of apps?

- **Creation of assets for the automatic and autonomous operation of the rail sector**
- **Connected cars and smart cities offer numerous possibilities for additional services and new business models How can we take advantage of it in designing new financial services?**

- **How can electromagnetic compatibility be ensured in electric cars, taking into account hyperconnectivity?**
- **How can we improve driving by sight by means of detection, discrimination and decision systems?**
- **How can railway operating decisions be taken in real time?**
- **How can the digital transformation of automotive industry SMEs be managed?**
- **How can we find fire protection solutions in case of thermal runaway in BEVs?**
- **Electric vehicles are subject to the phenomenon of ‘thermal runaway’, which could result in the vehicle catching fire. How can we address this challenge?**
- **How can we achieve BEV-ICE price parity earlier?**
- **How can we deal with the reduction in vehicle sales due to an increase in car sharing?**
- **How can we extend battery life? How can we give batteries a second life?**
- **How can we extend the autonomy of BEVs?**
- **How can we reduce BEV battery charging time?**
- **How can we design a strategy for flexibility, in order to be able to adapt to whatever battery technology becomes standard?**
- **In relation to driving by sight, ‘how can we use 4.0 to improve detection, discrimination and decision systems?’**
- **How can we make the most of opportunities resulting from the forecast increase in sales of light commercial vehicles and heavy goods vehicles? (They will equal those of passenger vehicles in 2023.)**
- **How can the transformation to BEVs of tier 1 suppliers of systems and components for ICEs be managed?**
- **How can the air conditioning in BEVs be optimised to extend autonomy?**
- **How can we find inductive battery charging solutions for BEVs?**
- **How can we identify opportunities resulting from the arrival of new players in electromobility: new OEMs (Tesla), mobility services (Über), suppliers of charging points, etc.?**

- **How can we optimise native ICE platforms used to build BEVs (space-range, unification of components, assembly, etc.)?**
- **How can we achieve flexible autonomy in BEVs according to the needs of each vehicle? (For short and familiar routes, it is not necessary to maximise autonomy.)**
- **How can we reduce the time to market of components for vehicles?**
- **How can SMEs manufacturing non-electronic components for passenger vehicles make the most of the opportunities afforded by connected or shared vehicles?**
- **Managing the whole cycle of intelligent assets: Automatic maintenance of machines.**
- **Improving the integration of transport systems in order to reduce noise, vibrations and carbon emissions.**
- **Improving passenger information systems and customer experience.**
- **Improving real-time traffic information on low-density networks and at a manageable cost.**
- **Access to the information for the whole logistics chain in order to make it possible to optimise flows of goods and routes.**
- **Harmonising safety systems with digital technologies which make it possible to cross borders without adding extra costs or delays.**
- **How can decisions in mobility planning and railway operation be taken in real time?**
- **How can we improve transport safety using the industry's new VR/AR and mixed technologies? Access controls, onboarding, biometrics, etc.**
- **How can the design of existing or new infrastructure be adapted to the impact of climate change?**
- **How can technology improve the protection of critical infrastructure from biohazards, viruses or terrorist threats?**
- **Is it possible to implement solutions based on on-board hydrogen?**

Additional Challenges

In addition to the challenges facing each sector, companies have also indicated that they face cross-cutting challenges, or challenges in addition to those discussed, which could apply to various sectors or other relevant sectors:

- **Scaling implementation in production for automation and RPA solutions**
- **How should we prepare ourselves to ensure post-quantum cybersecurity?**
- **How can we improve the marketing of products and services offered to customers and non-customers through virtual systems?**
- **Learning and obtaining more socio-economic information about customers, without physical media, with the aim of:**
- **Providing new financial services, taking advantage of communication between different devices, vehicles and/or pieces of infrastructure.**
- **How can blockchain be applied in the (external) supply chain?**
- **How can technology help the horeca channel with new business models? (delivery, drones)**
- **How can the different bacteria present on surfaces be detected, prior to cleaning, with a view to carrying out proactive cleaning of contaminated surfaces or avoiding touching them?**
- **There are certain challenges around cybersecurity which could give rise to new products. In particular, what products could be created in response to the following challenges?**
 - Protection on the deep and the dark web.
 - Security on devices, especially on apps containing a wallet and which could be susceptible to cyberattacks.
 - Solutions which prevent fraud techniques based on identity.
 - Innovative apps which detect cyberbullying and hate speech on social networks and WhatsApp.



The Collider

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