RADICAL BUSINESS

IDEAS FOR AN IMMINENT FUTURE

INSTITUTE OF NEXT
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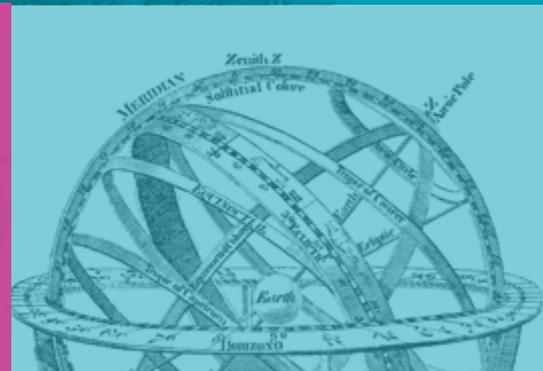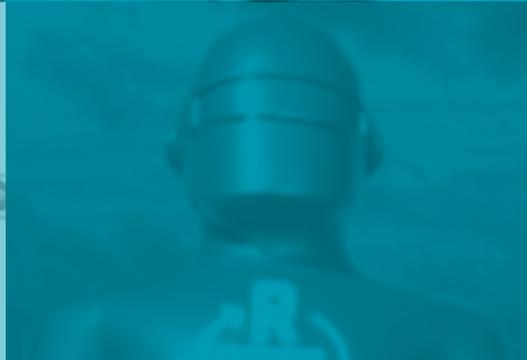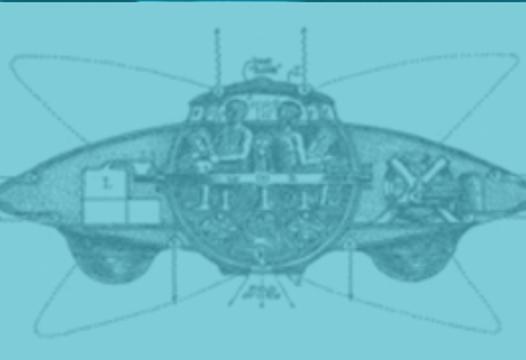
PEOPLE

PEOPLE EVERYWHERE

The active participation of the multitudes in the economy implies the emergence of something new to which close attention should be paid.

Good evidence for this is the huge amount of literature and the increasing number of projects generated under the heading of the so-called **sharing economy**. A collaborative economy which has the potential to disrupt the traditional economy, given that its objective is to utilise assets that are currently massively underused. This new perspective is evolving into a paradigm different from that of a traditional zero-sum economic context, in which when one person owns something, another ceases to do so. On the other hand, in the new sharing economy, whatever is not shared loses value. A prime example is that of car sharing companies, which aim to put an end to an unsustainable reality: 95% of private vehicles are unused 95% of the time.

But, beyond activating underused assets, special attention should be paid to the new ability of the multitudes to create and generalise creativity. Areas of the productive economy already benefit from such creativity through initiatives like **I AM Cardboard**, in which a com-

munity of users collectively improve an existing product on the market. Or, especially and increasingly, through projects linked to 3D printing in which designs for parts and all kinds of objects are shared through platforms such as **Thingiverse**, driven by the company **MakerBot**, specialists in 3D printers. Going beyond creativity, the multitudes now have the possibility to participate in funding projects and ideas. **Kickstarter** is a pioneer and model for such collective funding platforms with the potential to flip many industries of various kinds. From the publishing industry, with readers and loyal followers of an author funding their next piece of work, to technology companies, now competing with devices whose creation and production is financed by their future users, as in the case of the smartwatch **Pebble**.

But perhaps this new empowerment of the people is shown and demonstrated in an even more radical way beyond the productive economy. For example, in the administration of the public and of politics. This is true in the case of **SeeClickFix**, one of the numerous initiatives allowing citizens to actively participate in their neighbourhood and city by reporting incidents and issues, such as a street light not working or a sinkhole in need of repair, from their mobile phones. Or, in a more extreme case of new public participation, the active participation of twenty-five citizens in the drafting of the **new constitution of Iceland**, drawn from feedback from many other Icelanders collected through different social media channels.

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BE RESPONSIVE

> **Margaret Sanger.** *1879-1966*
> She was an American birth control activist, sex educator, writer, and nurse. Sanger popularized the term "birth control", opened the first birth control clinic in the United States. Given the connection between contraception and working-class empowerment, Sanger came to believe that only by liberating women from the risk of unwanted pregnancy would fundamental social change take place.

How, then, should organisations proceed in these times of transition? The answer can only be to learn and respond to change, to what is happening in their environment at any given moment and to do so faster and better each time. Recently published books such as ***Sense & Respond*** indicate that, in this new business environment, successful companies will be those capable of using newly available tools and sensors to provide them with a very accurate barometer, indicating consumers' needs and expectations at any given time and enabling them to respond appropriately.

This new business environment will make it impossible to avoid embracing and implementing the idea of putting the consumer, people in general, at the centre of their activity. But, what exactly does *people centric* mean? Different examples show us the approach that, in this sense, some organisations are implementing.

One example being the pharmaceutical company **LEO Pharma**, whose CEO has included a conversation with a patient as a key element in training and introducing a new employee to their business. Or that of Japanese brand **Muji** when they offered the opportunity to live free of charge in homes furnished with their products in order to study the habits of their potential clients and therefore better understand their needs. **Crohnology** is an initiative by a Crohn's patient whose aim is something that pharmaceutical companies are yet to do. With the voluntary participation of those suffering from the disease, this platform collects data regarding the everyday lives of thousands of patients in order to establish links between possible causal factors in the worsening and remission of this kind of intestinal inflammation.

This strengthens the idea that it is people themselves that must be the main source of information allowing for their needs to be met. And it is on this idea that initiatives such as **Streetbees** are based, making the most of new technologies so that any organisation can obtain real-time feedback from thousands of people by responding to a question. **Amazon** takes this concept even further, making it so that people can respond to the questions of others, putting a potential buyer of a certain product, with doubts about that product, in contact with someone who has already purchased it. Phenomena such as crowdfunding make it possible for people to fund the realisation of an idea that addresses a problem or need of theirs. Organisations such as **The Alliance for Useful Evidence** have been created with the aim of finding proof on which to build public policies as an alternative to decisions made by groups in which ideology can weigh more than evidence.

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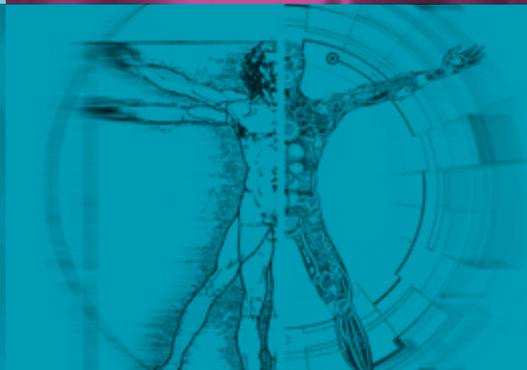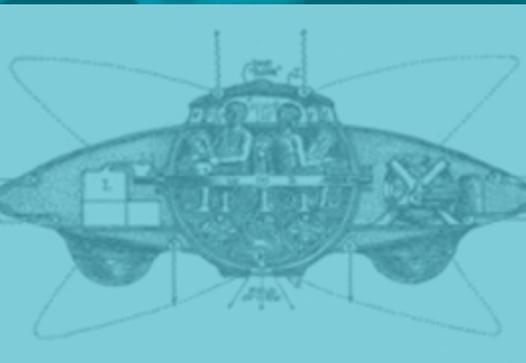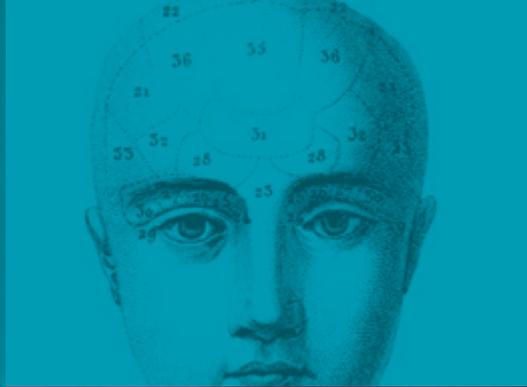
MACHINES

3 THE INTERNET OF THINGS

We do not appreciate the extent to which we now live amongst connected products until, for example, we lose our mobile phone or have it stolen and the only way we can locate it is by using another mobile phone. Mobiles have become a very sophisticated set of sensors, with almost twenty sensors in the most advanced models, and are perhaps the best example today of the emerging Internet of things. Our vehicles seem to be taking the same route. The recent **Telsa Motors** cars software update includes the ability to automatically synchronise the speed at which our vehicle is travelling with the vehicle in front of us. But even something as seemingly simple as a light bulb can be managed from an app on our mobile phone. Philips, with their **Hue** light bulbs, have created the concept of personal wireless lighting, converting what was once a simple lamp into a light emitter that can be adapted to our changing light necessities.

As **Michael E. Porter** recently wrote in the *Harvard Business Review*, no manufacturer can survive the coming years without introducing intelligent and connected products into its catalogue. If we have recently become used to talking about smartphones, without doubt we will go on to apply the adjective *smart* to an in-

creasingly wide range of objects. Like, for example, a tennis racket such as **Babolat**, which has multiple sensors to gather information about the user's play in order to improve it: acceleration, strength and location of impact, shot, quality of the backhand, etc. A similar case is that of the latest **Ralph Lauren** sports top, which has the capacity to register and send the wearer's real-time biometric data to a tablet or smartphone whilst they are carrying out physical activity.

Many similar examples show that today this intelligence is being incorporated into objects with the simple objective of **monitoring**. In other cases, a further step has been taken to also enable **control**. But the true potential of linked products stems from their capacity for **optimisation** and even **autonomous operation**. To find examples, once again we need look no further than to an apparently simple object such as the humble fan. A fan marketed by **Big Ass Fans** is not only sensitive to temperature, humidity and presence in the room which it is ventilating, but also learns the preferences of the user in order to adjust to them. Following the same notion, yet in another league entirely, **General Electric** is incorporating sensors in its turbines and motors. The same in-

telligence and connectivity are what the Basque company **NEM Solutions** is applying to its wind turbines and engines. Such examples already prove what **Porter** predicted in the aforementioned article: we will move from products to systems; and from systems to systems of systems.

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EXPONENTIAL TECHNOLOGIES

Many technologies no longer experience progressive evolution. The speed at which innovations occur in certain areas is now exponential. This is the case in areas such as the creation of new materials, in which, for example, the latest nanofabrication techniques enable the production of a steel ten times stronger than that previously obtained. **Corannulene**, a recently discovered molecule of carbon, has already been dubbed the *new graphene* given its properties which allow for the creation of electrical circuits the size of a molecule. Outside the laboratory, at its own foundry close to Barcelona, the company **Rovalma** now produces steel with properties considered practically impossible to achieve just a few years ago. Robotics is also advancing at an exponential rate. Today it is possible to integrate into robots the ability to recognise images and order objects regardless of their position in an assembly line, something inconceivable not that long ago. This is demonstrated by **Fanuc** industrial robots.

We have only just become used to printing objects in 3D and yet new possibilities continue to surprise us. Take, for example, **Voxel8**, a 3D printer with the ability to print a three-dimensional object and at the same time build an electronic cir-

cuit into it. Meanwhile, the concept of **4D printing** is beginning to open up, hinting at the possibility, now a reality, of printing objects with forms that change some time after printing or as a reaction to a change in their environment (temperature, for example). But perhaps the world of smartphones is currently the best representative of exponential technology. As shown by a gadget for smartphones, launched recently by **Columbia University**, which enables an AIDS detection test to be carried out in barely 15 minutes. Or **Peek**, an application that makes it possible to conduct professional eye inspections using just a mobile device. Energy is another

area in which there is constantly some innovation that seems to be better than the previous one. **Tesla** recently advertised the future manufacturing of a new type of battery which will provide energy not for vehicles, but for entire homes.

Innovations arising from initiatives that do not conform to improvements of any kind, but instead have been created with the explicit purpose of generating significant disruptive advances, can also be classified as exponential. This is true in the case of **Singularity University**, a project promoted by the likes of Google and NASA, the aim of which is to make

reality those ideas with the potential to have a positive effect on the lives of at least a billion people in no more than ten years. Along similar lines, the project **Solve** by **MIT** summons the best minds in the world with the aim of finding exponential solutions to problems in four principal areas: education, health, energy and manufacturing.

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5 OTHER INTELLIGENCES

Watson, IBM's advanced Artificial Intelligence project to which we referred to in the first edition of Radical is Normal, is beginning to find its first concrete uses. The **University of Toronto** has developed an application which uses this supercomputer to help lawyers in their investigative work during legal processes. Staying with this professional field, another line of development suggests that it could even be used in sentencing based on data generated during the process. IBM have recently confirmed the development of another application for Watson with, perhaps, a less glamorous aim but non the less very much in demand: a more efficient and less stressful way to manage the overload of emails received daily. To achieve this, Watson will use logarithms capable of learning from every decision we make and the actions we take as we spend more and more time dealing with our virtual mailbox.

Applications such as these, and others which will be here before we know it, raise the important question of how to manage the consequences of such intelligent systems which can already replace humans, including in cognitive and intel-

"THE CONCEPT OF RESPONSIVE ORGANISATIONS–THAT OF ORGANISATIONS WITH A SPECIAL ABILITY TO REACT AND ADAPT QUICKLY TO CHANGING MARKET ENVIRONMENTS–IS BEING CONSOLIDATED."

lectual functions which have until now been considered exclusive to mankind. Reputable names including Bill Gates and Elon Musk, amongst many others, have recently made public their concerns regarding advances in Artificial Intelligence, for which as a society we are not prepared. **Erik Brynjolfsson and Andrew McAfee** propose, in their indispensable book *The Second Machine Age*, a unique solution for a world of machines more intelligent than us: to be even more human, in other words, to reinforce those qualities that characterise us and differentiate us from these intelligent systems: creativ-ity, intuition and empathy with other humans, for example.

From the point of view of organisations, Brynjolfsson and McAfee propose a collaboration between the new capabilities promised by Artificial Intelligence and those distinctly human qualities to be able to respond faster to change. This approach is seen in the growing momentum for **responsive organisations**, that is, organisations capable of reacting quickly to changing market environments, companies with the ability to produce proto-types and test ideas with great agility, and companies and businesses that organise themselves within networks and that experiment, learn more quickly and respond to what today may seem radical but will begin to be the norm before we know it.

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NEW EMERGING TECHNOLOGIES

It is increasingly difficult to predict what will be the 'next big thing' in the field of technological development. This is because the 'next big thing' will not necessarily be a single thing, rather various things of equal or similar prominence. The list of 'Top 10 Breakthrough Technologies' published yearly by the MIT's *Technology Review* continues to be of reference. Amongst those mentioned this year it is worth highlighting a couple of new devices or applications, those which are apparently less technologically advanced but with a greater potential impact. For example, **Slack**, a kind of WhatsApp for businesses that could change the way people work and collaborate within an organisation. Or that which is able to **supply energy to sensors and other small devices through Wi-Fi**.

We should also watch out for advances in the fields of augmented reality and virtual reality, especially those coming from proposals backed by important companies, such as **HoloLens by Microsoft** or **Oculus Rift**. But perhaps more disruptive applications, in relation to these technologies, should be expected when it comes to their professional and industrial use. As seen

in the case of **DAQRI**, a helmet with augmented reality functions capable of interpreting the user's movement to enhance reality when and how necessary. These types of viewers will be complimented by other devices such as the **GloveOne** glove which goes beyond allowing the user to observe augmented reality, also making it possible to interact with it and 'feel it'.

Energy will, without doubt, continue to be the main area in which important technological advances will be seen in the coming years, especially in the United States, where the operations of companies dedicated to solar energy, such as **SolarCity**, are no longer anecdotal. SolarCity is currently completing new installations with a value of 750 million dollars enabling them to produce highly efficient solar panels with a potential annual energy production of one gigawatt and with production costs which convert solar energy into a fully competitive energy source. Another North American company in this sector, **First Solar**, has just broken the record for energy efficiency panels by converting 22% of energy directly into electricity when, just a few years ago, it was not possible to overcome the two-digit barrier. But perhaps the greatest promise in the energy field is, at this moment in time, made by a company founded at the MIT, **Transatomic**, which promises the possibility of converting residues from nuclear power plants into new energy sources.

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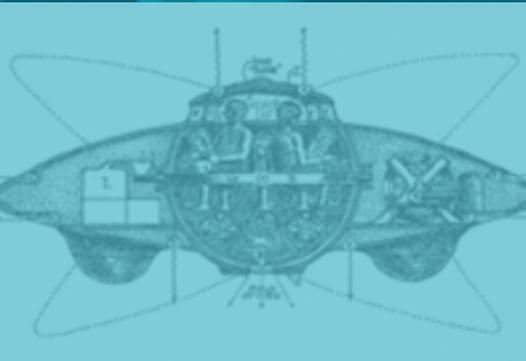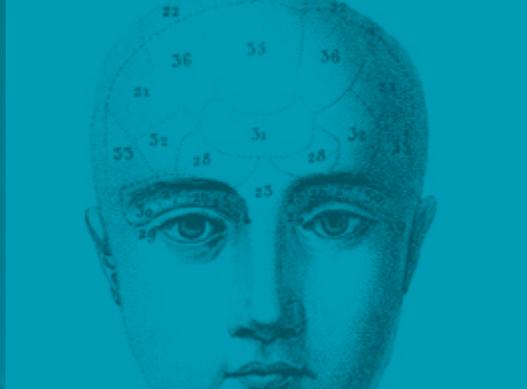
INTELLIGENCES

ARTIFICIAL INTELLIGENCE AND EMPLOYMENT

> **Ada Lovelace.** *1815 – 1852*
> She was an English mathematician and writer, chiefly known for her work on Charles Babbage's early mechanical general-purpose computer, the Analytical Engine. Her notes on the engine include what is recognised as the first algorithm intended to be carried out by a machine. As a result, she is often regarded as the first computer programmer.

A few years ago nobody expected to see the levels of Artificial Intelligence (AI) that we are now beginning to experience. Not even those most experienced in new technologies, as **Sergey Brin**, co-founder of Google, recently confessed in Davos. But the fact is that AI is starting to be really intelligent. In other words, it calls into question human intelligence. Amongst the few 'minds' that were able to predict the improbable presidency of Donald Trump was an AI system developed in India.

One of the ways in which AI will be applied in the coming years will be to act as a 'brain' in machines which are increasingly taking on the tasks that humans do not want to do. A mine belonging to the company Rio Tinto, in a remote area of Australia, now uses 70 enormous trucks that nobody drives and that function fully automatically. Another self-driving truck by **Otto** recently made its first journey for which the role of the driver was reduced to managing the loading and unloading of goods and getting behind

the wheel only when joining and leaving the motorway. **Relay** is being marketed as the first robot assistant for hotels, in charge of accompanying clients to their rooms and taking them what they need. AI systems are now being used in displays in public spaces, with the ability to change the content according to who is looking at it, in applications which can recommend a certain kind of make-up based on a simple selfie, and in systems capable of organising the diaries of company employees in the most efficient way possible. **Google's DeepMind** is making its first steps in developing software capable of programming software, opening up the possibility that even programmers will not have secure jobs in the future.

For this reason, the question that the whole world is starting to ask is: Will a robot steal my job? The data that we have today leads to interesting conclusions. For example that, at the present time, the most robotic countries are also those with the lowest unemployment figures. Meanwhile, world GDP continues to grow and until now it has done so thanks to a combination of more people being in work and significant increases in productivity. But future growth, which will allow us to maintain our current quality of life, could depend little on the active population. It can only be maintained if there is an increase in productivity, and this cannot derive from humans alone. Robots are therefore necessary for future growth. The real difficulty will be managing the transition to a world in which the mission of such robots is not to substitute humans, rather to multiply their capabilities.

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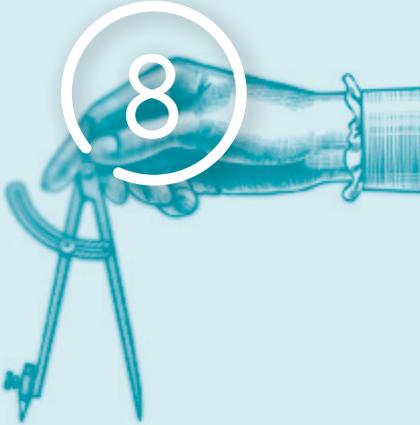
8 A WORLD WITHOUT WORK
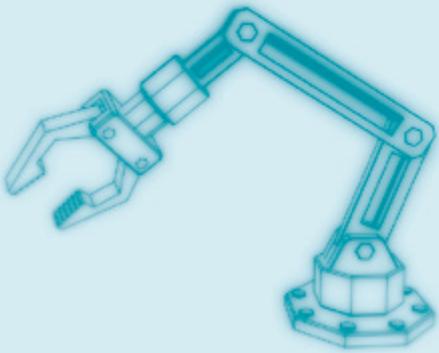
Rapid advances in technological areas such as robotics and AI systems increase concerns regarding the emergence or a world without work for humans. A recent study published by **McKinsey** offers an interesting new approach to evaluate the potential scope of this threat. This perspective starts by understanding a job not as a single activity but instead as the performing of 20 to 30 different tasks. New technologies will be capable of automating approximately 50% of these activities, the most routine or repetitive. But only 5% of current jobs can be fully automated. We should not expect the dis-appearance of our jobs, rather some of the tasks that they are composed of.

We should not think so much about the automation of jobs, but rather of their improvement. In other words, how new technologies can free us from routine tasks and enhance people's capabilities. It is already possible to find such jobs in areas as diverse as the use of exoskeletons by assembly line operators in Ford factories, the integration of robots in the training sessions of the Japanese national volleyball team and the fact that a deaf-mute can communicate through the voice

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of a machine capable of converting their sign language into spoken words.

This perspective contrasts with phenomena such as the so-called gig economy, the increasingly widespread practice of contracting people, generally through new online platforms, to carry out very specific, temporary tasks for a fixed price with very little, if any, employment protection. A model which not only affects the most basic jobs but is also developing in fields such as scientific investigation, for example, through marketplaces of open innovation like **InnoCentive**.

But if we are heading towards a 'post work' world, perhaps we should first reflect on the economic model which has, for the last couple of centuries, made us accept as normal that the economy mainly consists of work. Another perspective could lead us to question whether working is in our nature and, more specifically, whether the way we work today is natural to us given that it is the cause of so much stress and depression. It would also be suitable to consider whether we would be capable of learning to live a life of leisure, whether we would know what to do with time freed up by new technologies.

Perhaps this reflection will make clear the need for a revolution in education to focus on enhancing our abilities as people, instead of accumulating knowledge in our brains; in short, an education that really deals with teaching human beings to be more human.

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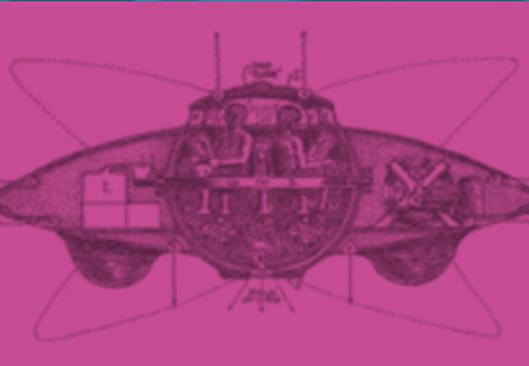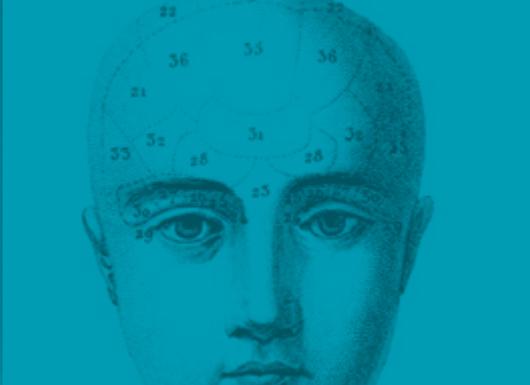
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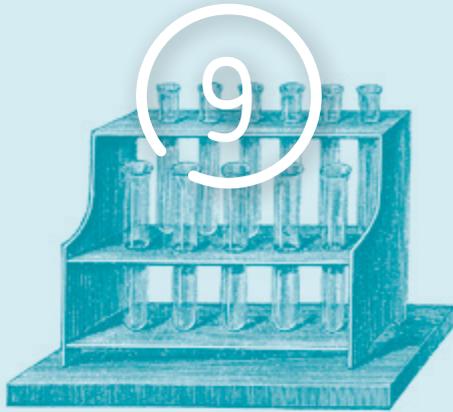
QUANTUM WORLD

It is no longer possible to talk about what is coming without making reference to the quantum world. The magazine *The Economist* recently announced that this science and its technological implications will become mainstream in the next 5 years. New quantum technologies will soon no longer be limited to research labs but will go on to have a significant impact on the economy. In fact, we have already seen and are living with the results of the first quantum revolution. Lead by a group of scientists from the start of the 20th century, the discovery of the mental construct that is quantum mechanics led to appliances such as lasers, semiconductors and atomic clocks upon which have

been based the majority of technological advances made since, which now drive our world and economy.

Now the second quantum revolution is coming and this will still want to take advantage of the 'strange' properties of submicroscopic and atomic particles. Its main ideas are difficult to understand for those of us who understand the universe as it was conceived by Laplace, a 19th century mathematician and physicist for whom our natural environment is like a great clock and we can uncover how it works through knowledge of its pieces and the laws and rules which govern it. This is not the case in the quantum world,

and for this reason metaphors based on the 'Laplacian' universe are of little use. Basic concepts of its physics, such as the superposition principle (a particle can be in two states simultaneously) or quantum entanglement (particles that can influence other particles despite being physically separated by a great distance), now seem counter-intuitive.

But the fact is the practical application of these concepts implies the possibility, for example, of using particles as extremely sensitive sensors with the ability to build scanning systems much more powerful and economical than the current systems based on magnetic resonance.

Ultra-precise atomic clocks can also be created to obtain systems sensitive to gravity so accurate as to detect and measure any element at the depth of the ground. Quantum computing will allow to address problems which, until now, have been considered irresolvable as they required computer power which did not yet exist. It is also necessary to redefine cryptography when such computer power makes current protocol regarding data and communications safety obsolete.

It is in this environment today that unimaginable businesses are emerging. **Element Six**, for example, is a company which makes diamonds with impurities

to be used as ultra-sensitive sensors. One Barcelona based company, **Entanglement Partners**, have just obtained the first quantum computer built in the city. The European Union is currently financing a quantum computing project with one billion euros, whilst private Chinese investors are investing ten times this amount in the creation of large research institutes to investigate this kind of technology.

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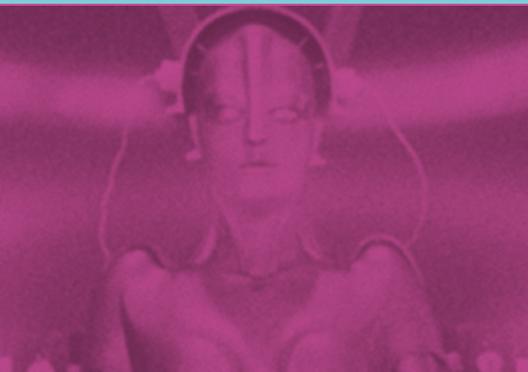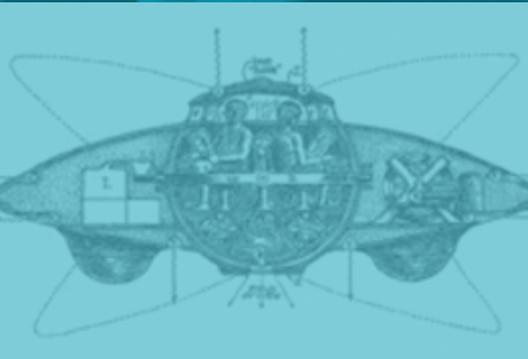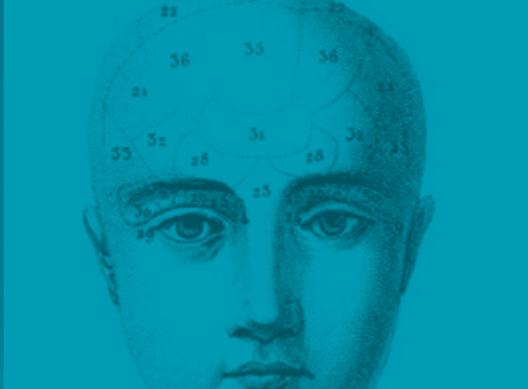
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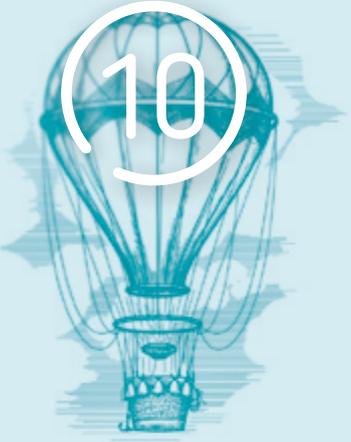
VERNE IN THE 21ST CENTURY

Jules Verne, the French writer considered to be the founder of modern science fiction literature, anticipated many of the technological advances which would become the norm a century later. He anticipated, amongst other things, the existence of what he called 'The Great Book', a repository of human knowledge that, without mentioning computers or connectivity, closely resembles what we today call the Internet. It is interesting therefore to ask what Verne would write today and what world would he expect to find 30 years from now, in 2050.

Fascinated throughout his life by aeroplanes and submarines, at that time brand-new means of transport, Verne would surely today write about new forms of mobility. This could include the **Hyperloop**, a system of transportation through vacuum tubes at speeds of close to 1000 km/h. A few years ago a 'madness' in the minds of a few, it is now taking shape in the first trials and prototypes. Although, for the moment, it can reach only a third of the suggested speed, its potential is already attracting the interest of countries such as India and China. Today Verne would also be interested in flying cars, which are already

"JULES VERNE ANTICIPATED SO MANY THINGS IN HIS TIME THAT IT IS INTERESTING TO ASK WHAT HE WOULD WRITE ABOUT TODAY, WHAT WORLD WOULD HE EXPECT TO FIND 30 YEARS FROM NOW, IN 2050."

a reality, such as the **Volocopter** and the **Lilium Jet**, a compact, totally electric vehicle capable of flying at a speed of up to 300 km/h. Of course, the French writer would also write about robots and would be fascinated by the advances we are currently making in this area, with humanoid robots capable of somersaulting in the air by themselves, or the **Boston Dynamics** robots, which take the form of a mechanical dog with the capacity to react to its environment in the same way the animal itself would.

Verne would also look into energy and it is more than likely that projects such as

the Russian boat **Akademik Lomonosov**, which works like a mobile nuclear centre, and **Flexblue**, the small submarine nuclear reactors, would capture his attention. He would take an interest in the possibility of using technology for the benefit of the planet, writing about companies such as **Global Thermostat** or **Climeworks**, which work on the ability to capture CO_2 in the atmosphere, package it and give it new practical industrial uses.

Finally, Verne would, without doubt, write about space exploration and interplanetary travel, showing an interest in programmes such as **Kepler**, whose objective

is the discovery of potentially habitable planets. Or perhaps he would be seduced by truly revolutionary projects such as **Starlight**, which is working towards sending a 'special ship' to Alpha Centauri (5 light years away from our planet), weighing no more than 10 grams, with a frozen nematode as the 'crew' and powered by a laser to a speed of up to one fifth of the speed of light.

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LINKS RADICAL IS NORMAL

① PEOPLE EVERYWHERE

umbrellahere.com
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  www.thingiverse.com
  www.google.com/get/cardboard
  www.imcardboard.com
  www.kickstarter.com
  goteo.org/project/go-hand-protesis-bionica-de-mano
  seeclickfix.com
  reparaciudad.com
  www.wework.com
  crowdcompanies.com

② BE RESPONSIVE

- **Sense & Respond**
  senseandrespond.co
- **Leo Pharma Innovation Lab**
  https://leoinnovationlab.com/
- **The humboldt dose pen**
  hmbldt.com/#
- **Muji Is Seeking Volunteers To Live In Their New** House For Free
  https://goo.gl/jN5N3v
- **Crohnology**
  www.crohnology.com
- **Streetbees**
  www.streetbees.com
- **The Alliance for Useful Evidence**
  www.alliance4usefulevidence.org

③ THE INTERNET OF THINGS

www.teslamotors.com
www2.meethue.com
www.sonos.com
www.babolat.com/product/tennis/racket/babolat-play-pure-drive-102188
www.ralphlauren.com/shop/index.jsp?categoryId=46285296
- **How smart, connected products are transforming competition:**
  www.hbs.edu/faculty/Pages/item.aspx?num=48195
  www.bigassfans.com/senseme
  www.nemsolutions.com
  www.joyglobal.com
  www.smartcityexpo.com

④ EXPONENTIAL TECHNOLOGIES

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- **Tesla batteries:**
  www.theverge.com/2015/2/11/8023443/
  tesla-home-consumer-battery-elon-musk
- **Nissan Leaf:**
  www.forbes.com/sites/
  williampentland/2011/08/05/nissan-leaf-to-
  power-homes/?partner=yahootix
- **Coal Plant:**
  www.technologyreview.com/demo/533351/a-
  coal-plant-that-buries-its-greenhouse-gases
  www.ohmconnect.com
  llchemical.com
  www.algaenergy.es

(5) OTHER INTELLIGENCES

www.responsive.org/manifesto

(6) NEW EMERGING TECHNOLOGIES

- **Microsoft HoloLens**
  https://goo.gl/JnkLyp
- **Oculus Rift**
  https://www.oculus.com/en-us/
- **Daqri Smart Helmet**
  http://daqri.com/home/product/daqri-smart-
  helmet/
- **GloveOne. Feel and touch Virtual Reality**
  https://www.gloveonevr.com/
- **Slacks. A messaging app for teams**
  https://slack.com/
- **10 Breakthrough Technologies: Power from
  the air**
  https://goo.gl/aGjDdA
- **10 Breakthrough Technologies: SolarCity**

Gigafactory
https://goo.gl/PrKIV9
- **First Solar's Cells Break Efficiency Record**
  https://goo.gl/5h7hE6
- **Transatomic**
  http://www.transatomicpower.com/

(7) ARTIFICIAL INTELLIGENCE
    AND EMPLOYMENT

- **The great AI awakening**
  https://goo.gl/vCcPMJ
- **Sergey Brin at 2017 World Economic Forum**
  https://goo.gl/kKB5ci
- **An AI system predicted Trump would win**
  https://goo.gl/qvlGp4
- **Mining 24 hours a day with robots**
  https://goo.gl/ZIJpu2
- **Robots mining (video)**
  https://youtu.be/lFe9JR5l1E0

RADICAL BUSINESS
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LINKS RADICAL IS NORMAL

- **Shipment by self-driving truck**
  https://youtu.be/Qb0Kzb3haK8
- **Relay autonomous delivery robot**
  www.savioke.com
- **Let This Algorithm Mix Your Makeup Perfectly**
  https://goo.gl/miAQsp
- **Clara Labs**
  claralabs.com
- **AI Software Learns to Make AI Software**
  https://goo.gl/lonf0R
- **Robots density in the world**
  https://goo.gl/vazTlD
- **A future that works: automation, employment and productivity**
  PDF: https://goo.gl/L9LMPU

8 A WORLD WITHOUT WORK

- **The second Renaissance**
  nature.com/news/the-second-renaissance-1.22827
- **Reboot for the AI revolution**
  nature.com/news/reboot-for-the-ai-revolution-1.22826
- **High-Precision Assistance For Eye Surgery**
  http://www.preceyes.nl/
- **Jobs lost, jobs gained: workforce transitions in a time of automation**
  https://goo.gl/9AEbza
- **Ford incorporates exoskeletons in assembly lines for the first time**
  https://goo.gl/6YPHu1
- **What is the 'gig' economy?**
  http://www.bbc.com/news/business-38930048
- **Flexible working: Science in the gig economy**
  https://www.nature.com/nature/journal/v550/n7676/full/nj7676-419a.html
- **Post-work: the radical idea of a world without jobs**
  https://www.theguardian.com/news/2018/jan/19/post-work-the-radical-idea-of-a-world-without-jobs

- **86% of Europeans suffering from depression are of working age**
  http://consalud.es/pacientes/el-86-de-los-europeos-que-padece-depresion-se-encuentra-en-edad-laboral-34520
- **A mad world: capitalism and the rise of mental illness**
  https://www.redpepper.org.uk/a-mad-world-capitalism-and-the-rise-of-mental-illness/

9 QUANTUM WORLD

- **Quantum leaps. The strangeness of the quantum realm opens up exciting new technological possibilities.**
  https://goo.gl/hiiV2B
- **The Nature of Technology. What It Is and How It Evolves.**
  https://goo.gl/tjit1w
- **Innovation straight from the source. Revolutionizing medical imaging by quantum technologies.**
  https://www.nvision-imaging.com/

- **Element Six supermaterials**
  e6.com
- **ID Quantique (IDQ) is the world leader in quantum-safe crypto solutions**
  idquantique.com
- **1QBit solves industry's most demanding computational challenges by recasting problems to harness the power of quantum computing.**
  1qbit.com
- **PQCRYPTO ICT-645622**
  pqcrypto.eu.org
- **Europe's billion-euro quantum project takes shape**
  https://www.nature.com/news/europe-s-billion-euro-quantum-project-takes-shape-1.21925
- **FQXi AXA Research Fund**
  http://qbnetworks.icfo.eu/
- Entanglement Partners
  entanglementpartners.com

(10) VERNE IN THE 21ST CENTURY

- Hyperloop-one
  hyperloop-one.com
- **Volocopter**
  volocopter.com
- **The Lilium Jet**
  lilium.com
- **The Surgeon Who Wants to Connect You to the Internet with a Brain Implant**
  https://goo.gl/aSUwy6
- **Russia Institution Approves Plans For Akademik Lomonosov Floating Nuclear Station**
  https://goo.gl/x3WLbw
- **Flexblue (PWR Underwater)**
  uxc.com/smr/uxc_SMRDetail.aspx?key=Flexblue
- **Global Thermostat**
  globalthermostat.com
- **Climeworks: Capturing CO2 from air**
  climeworks.com

- **Mars rover Curiosity's shot of the hill she'll never climb**
  https://goo.gl/mVzGjW
- **Kepler Project**
  kepler.nasa.gov
- **Artificial Intelligence, NASA Data Used to Discover Eighth Planet Circling Distant Star**
  https://www.nasa.gov/press-release/artificial-intelligence-nasa-data-used-to-discover-eighth-planet-circling-distant-star
- **Starlight: Directed Energy for Relativistic Interstellar Missions**
  deepspace.ucsb.edu/projects/starlight

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ALFONS CORNELLA

Founder and CEO of Infonomia, the professional services com-
pany for innovation, and of Co-Society, the cross-sectional
platform for collaboration between innovation teams. He is a
consultant for large companies in different sectors and has pub-
lished 22 books about science, technology and innovation, as
well as more than 1,000 short articles about how technology
and innovation can transform a business.

At his regular conferences he communicates his ideas and expe-
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His special areas of interest include the current disruption of
education and the radical transformation of business models.

Amongst his most recent publications are the Visionomics titles:
50 Ideas and Illustrations on the New Dynamics of Organisations
(2010), *The Solution Begins with C-* (2012), *Ideas x Valor = Re-
sultados* (2013), *Ganarse la libertad*, written in collaboration
with Roser Batlle (2013), *Verne, Innovation Manual* (2013), and
30/30:30 Ideas for 2030 (2014).

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