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DOSSIER

DISRUPTION

25 COMPANIES THAT
ARE CHANGING THE WORLD

After Skype, Netflix and Airbnb,
where will the next shake-up come from?

Elon Musk, CEO of Tesla and SpaceX

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ISSN 2296-3278

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Turning the world upside down



By Marc Bürki,
CEO of Swissquote

Disruption. Rarely has any concept so upset the corporate world, gradually permeating into every business sector. And in 2016, this relentless trend remains unstoppable. But what exactly does it mean? Based on the definition widely accepted among economic commentators, disruption refers to when a company, most often a start-up, breaks free from traditional thinking and standards to shake up the established order. And the intrepid, controversial **Elon Musk** – featured on the cover and in a portrait in this issue – feels right at home doing that. The CEO of Tesla and SpaceX, appearing frequently in the headlines, has made disruption his trademark. No stranger to subversion, the Canadian-American billionaire, convinced that robots will soon replace humans on the job market, has recently said he supports a universal basic income.

p. 56

In its more academic definition, disruption is not just about breaking the rules or veering off the beaten path. Originally, Harvard Business School professor Clayton Christensen developed his theory of disruptive innovation in *The*

Innovator's Dilemma. His landmark book was published in the late 1990s, and his theory has been continuously tweaked and redefined ever since. The rules and principles promulgated by disruption **analysts**, the devout followers of Christensen, prompt reflection. Some may find it surprising that companies such as Tesla or Uber do not quite match their rigorous criteria, while these very firms are hailed as disruption models by experts even in Silicon Valley. Now there's a refreshing point of view.

p. 27

Whatever your references for disruptive innovation, the **25 firms** featured in this report fully deserve their label as innovative, and even visionary, companies. They have all, in their own way, rewritten the rules of the game in their sector, be it health care, robotics, energy, food or social media. As you will see, Swiss companies feature prominently in our selection. Swissquote would also have deserved a mention... Finance is one of the most disruption-prone sectors today and our bank acted as a forerunner, paving the way for innovation.

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Enjoy!

DOSSIER

DISRUPTION THE NEW RULES OF THE GAME

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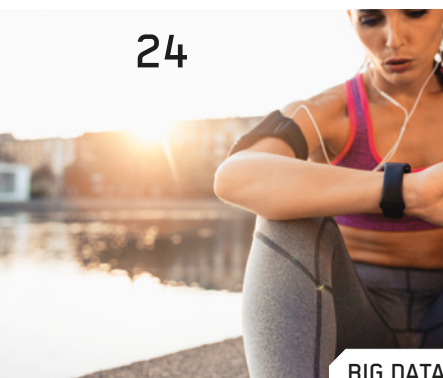
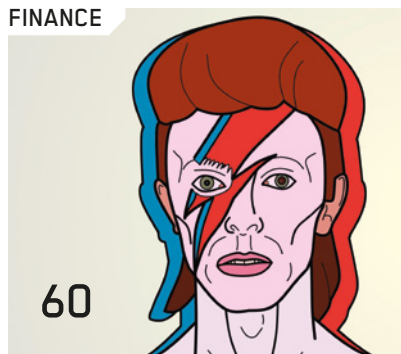
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Caecilia Charbonnier,
co-founder and CEO
of Artanim Interactive

ERRATUM

The smartphone app "Mobile Passport",
which we presented in the previous issue
(p. 69) is actually restricted to US and
Canada citizens. We apologize to our
readers for this mistake.

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Chemin de la Crétaux 33
1196 Gland - Suisse
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Cover

Miranda Penn Turin / Getty Images

Photography

AFP, iStockphoto, Newscom, Reuters,
Keystone

Editing (English version)

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PRINTING, BINDING
AND DISTRIBUTION

Stämpfli Ltd.
Wölflistrasse 1 - 3001 Berne
www.staempfli.com

ADVERTISING

Mediensatellit
Baslerstrasse 30 - 8048 Zurich
www.mediensatellit.ch

WEMF

REMP 2015: 49,471 ex. Print run: 60,000 ex.



printed in
switzerland

SUBSCRIPTION

CHF 40 FOR 6 ISSUES

www.swissquote.ch/magazine

SCANS

Industry

THE ROBOTS OF ABB LEARN TO SPEAK



Demonstration of an ABB robot at an exhibition in Shanghai.

HUANG ZHENGWEI / IMAGINECHINA / AFP

ABB will soon develop a platform that will allow its industrial robots to interact with their operators. It has partnered with the Chinese telecommunications giant Huawei for this purpose. The Swiss company will use a technology developed by Huawei called OneAir@Smart X, which enables

wireless, factory-wide communication between workers and machines. It also records all of the robots' actions in a central database which workers may access at any time. In this venture, the two partners will mainly target China, which is the leading market for ABB robots. — ABBN

Finance

GOLDMAN SACHS TRIES ITS HAND AT SMALL LOANS

Goldman Sachs has just launched a new loan service aimed at the general public. Marcus.com, as it is called, offers loans with a maximum value of \$30,000. The bank hopes to compete against The Lending Club and Prosper, two peer-to-peer lending giants, by venturing into their territory. Its target

is the indebted credit card holder market: its loans will have interest rates that vary between 5.99% and 22.99%, averaging out at 12.99%. This is compared to a typical rate of 17% for credit cards. In the United States, credit card holders have a combined debt of \$729 billion. — GS



“We have, since last year, reduced our footprint in London. Our strategy is to de-emphasise London.”

Tidjane Thiam,
CEO of Credit Suisse



170,000

The number of electric and hybrid cars sold in China in the first half of 2016, an increase of 162%. This is the largest market in the world ahead of the United States, where only 64,000 vehicles of this type were sold in the same period.

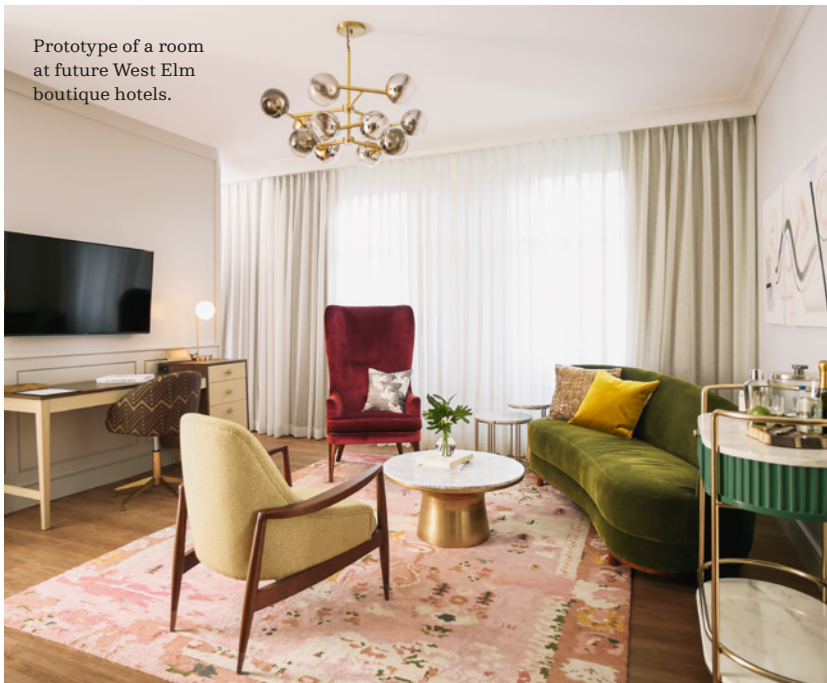
*Internet***GOOGLE PRESENTS ITS YOUTUBERS TO NEW BRANDS**

YouTube, a subsidiary of Google, has acquired the start-up FameBit, which brings together amateur creators of digital content and brands wishing to partner with them. These ad-hoc web video artists create a profile for themselves on the FameBit platform, which companies may access. They look for various criteria, such as the artists' online audience, when choosing whom to offer sponsoring or branded content creation contracts. Google hopes that this acquisition will enable it to attract more advertisers to its YouTube video platform.

— G00G

*Supplies***THE HOTEL WITH FURNITURE FOR SALE**

Prototype of a room at future West Elm boutique hotels.



West Elm, an American furniture shop and subsidiary of Williams-Sonoma, will open a series of boutique hotels in 2018. The first of these will open their doors in the cities of Charlotte, Indianapolis, Detroit, Savannah and Minneapolis. The hotels, operated by the hotel management company DDK, will be entirely furnished with West Elm products.

When they arrive, guests can download an app that will allow them to purchase furniture featured in their hotel. West Elm is not the first company to try this strategy. Restoration Hardware, another furniture shop, has also opened a hotel in New York, as has the fitness chain Equinox.

— WSM — RH

RANKING**THE TOP FIVE COUNTRIES IN VIDEO GAME SALES**

(based on revenue generated in 2016)

1. CHINA
\$24.37 BILLION
2. UNITED STATES
\$23.6 BILLION
3. JAPAN
\$12.45 BILLION
4. SOUTH KOREA
\$4.05 BILLION
5. GERMANY
\$4.02 BILLION

Source: Newzoo

THE FIVE COMPANIES SPENDING THE MOST ON ADVERTISING

(based on their 2016 budgets)

1. PAMPERS
\$8.3 BILLION
2. GILLETTE
\$8.3 BILLION
3. L'OREAL
\$8.2 BILLION
4. CHEVROLET
\$5.1 BILLION
5. LOUIS VUITTON
\$4.4 BILLION

Source: Forbes

THE FIVE BIGGEST SUPPLIERS OF CLOUD COMPUTING SERVICES

(based on their 2016 market shares)

1. AMAZON
31%
2. MICROSOFT
11%
3. IBM
8%
4. GOOGLE
4%
5. SALESFORCE
4%

Source: Synergy Research Group

SCANS

KICKSTARTER



ZEI° A USEFUL AND INFORMATIVE DESK TOOL

Tired of spending most of your day answering emails without knowing how much time it took you in the end? Or losing precious hours on the telephone or in meetings? Now there's an effective tool that gives you a better idea of your schedule so you can bring it under control. ZEI° is a white octahedron that can be placed on your desk or any other work surface. Each of its faces is assigned a task – meetings, emails, project A, B and C, etc. – that the octahedron will time. To start the timer, the face corresponding to the activity that is about to start is simply flipped to the top. When the activity is finished, the face associated with the next activity is flipped up, then the next, and so on. Everything is tracked in an application that the octahedron communicates with via Wi-Fi. At the end of the day, it generates a table that lists exactly how much time was spent doing each task.

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Logistics

GATEGROUP PUTS BIG DATA TO USE

Gategroup, the largest supplier of airline food, is entering the age of big data. The Swiss company, based in Zurich, has just adopted a new computerised system, Uqonic, which enables it to accurately manage its stock, minimise waste, anticipate its customers' needs and offer them customised orders.

This tool makes use of data generated by the millions of passengers who use the services of Gategroup each year to anticipate their future behaviour. It also allows for the deployment of smart carts on aeroplanes, whose contents and location can be tracked in real time. — GATE



A Gate Gourmet employee at the Zurich-Kloten airport.

RENE RIJIS / KEYSTONE



“Twitter is
the people’s
news
network”

Jack Dorsey,
CEO of Twitter



2.4 billion

The number of barrels in a new oil field discovered by Texas-based Caelus Energy off the coast of Alaska. This is equal to over half of Ecuador's reserves.

Distribution

AMAZON TESTS OUT HIGH-TECH SUPERMARKETS



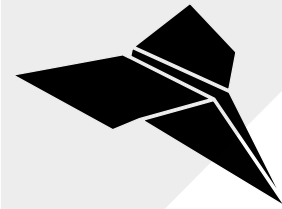
An Amazon bookshop in Seattle. In an unprecedented move, the company will open grocery stores.

ISTOCKPHOTO

Amazon has brick-and-mortar shops on its radar. The first one will open its doors in Seattle, where the company has its headquarters. These shops will sell fresh food, and customers will be able to order traditional, non-perishable items using touch screens installed in the shops. The products will then be delivered to their homes. Customers will also be able to order online

before they visit the shops, and even pick up their purchases without leaving their vehicles. However, the e-commerce giant is not planning on converting itself into a super-market chain – it simply hopes to get consumers into the habit of doing their food shopping at Amazon. Eventually, it will direct them to its online service, AmazonFresh.

— AMZN



123

The small number of orders for wide-body aircraft received by Boeing and Airbus in 2016. In 2013, the two aircraft manufacturers had orders for 750. This market is in the midst of a slowdown after a period of rampant acquisitions resulting in airline overcapacities.

Security

KUDELSKI AND CROWDSTRIKE JOIN FORCES



Christophe Nicolas, vice president and founder of Kudelski Security.

The Swiss group Kudelski has entered into a partnership with the American company CrowdStrike, planning to market and offer its customers cybersecurity solutions from the California-based enterprise's Falcon product line. The two firms will also join forces to develop new IT security solutions. To accomplish this, they plan to make use of the synergies between the Falcon products and the Kudelski Cyber Fusion Centers, which provide companies with 24-hour-a-day surveillance against online threats. One of these centres is located in Switzerland; the other is currently being developed in Phoenix, Arizona. — KUD

KUDELSKI

SCANS



“You will have a total mix-up of rumours and facts – a pretty traumatic scenario of information or propaganda. It will be very painful for democracies.”

Mathias Döpfner,

CEO of the German media company Axel Springer, about the risk posed by social networks

Raw materials

TRAFIGURA ENTERS THE INDIAN MARKET

The Swiss company Trafigura, based in Lucerne, which specialises in oil trading and transportation of raw materials, has joined forces with two Russian firms, the oil giant Rosneft and the investment firm United Capital Partners, to acquire a 98% share in Essar Oil, a subsidiary of the Indian conglomerate Essar Group. The deal amounts to \$13 billion. It includes the refinery in Vadinar in the state of Gujarat, the second-largest in the country, as well as a sea terminal and 2,700 petrol stations. For the three partners, this acquisition is effectively a gateway into the immense Indian oil market. This year, the subcontinent will overtake Japan to become the third-largest consumer of oil on the planet. — ROSN

Industry

CHINA BUILDS A STEEL GIANT



Inspecting steel rods at a steel warehouse in Lianyungang, in eastern China.

SI WEI / IMAGINECHINA / AFP

China is experiencing serious overcapacity in steel production. The slowdown in the domestic construction market has reduced demand, and the increase in exports has led to a drop in price of the metal on the international market. However, Beijing has promised to reduce its annual production to 100-150 million tonnes from its current level of 1.1 billion tonnes.

To accomplish this, the government has begun to merge the giant Chinese steel companies – in the end, only three to five of them will remain. The latest deal is the merger of Baosteel and Wuhan, which will create the second largest steel producer in the world after ArcelorMittal. The new company will produce some 60 million tonnes of steel a year.

THE FLOP

The Toyota Prius

In 2011, Japan-based Toyota announced that the Prius, its hybrid vehicle, would become its bestselling car by 2020. But nothing went as expected. Sales of the Prius have been in free fall for the last three years. They dropped by 12% between 2013 and 2014, then again by 16% between 2014 and 2015. The Prius is suffering from competition by new hybrid models such as the Volkswagen Golf and the

Honda Fit, which consume less petrol, and from the presence of purely electric cars on the market, such as the Tesla and the Nissan Leaf. Another disadvantage for this model is the nosedive in petrol prices, which has made environmentally friendly cars less attractive to consumers. The recent recall of 340,000 Priuses due to defective brakes will not help matters for Toyota. — 7203



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SCANS



“We have an impression that we have been misled for months by the current Polish government”

Tom Enders,

head of Airbus, after Warsaw cancelled a contract with the French company in favour of US-based Lockheed Martin



200

The number of social networking specialists that McDonald's has recently hired. The American chain hopes to enlist their help in winning back millennials, who are turning away from fast food in droves. Four out of five young people in this demographic category have never tasted a Big Mac.

Food

EMMI INTRODUCES MICROWAVE FONDUE



The largest fondue in the world (1,400 kg), made by Emmi employees at Winter Garden in New York (October 2007).

TIMOTHY A. CLARY / AFP

Spurred by a weak euro, the Swiss are turning away from Swiss cheese in favour of foreign specialties. This has had an effect on the financial results of Emmi, which makes over half of its sales in its home country. They have fallen by 0.7% in the first half of 2016 and by 3% in 2015. To counteract this trend, the Lucerne-based company is attempting to modernise

its image by launching new products. It will soon introduce a fondue that can be heated in the microwave and is now selling a ready-to-eat porridge with milk. Emmi is also looking to increase its market share in the United States, where it has acquired the cheese manufacturer Cowgirl Creamery.

— EMMN

IPO

A CHINESE GIANT – NOW ON WALL STREET

ZTO Express floated on the New York Stock Exchange in late October, raising \$1.4 billion. The Chinese company chose the United States so it could circumvent the administrative obstacles associated with a listing in its home country, and to attract foreign investors as well. Founded in 2002, ZTO Express dominates the package delivery market in China along with its two competitors, YTO Express and Shentong Express. It shipped

21 million packages in 2015, or 14.3% of all packages delivered in China that year. This is 1.5 times the number of packages delivered on American soil last year. Its clients include the e-commerce giants Alibaba and JD.com. Based in Shanghai, ZTO Express saw its sales increase from 3.9 billion yuan (572 million Swiss francs) to 6.1 billion yuan (896 million Swiss francs) between 2014 and 2015.

— ZTO



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TRENDS



the country

ISRAEL

The Jewish state is becoming a gas giant

In 2010, Israel announced the discovery of 450 billion m³ of natural gas along its coast – one of the largest reserves on the planet, equivalent to 1,600 billion barrels. But it would take five years for drilling to begin at the Leviathan gas field, held by the US company Noble Energy and the Israel-based Delek Group and Ratio Oil Exploration. This small country, which until recently was a net importer of natural gas, is now preparing to become an exporter. This discovery has also led to a change in the Jewish state's diplomatic situation, contributing to better relations

with some of its Arab neighbours. What is more, Israel has just entered into an agreement with Turkey for the construction of a trans-Mediterranean pipeline. This pipeline will pass through the Turkish port of Ceyhan before continuing on to Europe. Ankara will invest \$2.5 billion in this project. Another agreement made with Jordan, worth \$10 billion, makes provision for Israel to supply natural gas to the national electric company, Nepco, for 15 years. Egypt also stands to benefit from the Israeli windfall.

Population
8.5 million

**GDP per capita
in 2015**
\$35,343

**Growth
in 2015**
2.3%

**Main economic
sectors**
electronics,
agriculture,
chemical and
pharmaceutical products,
finance, military
equipment



YONHAP NEWS / YNA / NEWS.COM

the figure

TIMOTHY J. SLOAN

A new CEO at Wells Fargo

Timothy J. Sloan, an American, has been appointed CEO of Wells Fargo, the world's second-largest bank by market capitalisation and the third-largest bank in the United States in terms of assets. At 56 years old, this establishment figure has spent nearly his entire career with the US financial institution, which specialises in retail banking. He began working there in 1987 after his first job at Continental Illinois National Bank and Trust. Sloan, who has a degree in economics from the University of Michigan-Ann Arbor, was appointed CFO in 2011 and was then promoted in 2014 to head the company's Wholesale Banking business, overseeing the takeover of General Electric's financial operations for \$50 billion. A year later, he became COO of the company, which led to him being named the successor to the former CEO John Stumpf. Stumpf was forced to resign in October, under dire circumstances, following a scandal: some 5,300 bank employees had opened nearly 2 million accounts, unbeknown to their customers, in order to generate account management fees and commissions. Sloan is married, with three children. He lives in San Marino, a wealthy residential city near Los Angeles. WFC

Position
CEO of Wells
Fargo

Nationality
American

Annual salary
\$2 million
(2015)

The company Avantium has developed a new, entirely bio-sourced polymer, PEF, the more eco-friendly, next-generation PET.



the innovation

ECO-PLASTIC

Company
Avantium

Launch
Not yet
announced

Estimated cost
Approx. €100
million

Plant-based “green” plastic

The Dutch company Avantium – which fits well with the disruption theme of this issue – has developed a process for manufacturing biodegradable plastic using a non-polluting raw material. Instead of materials derived from petroleum, Avantium is turning to plant-based fructose to make its plastic. Avantium, a spin-off of Shell created in 2000, will soon begin construction of a plant to deploy its solution on a larger scale, in col-

laboration with the German group BASF. The site, located in Antwerp, Belgium, will yield an annual capacity of 50,000 tonnes. Eco-plastic, more sturdy than PET, can be used to produce textiles, rugs, electronic components, packaging, cosmetics and auto parts. Coca-Cola and Danone, both shareholders in Avantium along with the Dutch bank ING, have indicated their interest in this new material. They plan to use

this biodegradable plastic, which can be recycled using the same infrastructure as for PET, to manufacture bottles and yoghurt pots. The Japanese chemical company Mitsui Chemicals is also interested in this new process, as is the Austrian packaging producer ALPLA.

THE MATCH

Nestlé vs Mondelez

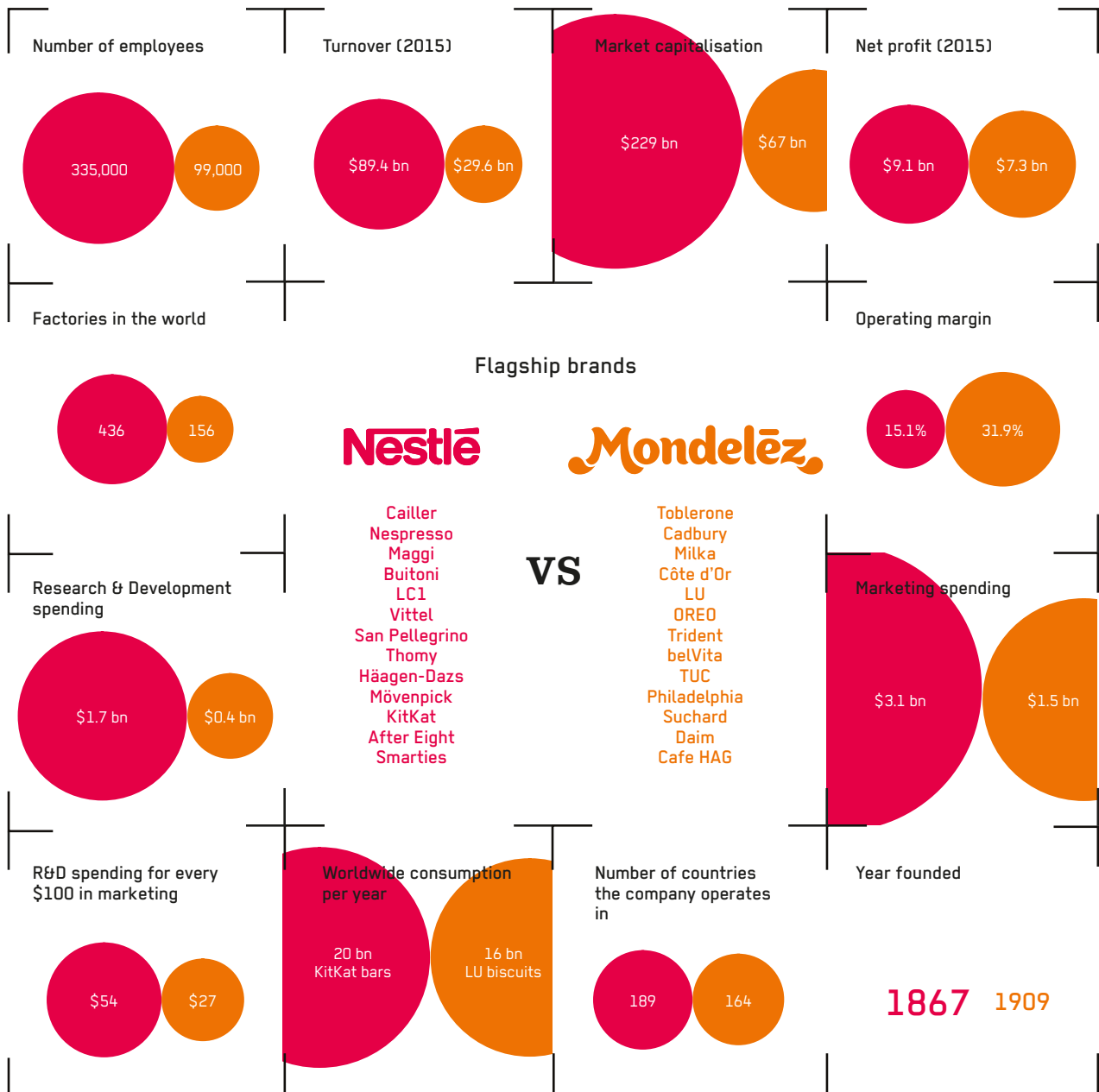
BY DANIEL SCHNEIDER

Very few multinational companies can rival the size of the Swiss food and beverage giant Nestlé. Procter & Gamble (Gillette, Pampers, Ariel, etc.) comes in at number two and is mainly active in personal care products and household products. Number three, Unilever (Rama, Knorr, Dove, etc.), is essentially active in products other than drinks, whereas number four,

PepsiCo, is almost entirely dedicated to the latter. Only number five rivals the diversity of Nestlé. Two years after acquiring Cadbury in 2010, the US giant Kraft Foods changed its name to clearly display its ambitions. Now operating as Mondelez International, the new entity has also distanced itself from the North American food business, save for one very lucrative exception: snacks.

Mondelez is three times smaller than Nestlé in both number of employees and turnover, but its significant profits and margin could make it a true competitor for the Swiss multinational. However, if the US company invests too much in marketing and too little in research, the long-term future of Mondelez might not be quite as sweet.

— NESN — MDLZ



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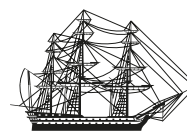
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The value of investments, and the income from them, may fall or rise and investors may get back less than they invested.



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Accurate counts of customer cars, made possible by satellite images, can provide valuable information to investors - as here, in the case of a supermarket car park.





Satellites: aiding investments

In four years, the number of artificial satellites orbiting the Earth has risen by 40%. The data they collect is transforming the agriculture and raw materials industries. But this information can also be used to make better economic forecasts. Report.

BY MARIE MAURISSE

It all began with the sound of a buzzer. On 4 October 1957, the Soviet Union launched Sputnik into orbit. On the radio waves, the device sent a shrill little signal that could be heard from space. Sputnik, the very first artificial satellite, travelled around the Earth in 98 minutes. It was the Cold War, and the technological triumph of the Soviets over the Americans started a space race which never really ended.

For decades, they were practically the only two countries in space. Their huge rockets and satellites were used to take photographs of the Earth, design maps or measure the damage of natural disasters. They also served in communication for diplomats, intelligence agents and the military. Then gradually, the private sector infiltrated the market, first by buying stakes in companies such as Intelsat

and Eutelsat, which owned vast fleets of satellites.

But the industry required heavy investment, and only large companies could afford it. That barrier to entry did not come down until the early 2000s, led by Cal Poly University in California. "A university researcher designed the specifications for manufacturing small satellites that measured 10 cm on each side, called CubeSats," says Simon Dandavino, executive director of eSpace, the Space Engineering Center at the Swiss Federal Institute of Technology in Lausanne (EPFL). Other universities followed suit for space research, forming a generation of innovative students who moved on to create dozens of start-ups. "Manufacturing a satellite has become simpler and, more importantly, much less expensive, because these CubeSats ▶

are built with commercially available components,” Dr Dandavino explains. “This approach also creates shorter development cycles by integrating the latest components developed for mass industry.” Manufacturing costs can be as low as a few hundred thousand dollars for a CubeSat, as opposed to millions for a traditional satellite.

Manufacturing satellites is no longer the big challenge. What counts is being able to process the data they collect and selling that information.

Within a few years, the market took off. The Satellite Industry Association reports that, at the end of 2015, 1,381 operational satellites were gravitating around the Earth, i.e. a 40% increase over four years. The industry represented \$208 billion in revenue in 2015, and growth is forecast at 600% for non-geostationary satellites over the next 10 years, according to a study by Northern Sky Research, a research and consulting firm specialised in satellite technology. The many grants awarded, especially by the European Union, have fostered research programmes and encouraged companies to invest in the industry.

The United States was one of the first countries to innovate. In 2010, two NASA research engineers, Will Marshall and Chris Boshuizen, launched smartphones into orbit, as their computing power far exceeds that of the US Space Shuttle. That experience convinced them to set up their own company, Planet Labs. Manufacturing satellites is no longer the big challenge. What counts is being able to process the data they collect and selling that information. These days, many commercial applications are available for data

Will Marshall, co-founder of Planet Labs. The former NASA engineer is responsible for sending into space mini-satellites powered by smartphones.

STEVE JURVETSON

collected by satellites. One of the most important uses is what is called “precision agriculture”. Thierry Lefort, a partner at the strategy consulting firm Strategy&, a member of the PwC network, explains: “These companies can create detailed maps of farmland, analyse soil quality for each parcel and recommend to farm owners which crop would be the best match and optimise the amount of fertiliser for each square metre of land.” The

Canadian company Farmers Edge offers its customers these types of solutions, featuring services that are not yet widely used but are likely to develop considerably over the next few years.

Numerous companies have surfaced to compete in this flourishing market with Airbus and DigitalGlobe, long-standing leaders with fleets of satellites. Planet Labs, based in



San Francisco, is one of the most active and already owns about a hundred micro-satellites. PlanetiQ, operating out of Colorado, will have about twelve by 2018. BlackSky Global from Seattle plans to launch six satellites into orbit. Terra Bella, owned by Google, operates two. The Canadian company UrtheCast even offers 30-second videos shot from space.

All of these companies have stood out by providing images that are updated faster than the imagery taken by big, traditional satellites. Originally, we had to wait for the satellite to travel around the Earth several times to come back to the specific geographical location. And that could take days. "But now these start-ups can design constellations of hundreds or even thousands of low-cost satellites for better coverage of the Earth so they can record the information they want," Lefort says. "Images are updated much faster. The possibilities are practically endless!"

Some of these include observing volcanic eruptions in order to predict the consequences, measuring the extent of an oil spill in the ocean, monitoring forest fires and more. A number of applications are available in environmental protection or border control and surveillance. "But these data are also of interest to industrial companies," says Dandavino from EPFL. "Information could be collected to monitor progress at a construction site or critical infrastructure or to optimise logistics. Other companies could use it to optimise the analysis of their sales figures or performance at a given store by counting the cars in car parks and comparing that number with revenue." That is the type of service developed by the Chicago-based company RS Metrics, whose customers include Walmart and Caterpillar.

These new tools also appeal to investment funds, as the information provided by satellites often comes in faster than information offered

in annual reports or official statistics. "If you don't have our data, you're at a serious disadvantage," Tom Diamond, co-founder and president of RS Metrics, likes to say. In March of 2016, using satellite imagery, the American start-up noted a traffic slowdown at the furniture retailer Pier 1 Imports. One month later, Pier 1 released a decline in quarterly performance. This gave investors time to react to the bad news and potentially sell their shares. The service provided by RS Metrics comes at a price. For access to all the company's data, subscribers pay up to \$300,000 a year.

The information provided by satellites often comes in faster than information offered in annual reports or official statistics

USING DRONES FOR CHEAPER DATA

In 2015, Simon Johnson co-founded the start-up OpenStratosphere. What is his plan? To collect as much data as possible from the sky. However, he won't be sending satellites into orbit but flying drones in the stratosphere, which is much closer to Earth. They will be solar-powered and can accomplish missions lasting several months to cover more restricted regions than traditional satellites. "The advantage is that we will be able to take high-resolution hyperspectral images of the ground on request, like a radiologist taking an X-ray," Johnson says. The information collected will be up-to-date and help in decision-making."

Here again, technology costs are made more affordable,

meaning that small businesses can use these services. The drones are expected to be operational within the next three years. "A number of attractive companies are in this market. Sion Power in the United States and Oxis Energy in the United Kingdom provide the components for batteries that enable drones to fly, while the Swiss company Gamaya is a data analytics company specialised in agriculture. As far as investing, I think that in addition to selling seeds and phytosanitary products, Bayer will eventually offer crop science advisory services to help customers use these products as efficiently as possible. In my opinion, the leading groups will be those that will benefit the most from big data collected using satellites and drones."

In the high-risk sector of raw materials, satellites can be used to guard merchandise loaded on to a cargo ship and detect any pirates that might attack the vessel. The California-based company Spire owns 17 satellites that can track cargo ships, send them information or warn them of a coming storm, even in areas not covered by current telecommunications systems. That's how business intelligence becomes, in this case, "geospatial intelligence". Their system can also be used to check up on competitors, estimating the amount of oil being shipped based on the level of the vessel on the sea. The deeper it sinks into the water, the heavier its load.

Switzerland is also a contender in this race to get into orbit. ELSE, a young company based in Lausanne, is working towards launching a constellation of some ten CubeSats by 2017. The satellites will be used to provide equipment monitoring services (cargo ships, cranes, trailers, etc.) to support economic forecasts. ▀

ANALYSIS

THE POINT OF VIEW OF SPECIALISTS

INVESTOR INTERVIEW

“Big data will revolutionise medical care”

The use of digital health information is transforming a number of economic sectors. Interview with the American health data expert, Michael Dillhyon.

BY JULIE ZAUGG

Michael Dillhyon, an American entrepreneur and the founder of the health data exchange Healthbank, encourages people to share their medical information. He explains how big data is revolutionising health care and insurance and who will benefit the most.

The amount of health data available has exploded in recent years. Why is that?

It used to be that only doctors and hospitals generated medical data. But the situation has completely changed in the past few years. Smart devices, such as Fitbit bracelets and smartwatches, have begun to collect information about our health that can be used to measure our physical activity, heart rate or glucose [blood sugar] levels. Mobile phone companies also have vast amounts of data from the location tools integrated into smartphones. They know how many steps individuals take on any given day and where they've been. Search engines such as Google and social media sites, like Facebook, also find out a lot about your health by analysing your online searches and posts. Pharmacies and supermarkets know which drugs and health products that customers buy from their loyalty cards.

How will this mass of information transform medical care?

It will revolutionise both diagnostics and the quality of care provided. Today, a doctor takes your blood pressure on the day of your visit, which only provides a partial reflection of your health. As the use of smart devices grows,

doctors will have access to a set of measures taken at regular intervals, meaning they can take more appropriate decisions. They will also know more about your other health behaviour, such as how much exercise you get or the vitamins you take. That will make it easier for them to treat you and avoid the dangerous interaction of some medications. For patients with serious diseases, such as cancer, who sometimes have to take up to a dozen drugs a day, these new monitoring tools will help the doctor check that the treatment is being followed properly and in the right doses.

What about upstream? Can all this information advance medical research?

It has opened up new opportunities, especially in genomics. To provide just one example, the Resilience Project launched in 2014 aims to profile nearly 600,000 genomes collected from the genetic sequencing company 23andMe. So far, the project has identified a small number of individuals who carry certain genetic variants associated with hereditary diseases but have not yet been affected by them. Eventually, these findings could be used to develop treatments based on these individuals' exceptional resistance.

Which companies have gone furthest with big data and health?

Pharmaceutical companies have been particularly innovative. Bayer, Novartis, Genentech, Merck, Pfizer, Bristol-Myers Squibb and

Monitors connected to smartphones have made it easy to measure blood pressure regularly. The multiplication of such data will transform the healthcare business.

VOISIN / PHANIE / APF

Biogen have all used big data to develop new treatments. For example, Novartis has teamed up with the telecommunications group Qualcomm to design a smart inhaler for asthma patients and an app where they can report their symptoms and frequency of attacks to compare with those of other users. Some insurance companies have also taken advantage of these new opportunities. Allianz has developed a platform based on blockchain technology. Customers can use it to provide the insurer with information that could have an impact on their health – e.g. whether they smoke, exercise or drive a sports car. However, users own and maintain control over their personal data. Allianz only has access to it in exchange for lower premiums.

And what about health care providers ?

Some hospitals are on the forefront in this area. The American group Kaiser Permanente has developed a secure ecosystem to collect a patient's health information, store it in an electronic file and share it with the professionals involved in their care. That prevents any duplicate tests and improves care as doctors know more about the patient.

What is the situation in Switzerland ? Are any companies emerging that have harnessed the potential of big data being applied to health care ?

There are several examples. Sophia Genetics has developed a platform that enables hospitals to better use data from genetic sequencing. The publicly listed company LifeWatch has come out with a technology solution used by medical staff to monitor a patient's heart rate remotely. And there are my two projects. The first, Healthbank, is a global health database open to all and owned by citizens. The second, YouBase, lets users exchange health information with one another and encrypts it using blockchain-inspired technology. Essentially, the main obstacle to developing big data solutions in medicine is that bits of data are stored in so many different areas. The information is out there, but it doesn't circulate enough yet. ▲



Michael Dillthyon
Co-founder
and CEO of YouBase

Dossier prepared by
Clément Bürge,
Ludovic Chappex,
Rinny Gremaud,
Armelle Vincent
and Julie Zaugg

DOSSIER

DISRUPTION: THE NEW RULES OF THE GAME

How can entire industries reach the brink of collapse by remaining so blind to the arrival of new competitors? The theory of disruption explains it, and might even predict the future.

BY RINNY GREMAUD

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“Master
disruptor”

So, is Uber really a “disruptive innovation”? Is Tesla really a “disrupter” in the automobile industry, as everyone says it is? In recent years, business schools and the financial press in France have been talking a lot about “disruption”, an Anglicism that’s been repeated so many times it has actually made its way into the French language. The term describes an innovation – often a technological one – with the potential to change the world. It evokes the radical nature of a paradigm shift and seems to herald impending doom for any industry that doesn’t stay on its toes.

But there’s good reason for all the buzz. A growing number of start-ups seem to have come out of nowhere in the past decade, upending entire industries. They have done so by focusing on design, user-friendliness and simplicity, and by intelligently using new internet developments – better mobility, speed and geo-location – to their advantage. They also cleverly circumvent “old world” regulations and, most importantly, develop business models that are ▶

more efficient, resilient and flexible. Uber, Airbnb, Netflix, Amazon and Tesla are all seen as disruptors. But that's not necessarily a fair assessment. Each of these companies has reshuffled the cards – to say the least – in their respective industry, often abruptly for the long-standing players in their field. So, generally speaking, you could call them disruptive.

But disruptive innovation is also a theory developed 20 years ago by Clayton Christensen, a professor at Harvard Business School, in his book *The Innovator's Dilemma* (see p. 29). His theory provides a more technical but less “sexy” definition of disruption. He clearly draws a line between

disruptive innovation and all other forms of innovation. Why? Because that distinction makes it easier to foresee the future.

But what exactly is a disruptive innovation? According to the definition, it's an innovation that allows a brand-new group of consumers to enjoy a product or service that used to be reserved for a small group of people – usually wealthier consumers or experts in a particular field. The most popular example is the PC, which made computers accessible to a much wider range of users. Prior to that, all computing was done on huge servers that took up entire rooms. Another example is personal photocopiers, which first targeted teachers, small associations and semi-professional customers with less stringent demands, before ultimately devouring Xerox's market share.

Disruptive companies often start out with lower profit margins, targeting a narrow group of customers by offering products or services that are less efficient and less expensive. They aren't seen as a threat by other players in the sector, because the customers they target are considered either not profitable or non-existent. That's why long-standing market players tend to look at newcomers condescendingly, while quietly – and logically, from an economic standpoint – continuing to improve the same old product.

Knut Haanaes, professor of strategy at IMD business school in Lausanne, says, “At the start, Christensen asked the following question: why are some companies able to take advantage of a technological breakthrough once, but can't duplicate their success when the technology changes again? And he concluded that the problem with well-established companies is that they listen to their customers! And when technology changes, customers are always more conservative at first.”

Clayton Christensen and his team have been working for 20 years to find empirical data to support his theory

But that's exactly why well-established companies are able to offer products and services that go beyond the actual needs of consumers – because they're constantly looking to do things better, and because their main priority is to satisfy their existing customers. Disrupters, on the other hand, position themselves in lower market segments or areas that don't generate as much revenue. They gradually improve their offer while maintaining an efficient cost structure, and eventually they are able to offer competitive products that are simpler, more affordable and more reliable. And that's when most consumers turn to them.

Kodak was one of the most innovative and profitable firms on the market for most of the 20th century. But the company filed for bankruptcy in 2012 following a massive change

THE 5 COMMANDMENTS OF DISRUPTIVE INNOVATION

- 1 **ACCESSIBLE**
New customers on the fringes of a market gain access to a product that was previously available only to an elite group.
- 2 **SIMPLER**
At first, the product is not as efficient as other products on the market.
- 3 **LEAN**
The company operates with low profit margins and low costs, and continues to pursue this strategy.
- 4 **MYOPIC COMPETITION**
Existing market players don't seem worried about the new product or service. They don't see it as a threat to their business.
- 5 **TECH ACCELERATION**
A revolutionary technological change suddenly makes the product highly attractive.



CLAYTON CHRISTENSEN: THE GURU

Statistically speaking, Clayton Christensen is one of the most influential management thinkers in recent decades. Every two years, Thinkers50 ranks the world's leading management gurus, and he topped the list in 2011 and 2013 – and was number two in 2015. *The Economist* called his first bestseller, *The Innovator's Dilemma*, one of the six most important books about business ever written. At over two metres tall, Christensen has been teaching business management at Harvard Business School since 1998. He teaches an elite group of students, most of whom are destined for top positions at companies such as McKinsey, Boston Consulting Group and Bain Capital. Many of the co-authors of his management books – all bestsellers – come from that network of students.

“Clay” – as his friends call him – enjoys interacting with others and discussing his faith. He is a Mormon. Like all male Mormons, he was trained since childhood in public speaking. When he was older, he spent two years in South Korea doing missionary work. Born in 1952 in Salt Lake City, he is the second-oldest of eight brothers. Now, he is married and has five children. He is an active member of the Church of Jesus Christ of Latter-day Saints, where he has taken on many roles, including bishop. He is a close friend of Mitt Romney and holds the Kim B. Clark chair at Harvard Business School – named in honour of the school's former dean, who was also a member of the LDS church.

in customer behaviour. Was Kodak completely oblivious to the changes occurring all around it? According to Scott Anthony in his case study for *Harvard Business Review*, the answer is “no”. The company created its first prototype of a digital camera in 1975, but tried to keep it a secret because it was worried it would eat away at its own business. The company later adapted to the digital reality, but always believed users would print their images. What Kodak really didn't see coming was Instagram.

“That's often the case with innovation,” says Knut Haanaes. “When you look at the market from the bottom, it's easy to see all the potential. But when you look at it from the top, it's harder to see the upside to certain investment opportunities.”

Clayton Christensen and his team

have been working for 20 years to find empirical data to support his theory. He wants to draw conclusions that can be used in corporate governance (see p. 28). That's why having a clear definition of what constitutes a disruptive innovation is so important.

A growing number of start-ups seem to have come out of nowhere in the past decade, upending entire industries

Let's take a closer look at the theory of disruption. Statistics show that when a new player enters a sector as a direct competitor offering a better product, existing players tend to respond quickly with an even better ▶

THE FACES OF DISRUPTION

Falling prices: a sign of disruption

The cost of some technologies has dropped spectacularly in recent years.

Drone (unit price)



\$100,000
2007

\$700
2013

3D printing (average price, similar features)



\$40,000
2007

\$100
2014

Industrial robots



\$550,000
2007

\$20,000
2014

DNA sequencing



\$2.7 bn
2000

\$1,000
2014

Production of 1 kWh of solar energy



\$30
1984

\$0.16
2014

3D lidar sensor



\$30,000
2009

\$80
2014

Smartphone (unit price, similar features)



\$499
2007

\$10
2015

The next wave

In the future, disruptive innovations will hinge on these new technologies.



Artificial
intelligence



Genomics



3D printing



Crypto-
currencies



Mobile
payments



Wearable
technology



Home
automation



Internet
of Things



Robotics



Drones



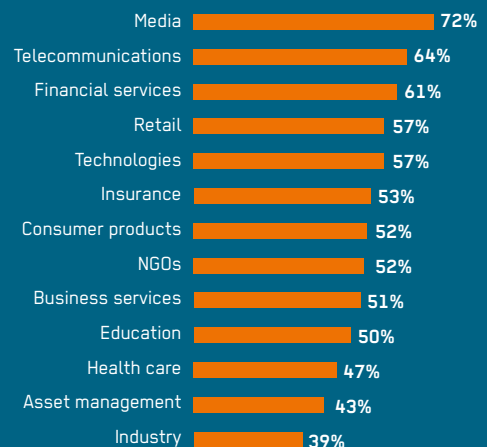
Electric and
smart vehicles



Virtual
reality

Predictions of company directors

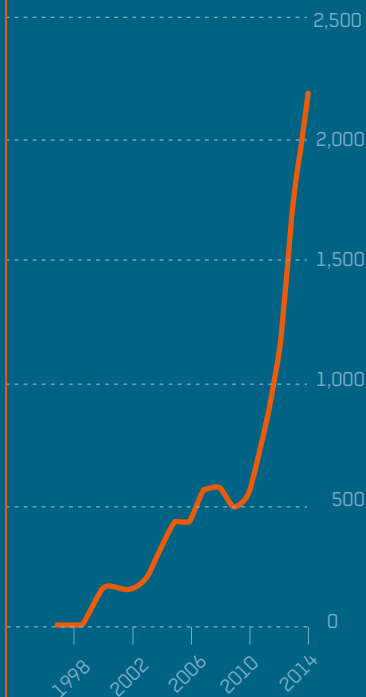
Sectors where management expects a disruption in the months ahead.



The growing power of a word

The terms “disruptive innovation” and “disruptive technology” are being used more and more, evidenced by the spectacular increase in their media presence in recent years.

Number of articles featuring the word “disruption”



Sources

Falling prices: a sign of disruption
Digital Transformation of Industries,
WEF White Paper (January 2016).

The next wave
Deloitte Digital (2015).

Predictions of company directors
Digital Pulse (2015)
Russell Reynolds Associates.

The growing power of a word
Factiva analysis of a wide variety
of English publications.
HBR.org

offer. Sometimes an existing player will even buy out a new player. But when established companies face disruptive innovation, the outcome is almost always disastrous.

Of course, it's always a bit more complicated than that. As for the question of whether the offers of Uber, Airbnb and Tesla constitute disruptive innovations in the strictest sense of the term, the answer is: it depends on your point of view. Scott Anthony, a close friend of Christensen, believes that by offering a service that's better than what's already out there, Uber has thrown taxi services worldwide under the bus. But although the platform quickly established itself on a very decentralised market, it can now expect taxi companies to quickly come up with a competitive offer in return. Airbnb, on the other hand, may be considered a true disruptive innovation. When the company first launched, no one in the hotel sector saw it as a real competitor. Even now, hotels have yet to come up with a response. “The good news is that Airbnb has not only revolutionised short-term housing, it has expanded the market in a big way,” says Knut Haanaes. “The bad news for existing hotels is that they can't tap into this new market.”

Tesla is a firm run by a man who is the epitome of disruption. But Harvard Business School wouldn't call it a disruptive company. And for good reason: Elon Musk's company entered the automobile market from the top, making electric vehicles that sell for over \$100,000. For now, Tesla has positioned itself in a niche market where it offers a better product – a niche also targeted by long-standing carmakers. So, it looks like Tesla is more engaged in continuous innovation.

If the theory of disruption is any guide, there's a good chance Tesla will face some tough competition when it tries to break into the

automobile market. And it should happen by 2017 at the latest, because that's when Elon Musk plans to launch his more affordable model (35,000 Swiss francs).

In *Harvard Business Review*, Tom Bartman – who works with Christensen – said that even if Tesla does eventually convert drivers to electric vehicles, existing carmakers could deliver a devastating counterblow. With a tried and tested distribution network and the ability to mass-produce, long-standing players could easily overtake Tesla on the electric market as Tesla doesn't have any competitive advantage in terms of cost, price or business model.

When established companies face disruptive innovation, the outcome is almost always disastrous

The counterargument, of course, is that the iPhone also entered the mobile phone market from the top, facing cut-throat competition to win over existing Apple customers, and that didn't stop it from becoming a huge success. After all, nobody talks about Nokia, Ericsson or Blackberry anymore.

According to Christensen, the explanation is simple. The iPhone did not disrupt the mobile phone market. It disrupted the laptop computer market by becoming the go-to device for accessing the internet. And Apple did that by offering more than just a technological improvement. The iPhone rose to dominance through a new business model, with a platform bringing together app developers and users.

These theoretical fundamentals make you wonder about hugely >

The golf cart – inexpensive, electric, practical and easy to park. Could it be the disruptive vehicle of choice for developing countries? That's the startling idea of Tom Bartman, disruption theorist and Christensen's collaborator.

The Virginia State Police seems to have already caught on.



successful products and services that have popped up recently. Contrary to popular belief, disruption often owes less to the underlying technology than to the creation of new business models. Airbnb and Amazon have been able to outdo

existing offers thanks in large part to a network effect that has helped them reach critical mass. These services appeal to users because they bring together a large volume of previously unexploited products or services.

But start-ups aren't the only ones who engage in disruptive innovation. By creating the right internal conditions for developing a new idea in addition to their existing business, the big names in an industry can also break into a related market or target a previously non-existent group of consumers. "Nespresso is a prime example," says Knut Haanaes. "Nestlé could've easily continued to ride on the wave of its position in the instant-coffee market. But the company wanted to go further and developed a product and business model that created a completely new market."

It's important to remember that disruptive innovation isn't synonymous with revolutionary technology. But given the pace at which mobile internet, social media and digitalisation have already transformed the world, companies still trying to adapt to current technologies are already worried about missing out on the next ones. They are closely following cutting-edge scientific labs and thinking about how they

THE FRENCH DO IT BETTER

Did you know that "disruption" is a registered trademark? Did you know that it's owned by a Frenchman? Jean-Marie Dru, chief executive of the US advertising agency TBWA, trademarked it in 1992 in 36 countries, including the European Union, the United States, Russia, India and Japan. That's where he got the name for his company's *modus operandi*. The TBWA website says it best: "Disruption® defines a vision that breaks market conventions and creates a new platform for growth."

After graduating from HEC Paris, Jean-Marie Dru entered the world of advertising in 1971. He is a model ambassador for his native France. That's probably

why the French government uses his definition when talking about disruption – the definition of the registered trademark. On its online portal (www.economie.gouv.fr), the French Ministry for the Economy and Finance dedicates an entire page to innovation-related terms: fab lab, MOOC, blockchain...and disruption. We learn that disruption is a "method making it easier to challenge the conventions that stifle creativity in business" and that it "helps companies come up with new ideas leading to big innovations." But most importantly, we learn that this definition is credited to Jean-Marie Dru, the "inventor of disruption". In other words, we owe a lot to him.



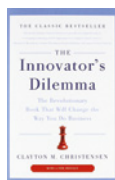
can use new technology to their advantage, from artificial intelligence, genomics and the Internet of Things, to blockchain technology, big data, virtual reality and the next generation of lithium battery.

Disruptive innovation isn't synonymous with revolutionary technology

If Tesla isn't the disrupter of the automobile market, then who is? Tom Bartman says it could be the golf cart. The simple, low-cost electric vehicle is inexpensive to operate, practical for city driving and easy to park. In developing countries, golf carts could be to individual mobility what PCs were to computing. And maybe someday, drivers in industrialised countries will realise that they can get by just fine using cheaper eco-friendly vehicles with fewer features. So will we all be driving Teslas someday? Or golf carts? ▲

FINE-TUNING THE THEORY OF DISRUPTIVE INNOVATION

1997



The theory of disruption starts with a question: what are the mechanisms that allow tiny start-ups to bring industry giants to their knees?

THE INNOVATOR'S DILEMMA. *When New Technologies Cause Great Firms to Fail.* Clayton Christensen (Harvard Business School Press, 1997)

2003



Accused of being too descriptive, the theory of disruption tries to offer solutions: what can established companies do to keep innovating alongside their main business?

THE INNOVATOR'S SOLUTION. *Creating and Sustaining Successful Growth.* Clayton Christensen, Michael Raynor (Harvard Business School Press, 2003)

2004



What if the theory of disruption could help us foresee the future? The Harvard Business School team comes up with a decision-making model to identify the tipping point of a sector facing a technological innovation and assess different scenarios in a competitive environment.

SEEING WHAT'S NEXT. *Using the Theories of Innovation to Predict Industry Change.* Clayton Christensen, Scott Anthony, Erik Roth (Harvard Business School Press, 2004)

2008



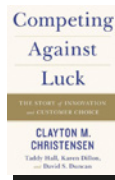
Clayton Christensen identifies two sectors in the United States that are distressed and ready to be "disrupted" by the spread of new technologies: university education and health care. Though his predictions turned out to be wrong, he later said that he had underestimated the weight of the regulations affecting both sectors.

DISRUPTING CLASS. *How Disruptive Innovation Will Change the Way the World Learns.* Clayton Christensen, Michael Horn, Curtis Johnson (McGraw-Hill, 2008)



THE INNOVATOR'S PRESCRIPTION. *A Disruptive Solution for Health Care.* Clayton Christensen, Jerome Grossman, Jason Hwang (McGraw-Hill, 2008)

2016



After publishing a self-help book in 2012 (*How Will You Measure Your Life?*), Christensen returns to innovation theory. In a book released in October, he explains why you don't need to understand your customers to come up with a new product or service.

COMPETING AGAINST LUCK. *The Story of Innovation and Customer Choice.* Clayton Christensen, Taddy Hall, Karen Dillon, David Duncan (Harper Business, 2016)

"The theory of disruption is a powerful management tool"

Business expert Michael Raynor has written a number of bestsellers on innovation. His work is based on the meticulous analysis of massive amounts of data.

BY RINNY GREMAUD

It's all about precision. Words. Context. Research. Michael Raynor believes in the power of applying scientific methods to business management. His theories contend that disruptive innovations and success are not just a shot in the dark. There are rules. And those rules can be found by carefully studying the history of companies. Interview.

How good is disruption theory at accurately predicting a company's future success?

Predictive accuracy is always very relative. There's even a margin of error in experimental physics. After examining this point in *The Innovator's Manifesto* (Crown Business, 2011), all I can say is that disruption theory (see inset p. 28), if applied correctly, improves prediction accuracy by 50%. That's why we believe it's a powerful management tool. It can really be

used to ground a strategic vision on some very concrete factors. As long as the basic tenets of the theory are applied correctly.

Hence the importance of distinguishing disruptive innovation from any other form of innovation...

Exactly! For the theory to retain its usefulness, we have to stick to a strictly technical, precise definition of disruptive innovation. The looser the definition, the less applicable the theory is. Basically, the theory's worst enemies are those who embrace it with the most enthusiasm. For example, saying that all companies that have recently experienced runaway success have done so by applying a disruptive strategy. That's totally untrue. It's as if, after seeing that vitamin C cures scurvy, we started prescribing vitamin C for any illness.

Interestingly, you say that Uber is not an example of disruptive innovation. Why not?

Uber is definitely an innovative company. Its business model and the service it offers have forever transformed the taxi business. In that respect, I have no problem saying that Uber "disrupted" its sector. But I insist on distinguishing between "disruption" and "disruptive innovation". That second notion is defined by the fact that it focuses on customers at the low end of the market. However, Uber generally offers an improved experience but primarily addresses existing taxi users.

What conclusions can we make about its future?

Nothing in particular! Disruption theory doesn't say anything about companies that don't follow this course. It only describes the potential trajectory of companies that come

into the market through the bottom, gaining a foothold in a segment ignored by long-standing incumbents. But there are countless ways to achieve success. Uber has shown us that. And so has Tesla. I don't religiously believe in disruptive innovation as the only way to innovate. It's one of many ways.

What would be a good example to illustrate disruption theory?

There are lots of them, but I'll take one that everyone knows: Netflix. We tend to forget, but Netflix started out by offering DVD rental by mail. Instead of going to the local video rental store and leaving with a film they could watch immediately, customers ordered on Netflix and received their DVDs four days later, and for a lower price. That mix struck a balance between convenience and price, addressing a niche market of film buffs. Meanwhile, Netflix saw the vast potential of streaming video as it began to emerge. By the time the technology fully caught up, the company had already built a strong business base and was able to break into the mainstream market as soon as it was ripe.

Is disruptive innovation more the result of the business model or technological innovation?

In my opinion, both. Using empirical data, we've found out that the success of disruptive innovation relies on a different business model, but also on the development of technology that accelerates its growth.

In your view, are there industries more likely than others to see disruptive innovation in the near future?

No. However, I've noticed that some powerful technologies are developing fast and are on the verge of finding

very concrete applications. By that, I mean cloud computing, the Internet of Things, artificial intelligence and blockchain technology. Any industry where these technologies could be applied is likely to be impacted. Which basically means all of them.

How do you explain why the word disruption is being tossed around so much?

I'm not a sociologist, but since you're asking, I'd say that it's a sign of the times. Disruption can be broadly defined as a process in which an orderly world is suddenly thrown into chaos. Just like the notion of "creative destruction", disruption contains an element of drama and powerful emotion. That might be why it's had so much success. ▲



THE DISRUPTIVE DATA ANALYST

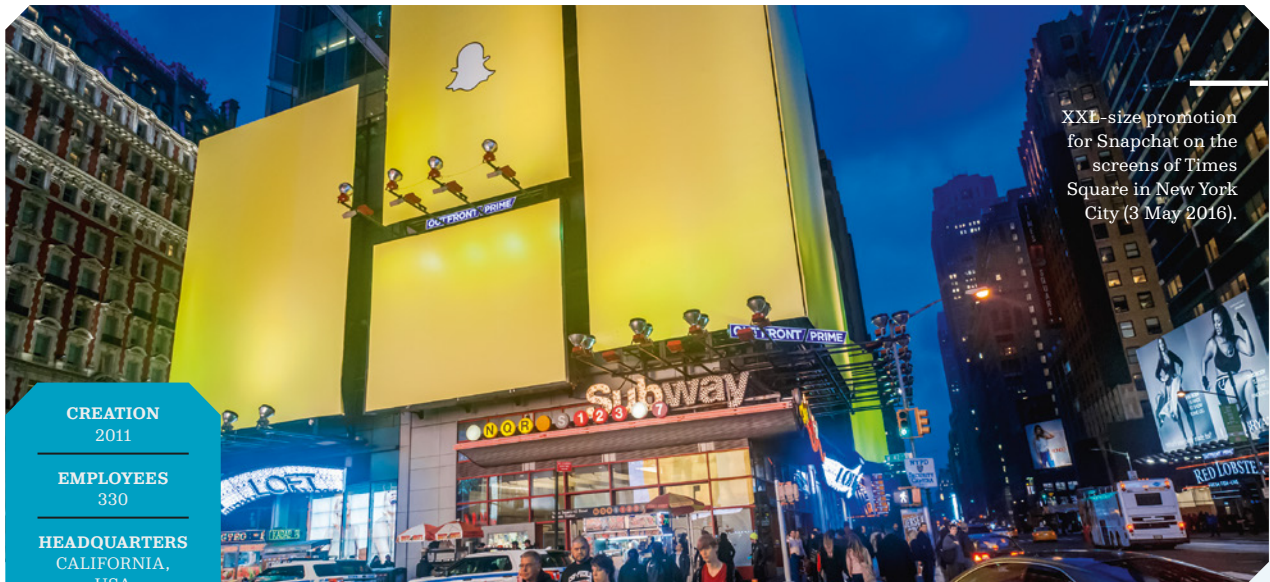
Michael Raynor is a managing director at Deloitte and the author of several books on innovation. His first book, *The Innovator's Solution*, co-written with Clayton Christensen, was published in 2003 and remains one of the world's bestselling books on business management. In *The Innovator's Manifesto*, published in 2011, he attempts to show the predictive accuracy of disruption theory using an expansive statistics-driven approach. His latest book, *The Three Rules: How Exceptional Companies Think* (2013), also draws on objective data to unlock the secrets to a company's success. Born in Brantford, Ontario in 1967, Michael Raynor earned his undergraduate degree in philosophy from Harvard University and went on to complete his MBA and DBA (Doctorate in Business Administration) at Harvard Business School.

25 COMPANIES THAT ARE CHANGING THE WORLD

A vaccination against Alzheimer's, artificial veins, a flying car and subscription razor blades. The companies featured in this article are changing the face of the world. Here's a selection.

BY CLÉMENT BÜRGE

THE CHALLENGERS



XXL-size promotion for Snapchat on the screens of Times Square in New York City (3 May 2016).

RICHARD B. LEVINE / NEWS.COM

CREATION
2011

EMPLOYEES
330

HEADQUARTERS
CALIFORNIA,
USA

REVENUE
\$59 MILLION

STOCK
LISTING IN
MARCH 2017

SNAP INC.

THE NEW SOCIAL NETWORK

Snapchat has created an app that will give Twitter and Facebook a run for their money.

When they created Snapchat, Snap Inc. managed to turn social networks, one of the most innovative industries of the modern age, on their heads. The success of the app was initially based on one rather short-lived feature: Snapchat enabled users to send messages and photos that deleted themselves once they had been seen. Nowadays, the app boasts numerous functions and has

transformed itself into a multimedia storytelling tool that lets users share their news via videos enhanced with special effects. Teenagers and young adults have fallen head over heels for it and are renouncing Facebook and Twitter. The company has started to monetise its platform, with great success. By supporting ads, Snap Inc. looks set to generate revenue of \$250-\$350 million in 2016,

and \$500 million to \$1 billion in 2017. According to the US press, Snap Inc. intends to float on the stock market in March 2017, with a valuation of \$25 billion. "Advertisers love the fact that Snapchat has attracted a certain sector of the population that isn't receptive to traditional forms of advertising. This is Snapchat's added value," explains Richard Kramer, analyst at Arete Research.



MINDMAZE

VIRTUAL REALITY AND MEDICINE

A Lausanne-based start-up that is treating stroke patients by using a virtual reality headset.

Mindmaze is a Swiss jewel. The EPFL spin-off has developed a virtual reality headset that helps treat stroke patients. Using a scanner to measure brain activity, the headset allows patients to perform rehab exercises in the comfort of their own homes or at the hospital. This technology has even been used to treat former US soldiers. The headset is only sold to hospitals and has a price tag of \$80,000. In February 2016, Mindmaze

raised \$100 million, which gives it a valuation of \$1 billion and makes it a “unicorn”. The start-up will use this money to reduce the price of its product and make it accessible to all.

CREATION
2011

EMPLOYEES
70

HEADQUARTERS
LAUSANNE,
SWITZERLAND

REVENUE
UNKNOWN

STOCK
NOT LISTED

CREATION
2009

EMPLOYEES
430

HEADQUARTERS
CALIFORNIA,
USA

REVENUE
\$64 MILLION

STOCK
NOT LISTED

SLACK TECHNOLOGIES

MAKING EMAIL OBSOLETE

This start-up wants to facilitate communication in the workplace.

Slack has created a new way of communicating online. The start-up has built a discussion platform that fuses chat, SMS and email and facilitates communication in the workplace. Each member of a team can look at discussions in progress and consult past conversations, which are automatically archived. These simple but effective functionalities have made it one of the most downloaded professional apps on the planet, with 2.7 million active users every day, including Samsung, Spotify and eBay employees. Slack raised \$200 million in April 2016 and is valued at \$3.8 billion. The company will use this money to expand its sales teams and convince more multinationals to use its platform.



Demonstration by Nicolas Bourdaud, an engineer at Mindmaze, during the Game Developers Conference in San Francisco (3 March 2015).

CREATION
2003

EMPLOYEES
55

HEADQUARTERS
LAUSANNE,
SWITZERLAND

REVENUE
CHF 39 MILLION

STOCK
ACIU

Research being done in the labs of AC Immune, in Lausanne.

AC IMMUNE

A VACCINE FOR ALZHEIMER'S

This start-up is developing treatments for neurodegenerative diseases.

AC Immune develops revolutionary treatments for neurodegenerative diseases. The company, based in Lausanne, has also recently launched a clinical trial for a new Alzheimer's treatment. AC Immune has developed a technique that uses antibodies to wipe out damaged brain cells, which are the cause of the disease. The company has also developed a vaccine for Alzheimer's which is already in the test phase. By 2035, approximately 70 million people will be affected by the disease – which makes this a very lucrative market. AC Immune has just raised 56.5 million Swiss francs on the Nasdaq, which it will use to step up product development and research into Parkinson's disease. For Credit Suisse, investing in AC Immune is high-risk but could produce equally high gains. Analysts recommend purchasing shares in this company, which is still largely unknown to the general public.

DOLLAR SHAVE CLUB

THE ALL-NEW RAZOR

This Californian start-up is transforming the highly lucrative men's razor industry.

The Dollar Shave Club business model has shaken up the men's razor industry. The concept is simple: send one razor every month to its customers, who pay a monthly subscription of between \$3 and \$12. This is essentially a simple idea that meets a real need. Men hate having to go shopping to buy the same product month in, month out. Dollar Shave Club didn't even need to invest in heavy infrastructure – it simply created an internet site and sourced a South Korean manufacturer. But what really made this strategy work was a hilarious online publicity campaign that seems to have captured the interest of internet users – one of the videos published in 2012 has been viewed nearly 24 million times. Its service is so revolutionary that Unilever decided to buy out the firm in July 2016 for \$1 billion. "Unilever has taken over a brand that connects with young men and which offers the multinational giant a strong online presence," says Sucharita Mulpuru, a specialist in the sector at Shoptalk. "They are planning to substantially develop their product line. Dollar Shave Club will most likely become a cornerstone of their portfolio."

CREATION
2011

EMPLOYEES
190

HEADQUARTERS
CALIFORNIA,
USA

REVENUE
\$152 MILLION

STOCK
UN

WARBY PARKER

CHEAP GLASSES

This company is breaking up the monopoly that has gripped the market for prescription glasses.

Warby Parker sells high quality glasses for 95 Swiss francs a pair. This is making a mockery of Luxottica and Safilo, the two brands that dominate the prescription glasses market worldwide and sell their products for anywhere between 500 and 1,000 Swiss francs a pair. What is Warby Parker's secret? The firm has internalised the entire production and distribution process for its glasses, by using its own designs and buying its own materials before selling the finished products on-line. Warby Parker has started setting up high street shops, which serve as showrooms, and plans to open 50 or so stores by the start of 2017.

CREATION
2009

EMPLOYEES
500

HEADQUARTERS
NEW YORK,
USA

REVENUE
\$100 MILLION

STOCK
NOT LISTED

A Warby Parker shop on Lafayette Street in New York City.



TransferWise's founders Kristo Käärmann and Taavet Hinrikus.

ANNA AMBROS / KEYSTONE

CREATION
2011

EMPLOYEES
600

HEADQUARTERS
LONDON,
UK

REVENUE
£28 MILLION

STOCK
NOT LISTED

TRANSFERWISE

BYPASSING THE BANKS

The London-based start-up has created an international money transfer system that enables users to avoid paying bank charges.

Created by a former employee of Skype, TransferWise has developed an ingenious system which enables users to make international money transfers whilst limiting the traditional fees associated with this kind of transaction. For instance, when a European resident wants to send the USD equivalent of €1,000 to a relative in the US, the start-up seeks out

a US resident who is looking to transfer an equal sum to Europe. This service entails fees of between 0.7% and 1.5% of the amount transferred, versus the 3 to 6% imposed by the banks. Valued at \$1.1 billion, TransferWise has performed transfers worth \$4.5 billion since its launch. The firm is now concentrating on developing a corporate service.



A presentation by Computer Science Professor, Sebastian Thrun, for Udacity for Udacity during TechCrunch Disrupt in San Francisco (2013).

J.D. LASICA

CREATION
2011

EMPLOYEES
240

HEADQUARTERS
CALIFORNIA,
USA

REVENUE
\$24 MILLION
(EST.)

STOCK
NOT LISTED

UDACITY

NO NEED TO GO TO UNIVERSITY

Udacity has revolutionised continuing professional development with practical MOOCs.

Udacity is transforming continuing professional development (CPD). The firm has launched a series of MOOCs (massive open online courses) with practical applications for professionals in the digital sector. You can now take classes in machine learning, app development or big data analysis. Thanks to this focus on technical skills, 60% of students registered complete their online course. This is in contrast to traditional, academic MOOCs where the figure stands at just 2%. The firm makes money by charging \$200 per month to obtain these “nanodegrees” within six to ten months – and the student is reimbursed 50% of the fees if they obtain the qualification. Udacity is currently working on creating new courses, including virtual reality developer and self-driving car engineer courses.

CORNERJOB

A JOB AT THE END OF AN APP

This start-up has developed an app that simplifies the recruitment process.

CornerJob has invented the simplest solution possible for finding a job. The company has created a platform that enables job hunters to find vacancies via an app, contact the employer and receive a reply within 24 hours telling them if they have got the job. And it is just as easy for the employers, who are based mainly in the hospital-ity and restaurant industry. All they have to do is publish job ads, using a maximum of 140 characters. The app has a total of 650,000 downloads per month. CornerJob raised €22 million in July 2016 and intends to use these funds to promote its platform,

which is available in 10 countries including France, Spain and Mexico.

CREATION
2015

EMPLOYEES
100

HEADQUARTERS
BARCELONA,
SPAIN

REVENUE
NOT PUBLISHED

STOCK
NOT LISTED

THE GIANTS

CREATION
1999

EMPLOYEES
19,000

HEADQUARTERS
CALIFORNIA,
USA

REVENUE
\$6.7 BILLION

STOCK
CRM

SALESFORCE.COM

THE LEADER IN ARTIFICIAL INTELLIGENCE

The cloud-computing leader has launched Einstein, a new artificial intelligence platform.

Salesforce.com was the first company to offer cloud-computing services. Since then, it has strived to get ahead, technologically speaking, of the competition. In 2017, Salesforce.com will work on deploying and perfecting Einstein, its artificial intelligence program. This tool should make artificial intelligence more acces-

sible and enable all of Salesforce.com's clients to use AI functionalities. Einstein can help users design more efficient marketing campaigns, among other things. The program will be able to recommend a specific product to a client based on a set of historical data. "This new offer will ensure that Salesforce.com stands out from the competition," explains Bhavan Suri, an analyst at William Blair. "We recommend buying into this company."

ACTELION

DISRUPTING THE PHARMACEUTICAL SECTOR

Actelion is the first company to have developed treatments for rare diseases.

Actelion, based in Basel (Switzerland), has revolutionised the pharmaceutical world. At the start of the Noughties, it was the first company to develop treatments for rare diseases, which large pharmaceutical companies wouldn't touch with a barge pole due to the lack of profitability. Among other products, Actelion has brought to market Tracleer, the first oral treatment for pulmonary arterial hypertension (PAH), and Zavesca, the only oral treatment that exists for patients suffering from a metabolic disorder called Gaucher disease. The company will soon release Ponesimod, a treatment for MS. Actelion currently devotes 20% of its revenue to research. Analysts remain divided on whether to buy shares in the company as the share price currently appears to be overvalued.

+

The Basel-based firm dedicates 20% of its revenue to research.

CREATION
1997

EMPLOYEES
2,560

HEADQUARTERS
ALLSCHWIL,
SWITZERLAND

REVENUE
CHF 2 BILLION

STOCK
ATLN



ACTELION

ROCKET INTERNET

CLONING THE REVOLUTION

The company that aggressively copies the best start-ups on the planet.

Rocket Internet has developed an extraordinary business model: the firm copies the most revolutionary start-ups of the day and exports the concept elsewhere. Rocket Internet has created Easy Taxi, a Brazilian Uber, Zalando, a German Zappos and Linio, a Mexican Amazon. The German-based company has launched 100 different start-ups that are operational in more than 110 countries since it was founded. But this highly aggressive strategy needs significant amounts of capital. In 2015, Rocket Internet invested \$1.5 billion in various entities but its revenue only amounted to €530 million. “In 2017, we expect Rocket Internet to concentrate on consolidating its balance sheet and sell certain start-ups,” says David Reynolds, an analyst at Jefferies. Most analysts recommend buying shares in this company, which should benefit from a repositioning.

CREATION
2007

EMPLOYEES
36'000

HEADQUARTERS
BERLIN,
GERMANY

REVENUE
\$128 MILLION

STOCK
RKET

Alphabet's Loon project consists of releasing a network of hot-air balloons into the stratosphere and using them as internet relays.



GOOGLE

CREATION
1998

EMPLOYEES
66,575

HEADQUARTERS
CALIFORNIA,
USA

REVENUE
\$75 BILLION

STOCK
GOOG

ALPHABET

REACHING FOR THE STARS

In addition to its work on the internet, Alphabet, a.k.a. Google, is trying to “tackle” ageing and create robot soldiers.

Alphabet, the company that owns Google, has been investing in a series of extravagant projects that could just change the face of the world. The most interesting of these is called Calico, a company that is looking to “treat ageing”. The company has received financing of \$1.5 billion to develop drugs and other treatments to slow down cellular ageing. Alphabet is also working on hot-air balloons that will provide Wi-Fi to the most remote areas on the planet, all-terrain robots that can be used as soldiers by the army, and even contact lenses that can measure a patient's blood-sugar levels. Analysts highly recommend buying shares in the company as it can take advantage of using Google to launch new forms of online publicity.

CREATION
2004

EMPLOYEES
1,800

HEADQUARTERS
CALIFORNIA,
USA

REVENUE
\$1.5 BILLION

STOCK
NOT LISTED

PALANTIR TECHNOLOGIES

TRACKING TERRORISTS ON THE WEB

This company specialises in applying big data to the security sector.

Palantir Technologies works primarily for US government agencies, including the CIA and FBI. Thanks to its Gotham and Metropolis software, the company uses big data to detect terrorist threats or security flaws. How does it work? By detecting suspicious movements of money or tracking the flow of people. Palantir Technologies operates on a highly lucrative market, where services often cost several million dollars per month. Due to the nature of its work, the firm is reputed to be one of the most secretive in Silicon Valley. So much so, that it announced that floating on the stock exchange "was not compatible with its business activities." Analysts estimate Palantir Technologies to be worth \$20 billion.

TESLA

THE KING OF BATTERIES

The batteries made by Elon Musk can be used for other things – not just for powering cars.

Tesla is well known for its luxury electric cars, but they are only accessible to a small number of wealthy clients. "Tesla's real innovation is making batteries," says Stephen Shapiro, a US expert in innovation. These batteries can not only power cars, but homes and offices, too. Elon Musk's ultimate goal is to enable people to store the energy generated by solar panels and then sell it back to the grid.

"2017 will be dedicated to integrating SolarCity, the solar panel manufacturer that Tesla has been trying to take over for several months. This will mean that Elon Musk can accomplish its vision," explains Colin Rusch, an analyst at Oppenheimer.

CREATION
2003

EMPLOYEES
14,000

HEADQUARTERS
CALIFORNIA,
USA

REVENUE
\$4 BILLION

STOCK
TSLA

A presentation by Elon Musk of the Powerpack battery, intended to revolutionise the storage of energy by both individuals and businesses (Hawthorne, California, 30 April 2015).



The website of Supercell, the Finnish developer of Clash of Clans, one of the most popular video games for smartphones. The company was acquired by Tencent in June of this year.



TENCENT

CONQUERING THE CHINESE INTERNET

The company's WeChat app brings together all the best online functionalities.

Tencent created WeChat, an app used by 806 million people every month. What makes it different? WeChat started out as a simple messaging app and now gives users access to everything that the internet has to offer: you can order a taxi, send videos, use it to pay in a shop, look at a restaurant menu, book a home hairdresser or even send money to your friends. WeChat brings together all the functionalities offered by Google, Facebook, WhatsApp, eBay and Tinder. Behind the scenes, Tencent uses and sells all the information that it collects

about its users, which constitutes a more comprehensive database than those of its US competitors. The Shenzhen-based company also owns Weibo, the Chinese version of Twitter, and another popular messaging service called QQ. The company has also just acquired Supercell, the mobile game developer, for \$8.6 billion. With capitalisation of \$255 billion, this tech giant is the largest in Asia. And according to Douglas Morton, an analyst at Northern Trust Capital Markets, its growth is far from over. "Tencent could become the largest company in the world," he says. Analysts unanimously recommend taking a stake in this company.

CREATION
1998

EMPLOYEES
30,000

HEADQUARTERS
SHENZHEN,
CHINA

REVENUE
\$15.9 BILLION

STOCK
TCEHY



Enzyme fermentation at the Novozymes plant in Bagsværd, Denmark.

CREATION
2000

EMPLOYEES
6,485

HEADQUARTERS
BAGSVÆRD,
DENMARK

REVENUE
DKK 14 BILLION
(APPROX. CHF 2 BILLION)

STOCK
NZYMB

NOVOZYMES

MAGIC ENZYMES

The Danish company has developed microorganisms which improve corporate efficiency.

Novozymes is turning to microorganisms and enzymes to make manufacturing various products more efficient. Using enzymes in food production is quite common: for example, we use yeast to make bread and enzymes for alcohol and cheese. Novozymes takes this idea one step further by using genetically modified microorganisms. This has resulted in the company improving the efficiency of various manufacturing processes. For example, Novozymes has managed to reduce the washing temperature used by dry cleaning companies from 60 to 30 degrees, reduce the amount of water needed to produce ethanol by 50% and increase corn production by 3%. "The company's share price is, sadly, too high at the moment," says Michael Friis Jorgensen, an analyst at Alm Brand Markets. "New R&D projects should arrive on the market in the next few years and the share price should then become much more interesting again."

CREATION
1999

EMPLOYEES
36,446

HEADQUARTERS
HANGZHOU,
CHINA

REVENUE
\$15.69 BILLION

STOCK
BABA

ALIBABA

REVOLUTIONISING E-COMMERCE

The Chinese platform that connects local users with Western-based resellers.

With the visionary Jack Ma at the head of the company, Alibaba hasn't just transformed the Chinese internet, it has revolutionised the way companies around

the globe do business. Alibaba uses a unique business model: an e-commerce platform which puts Chinese companies in touch with Western firms who are looking for reasonably-priced products to complete their inventory or individual items that can be used to make a larger product. And the way the company makes money is ingenious. "Alibaba doesn't have an inventory of its own – it acts solely as an intermediary," explains Ryan Roberts, an analyst at MCM Partners. "The company doesn't finance itself on commissions but through advertising. Its business model is very different from Amazon, which sells its own products and earns money from each sale." Ant Financial, its financing arm, should float on the stock market in 2017. Estimated to be worth \$60 billion, the company is about to launch a new form of online payment based on virtual reality, with integrated user facial recognition for making payments. "In the short term, Alibaba will benefit from an increase in profits in the cloud-computing and entertainment sectors," says Scott Devitt, an analyst at Stifel, who recommends buying shares in the company.

FOXCONN

THE ROBOTS THAT MAKE ANYTHING AND EVERYTHING

The Taiwan-based giant has transformed the way factories operate.

Foxconn has revolutionised the way electronics are manufactured. The Taiwanese firm is in the process of replacing human workers with industrial robots on a large scale. Foxconn assembles 40% of the world's electronic products, notably for Apple and Sony. These new Foxbots are capable of performing 20 different tasks and their ability to imitate human hand-eye coordination is constantly improving. They can also be reprogrammed quickly to meet ever shorter production cycles. The company has just bought out Sharp, an LED screen manufacturer, for \$3.5 billion. "This

will put them in a better negotiating position with Apple, who buys these screens," says Arthur Liao, an analyst at Fubon Bank.

CREATION
1974

EMPLOYEES
1,300,000

HEADQUARTERS
TAIPEI,
TAIWAN

REVENUE
\$136.4 BILLION

STOCK
2,354

Pepper, a robotic assistant made by Foxconn, lends itself to a wide range of applications, including at this forum on dementia organised by the OECD (1 June 2016).

CRAZY GAMBLER

IMPOSSIBLE FOODS

THE MEAT WITHOUT ANY MEAT

This Californian start-up has created meat from plant-based ingredients.

CREATION
2011

EMPLOYEES
130

HEADQUARTERS
CALIFORNIA,
USA

REVENUE
NOT PUBLISHED

STOCK
NOT LISTED

Impossible Foods is trying to achieve...the impossible. The start-up is aiming at recreating meat using plants. And the result is incredible! Its first burger truly looks like meat: red and bloody when it's cooking and brown-grey

and firm once it is cooked. And it tastes extremely like meat. The burger is made from wheat protein, potato protein, coconut oil and heme – a sort of natural flavouring – that gives the burger a reddish colour before it is cooked. Currently only a handful of prestigious restaurants serve this famous hamburger but it will soon be available in shops and a larger number of restaurants. The company also plans on creating new types of meat. This product is so revolutionary that Google tried to take over the company, to no avail.

An employee of Impossible Foods going through preparations at the company headquarters (Redwood, California, 6 October 2016).



CREATION
2004

EMPLOYEES
55

HEADQUARTERS
NORTH CAROLINA,
USA

REVENUE
NOT PUBLISHED

STOCK
NOT LISTED

HUMACYTE

RE-GROWING ORGANS

The start-up has just developed the first blood vessels to be grown in a laboratory.

Humacyte is the first bio-medical start-up to have successfully grown biogenetic blood vessels. Using patients' cells,

the start-up recreated veins that can replace an artery or any other blood vessel. This will mean that coronary bypass is no longer necessary for cardiovascular problems. The company has already received investments worth \$200 million, including \$63 million from Brady Dougan, former CEO of Credit Suisse. Humacyte is planning to implant the first of these veins in 2019.



AMAZENTIS

A MOLECULE TO FIGHT AGEING

This Swiss company has uncovered an element found in pomegranate which helps increase life expectancy.

The Lausanne-based start-up Amazentis has discovered the amazing power of a natural chemical found in pomegranate that is converted by gut flora into urolithin A, a molecule that fights muscle ageing. Researchers from the Swiss Federal Institute of Technology in Lausanne (EPFL) extended the lifespan of worms by 45% and boosted the running endurance of two-year old mice – the equivalent of age 80 in humans. The findings from the study were published in Nature Medicine. Amazentis plans to develop a new generation of food supplements and nutritional products.

CREATION
2007

EMPLOYEES
NOT PUBLISHED

HEADQUARTERS
LAUSANNE,
SWITZERLAND

REVENUE
NOT PUBLISHED

STOCK
NOT LISTED

The Amazentis study was conducted in partnership with three laboratories at EPFL, including the team led by Professor Johan Auwerx, a scientist renowned for his work on mitochondria and their role in metabolism.



Is it a plane? A car? It's both! This two-seated "superhero"-type vehicle can spread its wings and fly. Now all it needs is a business opportunity...

AEROMOBIL

THE FLYING CAR

AeroMobil has made the first ever flying car and is planning to make it a normal means of transport.

AeroMobil has created the car of the future. Its two-seater, 6-m long, blue and white model doesn't just stick to the road. Once it has 200 m of clear road in front of it, it can spread its wings and fly at 200 km/h. The flying car can cover 700 km in the air, the equivalent of a trip from Lausanne to Copenhagen. AeroMobil's slightly crazy aim is to transform

the small plane and luxury car market. The vehicle will probably cost "several hundred thousand euros," according to Juraj Vaculík, CEO of the Bratislava-based company. The start-up, which has former VW, Mercedes, Saab and Airbus staff on its payroll, will start accepting orders in 2017 with the first cars to be delivered in 2018. And the company's goal isn't simply to create a luxury item. "We would like to develop a hire facility so that people can use these vehicles regularly," confirms Juraj Vaculík.

CREATION
2010

EMPLOYEES
54

HEADQUARTERS
BRATISLAVA,
SLOVAKIA

REVENUE
NOT PUBLISHED

STOCK
NOT LISTED



CRISPR THERAPEUTICS

GENETIC MODIFICATION

This start-up based in Basel is developing CRISPR technology, a genetic pair of scissors that allows genetic mutations to be corrected.

CRISPR Therapeutics is developing CRISPR technology, essentially a pair of molecular scissors that lets you insert, activate or deactivate certain human genes. This technology has huge potential. Some researchers are studying how it could be used to eliminate the AIDS virus in patients, others are trying to make mosquitoes immune to malaria or attempting to use it to stop cancer cells from multiplying. Vertex Pharmaceuticals, a pharmaceutical firm based in Boston, has injected \$105 million in CRISPR Therapeutics and is looking to collaborate with the Swiss start-up. The company listed on the Nasdaq in October and has raised \$56 million.

CREATION
2013

EMPLOYEES
77

HEADQUARTERS
BASEL,
SWITZERLAND

REVENUE
NOT PUBLISHED

STOCK
CRSP

YNSECT

TUCK INTO SOME INSECTS

The company breeds insects to be used as a source of protein in cosmetics or food.

This French start-up breeds insects in order to extract certain molecules, such as proteins, chitins and oils. The idea is to use these components in human or animal food products and certain cosmetics. One of its products, trout and salmon feed,

helps increase the weight of the fish by 30%. In February, Ynsect opened a 3,000 sq. m plant in Dole, in the French Jura. It plans on using this centre to prove to its investors that it can industrialise its manufacturing system.

CREATION
2011

EMPLOYEES
45

HEADQUARTERS
EVRY,
FRANCE

REVENUE
NOT PUBLISHED

STOCK
NOT LISTED



Antoine Hubert, director of Ynsect, in one of the R&D labs in Evry, France.



BY JULIE ZAUGG

"Shenzhen is the very heart of Chinese innovation," says David Li, a major player in the local tech scene, who heads an incubator called Shenzhen Open Innovation Lab. "It's a cocoon that has allowed this communist country to freely experience capitalism." A designated free-trade area since the 1980s, this city of 10 million people was at first home to a multitude of SMEs specialising in



Visitors at Mass Innovation Week in Shenzhen, in front of an artist's vision of a rosy technological future. (12 October 2016)

JIN LIUWANG / XINHUA

subcontracting and copying, making it the "world's factory".

But after 2005, this model began to change. "An ecosystem started to emerge made up of electronic component manufacturers, industrial design firms, incubators and hacker-spaces," says Li. "Today, Shenzhen is home to 150,000 industrial designers – the biggest concentration in the world – and nearly 25,000 start-ups." These players quickly began to trade ideas, know-how and materials.

THE BOTTOM-UP MODEL

"The absence of strong intellectual property protections made it possible for an entirely bottom-up and collaborative innovation model to emerge," says Li. "When a start-up has a problem, it can turn to a vast network of suppliers and designers that will come together to find a solution."

The close proximity of the factories has also led start-ups to call on them time and again. "Chinese entrepreneurs tend to release an initial version of their product on the market very quickly, then modify and improve it several times based

on feedback from users," says Edward Tse, a seasoned observer of the Chinese market and founder of the consulting firm, Gao Feng Advisory Company. This trial-and-error method is used, for example, by Chinese start-ups developing electric cars. The first, imperfect models are already for sale, but they will soon be replaced by better-performing vehicles.



"Today, Shenzhen is home to 150,000 industrial designers – the biggest concentration in the world – and nearly 25,000 start-ups"

David Li, director of Shenzhen Open Innovation Lab

This approach to innovation, called Shanzhai, is quite different from

the methods used in the West, where everything is done internally for fear of ideas being leaked from the company, and where each product is tested extensively before it is put on the market. "It's not like Japanese or Korean innovation either, which is directed from above and dominated by a handful of large conglomerates," says Marina Oulion, a doctoral student at the Institute for Research and Innovation in Society who is writing a thesis on Chinese innovation.

The first applications that emerged from this process were specially adapted to meet the needs of the local market, such as smartphones that can hold two SIM cards at the same time, prized by migrant workers who want to make calls in several different calling zones. There were also UV lamps for the many shop managers and security guards who must verify the validity of banknotes and ID cards. Not to mention thicker smartphones equipped with batteries that could last for seven days without recharging – an essential feature in countries where electricity is often not reliable. ▸

These telephones were snapped up in other emerging markets such as India, the Middle East and Africa. They gave rise to a small group of celebrated national brands such as Xiaomi, Tinno, Vivo and Oppo. Every year, the Shenzhen ecosystem releases some 300 million Chinese-brand mobile telephones. "That represents a quarter of the global market," says Li.

Chinese innovation reached a new milestone in 2010, freeing itself from the constraints that had confined it to Shenzhen. "The 12th five-year plan of the Chinese government (2011–2015) made this an absolute priority," says Georges Haour, professor of management at IMD Business School and an author of a new book on Chinese innovation. "The government adopted an

assertive policy to transform the country from an economy based on low-cost manufacturing output to one based on internal demand and innovation."

Tax rebates for start-ups, the creation of special courts to protect intellectual property and massive injections of university funding soon followed. China now spends over \$200 billion a year on research and development, or 2% of its GDP. Globally, this puts it in second place, behind the United States. It also ranks second in terms of scientific publications, and first in patent applications. "Currently, 40% of all Chinese university graduates are engineers," says Oulion. "That amounts to about two million people every year."



"The logic is to first let an innovation develop and not try to regulate it until later"

Bruno Bensaid, co-founder
of the consulting firm Shanghaivest

In addition, Beijing has adopted a wait-and-see attitude on the legislative front. "The logic is to first let an innovation develop and not try to regulate it until later," says Bruno Bensaid, co-founder of the consulting firm Shanghaivest. "China's first law on carpooling will not enter into force until the end of the year. Along the same lines, many online payment services have operated for some time in a legal vacuum, with no government intervention."

Chinese innovation has also benefited from massive injections of capital from investors tempted by the huge potential of this market of 1.3 billion people, which includes 700 million internet users and a growing middle class. "This has attracted investment companies, such as Sequoia Capital in the US and Legend Holdings in China, endowment funds from Harvard and Yale and pension funds such as CalPERS in California," says Bensaid. In 2014, Chinese start-ups attracted \$15.5 billion in venture capital.

A FINANCIAL TSUNAMI

All of this has led to the emergence of several clusters of innovative firms headquartered in Beijing, Hangzhou, Shanghai and, of course, Shenzhen. The result: a series of innovations that have completely



Robots for education and assistance are the stars of Mass Innovation Week (12 October 2016).

MAO SIQIAN / XINHUA

transformed the sector in which they operate. This is the case of the online payment platform Alipay, affiliated with Alibaba. Launched in 2004, it now has 350 million subscribers who use it for all types of payments, from purchasing a new refrigerator to buying cinema tickets or paying electricity bills.

“Customers can also use the platform to transfer money or try their hand at wealth management, with returns that are more attractive than those offered by a traditional bank,” says Jeongmin Seong, an analyst with the McKinsey Global Institute, who recently published a report on Chinese innovation. Ant Micro, a service launched in 2010, allows customers to obtain microloans. Another platform introduced in 2013, Yue Bao, offers interest rates that are twice as high as those of a standard financial institution. Faced with such a tsunami of competition, Chinese banks have become largely redundant.

The same type of disruption was seen with WeChat, an application created in 2011 by the company Tencent, which combines the instant messaging features of all of the other social networks (p. 45): Facebook, WhatsApp, Snapchat, Instagram, Skype, Twitter, Uber, Groupon and Tinder. It also allows users to make doctor appointments and on-line payments. “This one-stop-shop model is so revolutionary that the other social networks have begun to copy it, such as Facebook, which is now trying to incorporate a payment system,” says Bensaid.

In the medical industry, the high-speed genetic sequencers manufactured by BGI, a company based in Shenzhen, have also completely transformed their field. These machines have allowed researchers to decode the SARS virus and to sequence, in less than three days, the genome of a variety of E. coli bacteria that plagued Germany in

FOUR STROKES OF GENIUS

DR



DRONES

Founded in 2006, DJI is the company behind the invention and large-scale marketing of miniature drones for use by civilians. Its Phantom product line is currently dominating the market.

BEN LARCEY



HOVERBOARDS

Unfortunately, Marty McFly's flying skateboard in Back to the Future II has not yet been invented. All the same, these skateboards powered by an electric motor took the world by storm in 2014. Chinese-American inventor Shane Chen claims to have invented them, but the manufacturing companies of Shenzhen are the ones who actually brought them to life.

DR



E-CIGARETTES

Invented in 2001 by the Chinese pharmacist Hon Lik, electronic cigarettes were first marketed in 2004 under the brand name Ruyan. They were copied by several Western producers, eventually becoming an important substitute for tobacco.

ISTOCKPHOTO



HIGH-SPEED CLINICAL TRIALS

The companies WuXi AppTec and BeiGene have massively reduced the time needed to conduct a clinical trial. WuXi has done so by breaking down each step of the process and entrusting it to subcontractors. BeiGene has conducted pre-clinical trials on tissue rather than humans.

2011. BGI now handles half of all genetic sequencing worldwide. It has become a key partner to pharmaceutical companies.

At Mass Innovation Week in Shenzhen, the BGI stand is invaded by teenagers who have descended

upon a row of microscopes to look at strands of DNA. In a corner, a huge square-shaped machine hums away, emitting a beep from time to time. This is the firm's latest-generation genetic sequencer. It can decode the entire genome of an organism in under 24 hours. ▲

Master disruptor

Fantastist or visionary genius?
The South African billionaire and CEO of Tesla
and SpaceX hopes to colonise Mars by 2031.
A quick profile of a busy man.

BY ARMELLE VINCENT, LOS ANGELES

We were wrong: Martians are not the green creatures from science-fiction novels. We, Earthlings, are the Martians. By 2031, we will have colonised Mars, travelling in SpaceX rockets. We will have made the red planet like Earth, becoming a “multiplanetary species,” according to the childhood dream of Elon Musk, the man at the centre of this saga. And since, according to Musk, he “would rather commit seppuku than fail,” we are free to fantasise about the possibilities of extra-terrestrial life. “I think we need to acknowledge that there’s certainly a possibility of a third World War, and if that does occur it could be far worse than anything that’s happened,” says Musk, fearing that a war or unexpected disaster could destroy the human race. As an engineer and billionaire – his net worth is estimated at \$11.6 billion – it is Musk’s mission to save us all from such an end.

Is it possible to sum up the 45-year-old visionary in just a few words? He punctuates most of his sentences with “ummm”. His personal life is messy, with three marriages behind him, two of which with British actress Talulah Riley and they are now separated again. He is also the father of five children. He is equally at ease rubbing elbows with both geeks and stars. To label Musk as a “disruptor” does not do him justice. He is head and shoulders above the competition, including all the brilliant minds in Silicon Valley. Musk no longer lives there, instead choosing Los Angeles for its proximity to the aerospace industry.

The ultimate goal of the serial entrepreneur is not to virtually connect the world or make a myriad of information easily accessible to us. No, his goal is to save the world from extinction. The first step is to help spare the planet through developing renewable energy at the expense of fossil fuels, which is where his

companies SolarCity and Tesla Motors come in (read our profile of Tesla on p. 44).

Extremely eager to fulfil his mission of saving the world, Musk works urgently. He rejects the belief that technology is immortal or relentlessly progressive. He recently told a journalist: “There have been times before now in human history – after the Egyptians built the Pyramids, for instance, when the civilizations that followed could no longer do what had been done before, and perhaps there’s a complacency and arrogance in assuming that this won’t happen again.” Hence the frenzy of innovations.

Trapped in a flood of cars, he began dreaming of a giant pneumatic tube connecting Los Angeles and San Francisco

“People don’t realize that most of my time is spent in engineering,” says Musk. In fact, the inventor is currently deeply involved in three projects: self-driving cars (Tesla), space (SpaceX) and pod transportation (Hyperloop). The latter is the result of an immense frustration Musk felt

one day while stuck in Los Angeles traffic. Trapped in a flood of cars, he began dreaming of a giant pneumatic tube connecting Los Angeles and San Francisco. The 650-km trip would take only 35 minutes, carrying passengers in pods. After being on the receiving end of much public scepticism, Musk set out to prove his idea, since he hates blowing smoke just as much as he hates being labelled a fantasist. Though his ideas may seem far-fetched, his work is very much concrete. Faced with the challenge of explaining exactly how the Hyperloop would work, Musk locked himself away for a few days to publish a detailed 58-page report online. Then, he passed the project on to his fellow mad scientists, who are currently in a Los Angeles warehouse working to make Hyperloop a reality. Musk may well be gifted, but even he can’t do everything.

Let’s return to colonising Mars. Anyone other than Musk who talked about colonising Mars so assuredly, saying not “if” but “when”, would surely not be taken seriously. But Musk has proven himself time and again, ever since childhood. He was raised by his father Errol in Pretoria, South Africa, growing up with his siblings Kimbal and Tosca. His mother Maye was a model who returned to her native Canada after divorcing Errol in 1980. At the young age of 10, Musk was already showing signs ▶



of exceptional intelligence, mastering a six-month course of BASIC programming language in only three days. He was a brilliant student at the University of Pennsylvania. He began a PhD program in applied physics at Stanford but left after two days to pursue a start-up, Zip2: an online content editor for newspapers. Musk then sold this for \$22 million in 1999. Then came PayPal, for which he collected \$250 million after its sale to eBay in 2002, the same year Musk became a US citizen. Next came Tesla and finally SpaceX, a private company which demonstrated this year its unique ability to recover the first stage of its Falcon 9 rockets. However in September it suffered the “most difficult and complex failure” since its inception, as Elon Musk himself admitted: the explosion of one of its rockets during a routine procedure in Cape Canaveral. The credibility loss could be important. Space X is hoping

to resume its launches before the end of the year. In the meantime, it carries on its long-term projects, such as the construction of an “interplanetary transport system”, aiming to send manned missions to Mars.

Before completely revolutionising the aerospace industry, Elon Musk also transformed the automobile industry with Tesla. In 2008, the first model, a sports car named Roadster, was an instant success despite its steep \$109,000 price tag. The second model, S, has been on the market since 2012 and is more affordable, with a current base price of CHF 67,000. You'll need to wait several months before driving one, however, as demand far exceeds supply. Thanks to charging stations installed on more and more motorways and its range of approximately 300 km, the S is becoming more popular and...trendy.

Two other models, the X and the 3, will soon be available. The Model 3 is expected to have the most impact on the automobile market due to its price of approximately CHF 35,000, placing it in the same market as regular vehicles. If the Model 3 becomes a widespread commercial success, Musk will be a true disruptor. In that case, the big automobile manufacturers will likely respond quickly. Regardless, Musk keeps the pressure on the automobile industry, with his plans to make the electric car the car for the masses, as well as his plans for self-driving cars. Tesla announced that all upcoming models will be equipped with a system that can change lanes, accelerate and slow down, completely autonomously, with a simple tap of the main screen on the dashboard. All that, of course, while waiting to colonise Mars. ▲

To label Musk as a “disruptor” does not do him justice. He is head and shoulders above the competition.



An artist's portrayal of a Dragon capsule, as imagined by SpaceX, landing on Mars.

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Esoteric investments are back

With the traditional bond market offering near-zero interest rates, an increasing number of institutional investors are (re)turning to alternative investments. High risk, illiquid and traded over-the-counter, these alternative investments offer more profitable returns.

BY CLÉMENT BÜRGE AND RINNY GREMAUD



DIRTY LAUNDRY AND FRANCHISED RESTAURANTS

The market for securities backed by the most unusual assets is at its highest level since the 2008 financial crisis. Restaurant franchises, mobile phone masts, holiday apartment rentals, everything from the weird to the wonderful is in play when it comes to finding the best returns on investment.

The 2008 financial crisis was the opportunity for the general public to discover the apparently limitless creativity of the financial sector when it comes to developing investment products. We all remember the infamous mortgage-backed securities (MBS) which, due to their total lack of transparency and immense popularity, brought the global financial system crashing down.

However, this strategy, which involves creating securities that are backed by loans – otherwise known as asset-backed securities (ABS) – is still in vogue. And all the more so

now that bond market returns are at their lowest. A growing number of institutional investors – pension funds, insurance companies, hedge funds and other banks – are allowing themselves to succumb to the charms of the particularly attractive fixed returns that asset-backed securities offer.

Standard ABS are backed by loans, student loans, credit card receivables and automobile loans. But the principle behind them can be applied to any kind of credit – including profit rights or gains on future sales – for any level of income imaginable. In financial jargon, these are called esoteric investments.

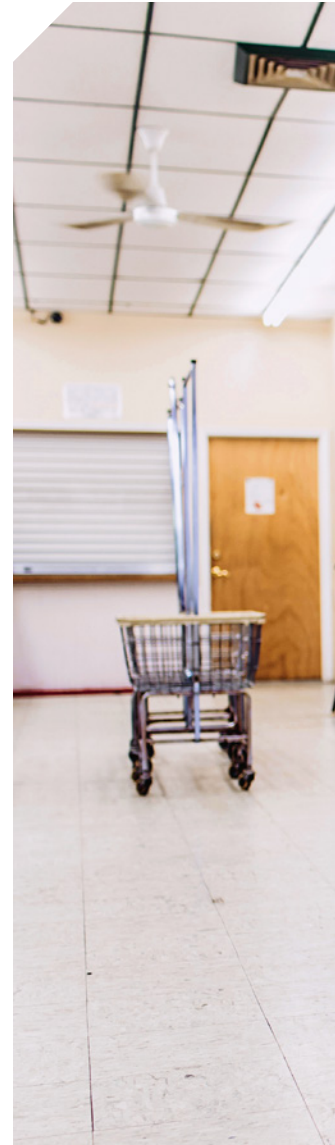
ABS currently represent 18% of the total volume of asset-backed securities

Let's take Alliance Laundry as an example. The US-based laundry equipment manufacturer offers its customers the option of purchasing machines using credit. So that it had immediately accessible capi-

Selling washing machines on credit and turning the future revenue into fixed-yield financial products? Such is the strategy of Alliance Laundry, an American manufacturer of laundromat equipment. Just one example of the overflowing creativity seen in the world of alternative investment.

tal, Alliance Laundry enlisted the help of a bank and transformed all of its potential future revenue into fixed income securities. In 2015, the company ultimately sold its dirty laundry-backed securities for USD 400 million.

In 2007, the ABS deal relating to rights of use for racehorse sperm marked a turning point in the financial industry and opened the door to more original or creative transactions. These deals now involve larger sums of money and even odder types of assets. In 2012, Barclays issued USD 1.575 billion





PEXELS

of asset-backed securities in the Domino's Pizza franchise. In 2013, American Tower, a mobile telephone mast operator, sold rights to use its antenna for USD 1.8 billion. Another recent trend comprises incorporating holiday apartment rentals and even rights to brands sold under a licensing agreement. Even Hooters, the restaurant chain that constructed its franchise based entirely on the size of its waitresses' chests, securitised their franchise rights in 2014.

According to a report by JP Morgan, the esoteric ABS market is now

at its highest level since 2008. In the first three quarters of 2016, USD 23 billion in loans were issued in this form, versus USD 7 billion in 2009. Esoteric ABS currently represent 18% of the total volume of asset-backed securities. And it is the same banks that were the most active in this area before the financial crisis that are currently issuing these securities. Barclays, which bought Lehman Brothers after it failed, maintained particular expertise in this area, as did Deutsche Bank, Credit Suisse, Morgan Stanley, Bank of America Merrill Lynch and Goldman Sachs.



BETTING ON A DISASTER

Cat bonds – having nothing whatsoever to do with their feline namesakes – enable investments to be made against disaster risk: hurricanes, pandemics, earthquakes and even an insane trader. And their popularity is increasing.

In 1992, Hurricane Andrew ravaged Florida and caused damage costing USD 25 billion. At the time, it was the most expensive storm in >

history. Whilst reflecting on the scale of the disaster, Eberhard Müller, who worked for the German-based reinsurance company Hannover Re, wondered if there was a way to transfer some of the financial risk to the markets. And thus, “cat bonds” were born.

“Bond yields are high if nothing happens, but if disaster strikes, then the investor loses all or part of his investment”

Siti Dawson, analyst at LGT Partners

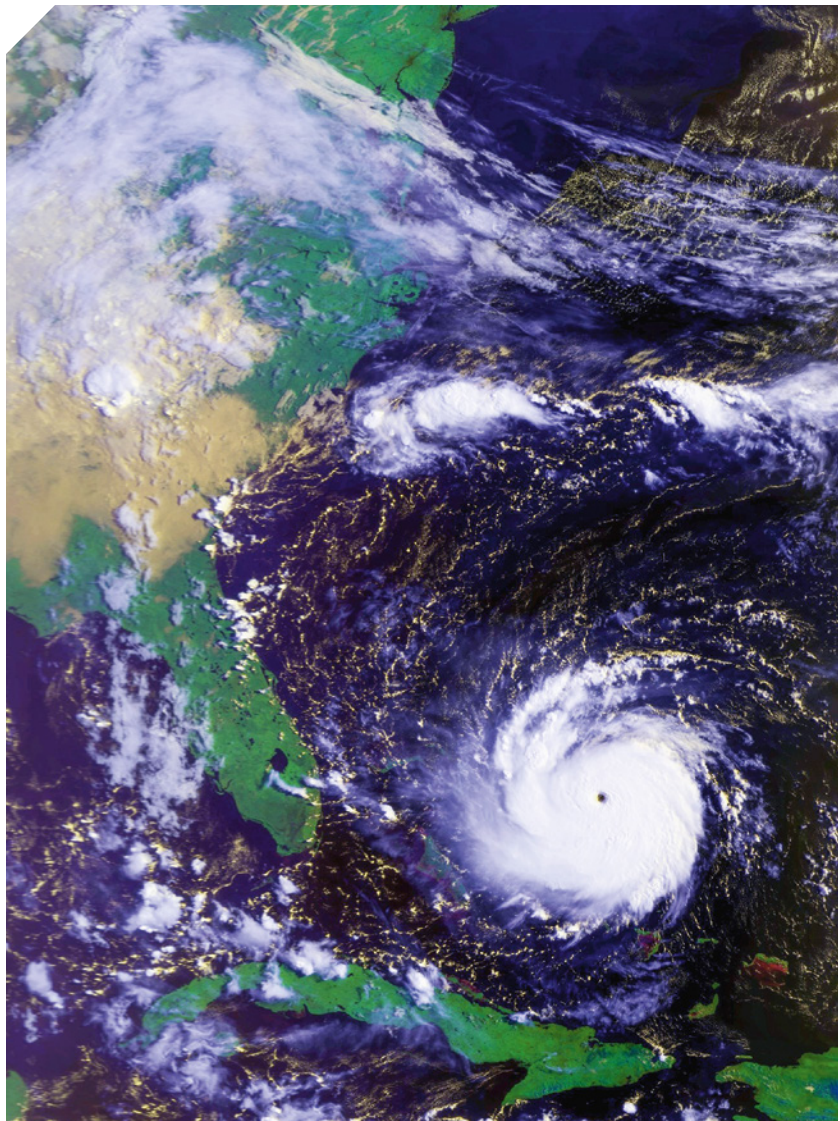
Broadly speaking, the principle is this: an insurance company covers its clients for a certain type of disaster. It then sells its bonds and the full or partial pay-out provided by these bonds depends on whether the disaster occurs. The risk is analysed by an independent firm. “Bond yields are high if nothing happens,” explains Siti Dawson, an analyst for LGT Partners, “but if disaster strikes, then the investor loses all or part of his investment.”

These financial products, which have little correlation with the financial markets, are proving extremely popular due to the high yields that they offer. More and more pension funds, family offices, hedge funds or sovereign wealth funds are using cat bonds to diversify their portfolios. Cat bonds in circulation currently total USD 72 billion (compared to USD 19 billion in 2008) according to Aon Securities, one of the biggest brokers in the sector.

“The reason for the increase is that people now understand the product better,” says Jay Patel, an analyst at Timetric. “Yields have increased because there haven’t been any huge disasters. This is particularly the case in the US, where the majority of cat bonds are put up for sale.” Reinsurance companies are the first victims of the success of these products that they themselves created. Nowadays, “the bond market is acting like a giant reinsurance company,” explains John Seo, a specialist in the field, in an article in the *Wall Street Journal*.

This product originally only covered natural disasters, but it has evolved to include any category of risk that is covered by an insurance policy, including human risk. There are cat bonds that pay out based on the number of people that die in a pandemic, for example. This year, US-based insurance company AIG issued bonds to cover the risk of a large proportion of its clients going bankrupt, whilst a Credit Suisse cat bond sale insured the bank against the risk of cyber hacking, rogue traders and accounting fraud. Thanks to the magic of securitisation, these risks now fall on other players in the financial market.

A satellite image of Hurricane Andrew, which devastated Florida in 1992. This event, causing USD 25 billion in damage, gave rise to the famous “cat bonds” – bonds linked to the risk of a catastrophe.



NOAA



A NOSE FOR FINE WINES

Following a spectacular collapse in 2011, the collectible alcoholic drinks market is a shadow of its former self but still offers some investment opportunities for connoisseurs.

Ever since man first started producing wine, he has had trouble financing its production. This is because there is a minimum of three years from the moment the vine is planted to when the wine can be drunk. Throughout this period, the wine-grower has to find the means to pay his expenses. In the Bordeaux region, since the end of the 18th century, winegrowers have had to sell their wine *en primeur*, i.e. 10 years before it is even bottled. This enables the winegrowers to cash out in advance on revenue from the sale of their wines whilst the buyer takes a gamble on the quality of the wine.

This system has become institutionalised and is now regarded as a real investment tool. In 1999, the London International Vintners Exchange (Liv-ex) was founded in the United Kingdom as an exchange for investing in wine. It publishes five benchmark indices which classify the high-end wines by category, primarily Bordeaux.

However, as with other luxury products, fine wines have largely benefited from an increase in the number of Chinese millionaires. Prices went sky high in 2008, when the restrictions on import duties were lifted in Hong Kong. Numerous investment funds were created with the intention of taking advantage of this vast speculative movement.

But in 2011, the market dramatically changed direction, due to the combined effects of over-inflated prices, a slowdown in the Chinese economy and poor harvests. The Liv-ex 100

has lost 80% of its value since the highs of 2011 and numerous funds have since folded. The spectacular liquidation of the Nobles Crus fund is an example that is hard to forget. "In reality, this collapse only affects the visible part of the wine market," says Philippe Masset, assistant professor at the Ecole hôtelière de Lausanne and co-author of a study on wine as an investment. "We mustn't forget that the majority of these funds are operating on the secondary market, i.e. mainly on Bordeaux wines. In other famous wine-growing regions, prices remain stable."

Es gibt immer mehr reiche Chinesen. Davon profitiert auch der Qualitätsweinsektor.

Philippe Kalmbach is the CEO of Wine Source Group, a company that specialises in trading fine wines. In 2012, when the market was already bearish, he started the Wine Source Fund, an alternative investment fund based in Malta. With assets under management of EUR 4.4 million, the fund returns a regular performance of 7% each year. How does he explain this result? "Our fund is diversified. We have some Bordeaux, of course, but this only accounts for 25% of our assets. The rest is split between Bourgogne, Champagne, Italy, the US and the best whisky. In contrast to the majority of other funds, we buy wines straight from the vineyards rather than using the secondary market. We store them until they reach maturity, at which point we then make them available to the best dinner tables around the world. Our trading activities span three continents, which guarantees our fund's liquidity. We are also subject to supervision by the Financial Markets Authority and our assets are valued by Wine Owners, an independent organisation."

In many respects, investing in collectible wine and alcohol is still risky. This largely decentralised, obscure and (ironically) illiquid market does not allow for an objective evaluation of prices. And this makes it an attractive niche market for fraudsters. "Before selecting a fund, you need to ask yourself three questions: How do they manage liquidity? What is their allocation strategy – is it sufficiently diversified? What asset valuation method do they use?" advises Philippe Masset.

Other types of funds, which are similar to an investment club, are also available within the alcohol sector. The Platinum Whisky Investment Fund based in Hong Kong, for example, is a closed fund with a limited lifespan and only invests in collectible Single Malt. Launched in 2014 for a period of seven years, it expects to pay an annual dividend of 17% to its 37 investors.



ROYALTIES AND THE ART MARKET

Despite the existence of royalty-backed securities and specialised investment funds in the art market, this sector is known for its obscurity and remains discreet.

David Bowie was avant-garde, and we're not just talking about his music. In 1997, the singer became the first artist to turn the rights to his royalties into asset-backed securities. "The deal included rights to 25 albums that were released between 1969 and 1990," says Rob Ford, a London-based fund manager. "It included *The Man Who Sold The World* and *Ziggy Stardust*. He sold them to the insurance company Prudential for USD 55 million, with a fixed annual yield of 7.9% and 10-year maturity." By inventing royalty securitisation, David Bowie opened the door for similar deals. "Nobody from the music ▶

The famous sleeve of *Aladdin Sane*, David Bowie's sixth album, released in 1973. Twenty-four years later, the English artist was still innovating, inventing the concept of copyright protection.



DR

scene had ever done this before,” says Rob Ford. “Bowie inspired a whole host of artists.” Since then, Iron Maiden and James Brown have sold royalty-backed assets for USD 30 million and USD 35 million respectively. Brown’s Motown catalogue was securitised for USD 30 million in 1998.

But royalty-backed securities have never been widely exploited by the music industry. “The majority of artists sell a large portion of their royalties to record labels at

the start of their career,” says Rob Ford. “They then no longer have enough left to perform this type of operation.” Over the next decade, the music industry saw its profits eroded due to the increasing digitalisation of the market. Ten years after “Bowie bonds”, the financial crisis seemed to have got the better of the relationship between musicians and bankers.

However, after 2008, the idea of royalty-backed securities reared its head again but this time in other

artistic circles. In 2011, Barclays securitised the Miramax catalogue for USD 500 million. These securities, which were related to the rights to broadcast *Pulp Fiction* and *Shakespeare in Love*, among others, were given a BBB+ rating by Standard & Poor’s.

“Snoopy bonds” followed in 2012 with a deal worth USD 600 million for the copyrights to several brands owned by Iconix, two of which involved the *Peanuts* comics.

Lastly, in 2012, a project to securitise Bob Dylan’s catalogue for USD 300 million was aborted when Standard & Poor’s assigned it a BBB- rating, i.e. only slightly better than a junk bond. Apparently, rating agencies are not using the same judging criteria as the Nobel Prize jury.

A project to securitise Bob Dylan’s catalogue for USD 300 million dollars was aborted in 2012, when Standard & Poor’s assigned it a BBB- rating

Investing in art can take other forms, notably funds specialised in trading works of art. Yields on these investments are provided by profits earned on the resale of the works. Deloitte estimates that these funds, which are structured like hedge funds, represent a niche market of USD 1.2 billion, and possibly more, as this sector is incredibly enigmatic.

The Fine Art Group, in London, is one of the main players in this field, with assets under management of USD 500 million. The minimum investment required is USD 500,000. Although the fund says that it primarily addresses aesthetes, it has launched a system for borrowing the works that it owns. This enables investors to decorate their homes for a (reasonably) good price. ▲

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Jürg Schwab
Head of Trading
at Swissquote

INVESTMENTS

Hedging: The art of protection

In a single click, tools are available to protect your investments effectively against a range of risks, including changes in share prices and fluctuating exchange rates. Swissquote's Head of Trading, Jürg Schwab, explains how.

What does hedging involve?

It is protection against a potential risk. Hedging your investments means offsetting a possible downturn in the market. The process can be applied to portfolios containing equities, bonds or other financial instruments or to exposures in foreign currencies. The two are very often linked. For example, a Swiss client who owns a share in a German company in euros is exposed to an equity and a foreign exchange risk. That investor can hedge against both: a drop in equity markets and a decline in the currency.

What are the main hedging tools available?

We offer a wide range of derivatives on our website. These products include options and futures contracts. Let's go with a scenario of a potential future hike in interest rates. You know that, as a consequence, the value of bonds would fall, so if you own any bonds, you can hedge that risk by selling an interest rate future.

This strategy hedges against the rise in interest rates. In the theoretical case of a perfect correlation, the investor makes up for the loss on the bond portfolio with the gain made on the hedging instrument (the future). If a client has an equity portfolio and wants to offset a drop in the stock market, that person can use a put option. That means paying a premium for the right to sell a product at a fixed price. This right provides insurance in the event of a significant decline in financial markets, as the client gains on the option that will rise in value.

Can you give us a relevant case of hedging?

Brexit was a prime example this year. Before the British vote, many of our clients wanted to know if they could hedge their equity portfolio, for example by selling Euro Stoxx futures. And to hedge the foreign exchange risk on investments in pounds sterling, clients could choose from a variety of hedging

strategies using currency options or forward contracts.

Can these products be used differently?

Yes, they can. These derivatives are often used to optimise a portfolio but can also be applied for more speculative purposes. There are two types of options that offer potential for high gains. Calls give you the right to buy and puts give you the right to sell. These products are attractive, as well-informed investors can either go long (by buying the option) or go short (by selling it).

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In each issue, *Swissquote Magazine* takes a look at the image of a company through an aspect of its communication or identity. After looking at Nestlé's art collection, here we present the concept behind AccorHotels Group's Pullman Hotels and Resorts, a chain designed and conceived by a sculptor and artist.

Accor's aerodynamic hotels

BY SYLVAIN MENÉTREY

In 2007, the French hotel giant Accor, which owns 3,942 establishments worldwide, decided to launch a new upscale hotel brand aimed at technophile business travellers. The group turned to what one might think would be an unusual pair of consultants – sculptor Alexandre Ovize and artist Florentine Lamarche – to convert the hotels and define the guest experience. Under the supervision of Christian Mayeur and his company Entrepert, specialised in applying artistic methods to business, the team outlined the concept for the future Pullman brand, which today includes about a hundred hotels and resorts.

The two artists spent a 48-hour immersion at the Sofitel Porte de Sèvres near Paris, destined to become a Pullman. They observed how things are done, talked to guests, maids, servers and reception desk staff. Alexandre Ovize was struck by the number of aspects that hindered the flow of movement at the hotel, such as frequent chang-



ABACA CORPORATE / DIDIER DELMAS

es in shades, paint that was too dark and objects cluttering the space. "In a motorway tunnel, coloured rumble strips are used on the pavement to limit the speed. But these techniques are unwelcome in a hotel designed for digital tech lovers," Mayeur says. Based on this observation, the artists came up with

the concept of "aerodynamics", referring to continuity and flow in open spaces.

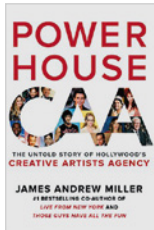
Next, Ovize and Lamarche organised workshops with all the hotel staff. They were all encouraged to share their view of the ideal hotel, while Ms Lamarche documented

all the ideas in drawings. This series of sketches developed into the "Get Closer" concept, which refers to getting closer in two ways: first to the vast world around us through excellent Wi-Fi coverage throughout the hotel – which was not yet standard 10 years ago – and second, within the hotel itself. The artists suggested creating a new position of "welcomer", designed for a multi-skilled employee who can spot guests that look lost or confused. They also transplanted the model of a *table d'hôte* to a traditional hotel, setting aside a table in the restaurant where guests travelling alone can come together to eat, meet new people and chat over a meal. Mr Mayeur oversaw the conversion of around 30 Pullman Hotels, adapting the first concepts outlined with Ovize and Lamarche with the help of other selected artists. Pullman is supposedly the AccorHotels brand which best weathered the drop in occupancy rates following the economic crisis of 2008. A sign, Mayeur believes, that this unconventional form of collaboration works. ▀

TO READ

POWERHOUSE THE UNTOLD STORY OF HOLLYWOOD'S CREATIVE ARTISTS AGENCY

By James Andrew Miller (Custom House)

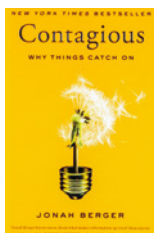


As its title suggests, this book presents the Hollywood scene through the rise of the Creative Artists Agency (CAA) – a legendary establishment that made the city of cinema what it is today. CAA was founded in 1975 by five extravagantly impulsive, ambitious employees at the William Morris Agency. It is depicted as the heart of a jungle where a few fiercely egocentric tigers run the show, stopping at nothing to conquer music, advertising, marketing, banking and, more recently, sports – even if it means stabbing each other in the back. This is a real page-turner.

From 16 Swiss francs

CONTAGIOUS WHY THINGS CATCH ON

By Jonah Berger (Simon & Schuster)



What makes a product, message or a song (like Gangnam Style) popular? *Contagious* – which has topped the best-seller lists since hitting the shelves – doesn't set out to take apart each case piece by piece. Rather, it analyses and demonstrates the principles underlying these wildly successful fads. The book sheds light with gusto on the social and psychological catalysts that help certain creations morph into widespread phenomena. Direct and to the point, this book will give you the tools to generate ideas fit to go viral.

From 6 Swiss francs

TO DOWNLOAD

WolframAlpha THE MATHS AND SCIENCES WIKI



WolframAlpha is the mobile version of the search engine that's "got all the answers".

It can compute, compare and summarise roughly 10 billion data entries – not gleaned from the web, but taken from knowledge bases – and organise them into useful data sheets. One of the app's most impressive features is its ability not only to calculate math equations, but also to answer questions about physics, chemistry and genetics.

3 Swiss francs

Apple Store, Google Play

Google Sheets SPREADSHEETS IN THE PALM OF YOUR HAND



Google Sheets works in tandem with Google Drive. The app is compatible with

Microsoft Excel and allows users to create, edit and format spreadsheets. You can also add and delete columns, and share spreadsheets with colleagues in real time – with or without Wi-Fi. Plus, the auto-save feature means you'll never have to worry about losing your work. The app also lets you import data from other Google services.

Free

Apple Store, Google Play

Pushbullet STAY SUPER-CONNECTED



Gone are the days when your devices had to have the same operating system

to sync data. Images, cards, notes, address books, files (up to 25MB), links – Pushbullet "pushes" all types of data from one device to another with incredible speed and ease. It also works as an RSS reader, syncing your subscribed content automatically.

Free

Apple Store, Google Play

1Blocker BLOCK UNWANTED ADS



Unwanted ads on mobile devices can eat up space and time. 1Blocker stops

them in their tracks. Users can take advantage of a variety of functions to block ads, widgets, trackers, cookies and pop-ups from adult websites. You can even disable certain URLs and broaden the scope of each function for more precise blocking.

Free

Apple Store



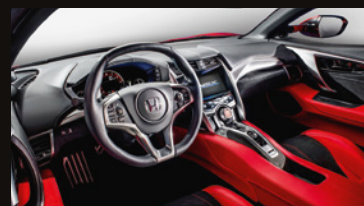
AUTO

Exotic supercars

THREE MODELS THAT WILL GET YOU NOTICED FOR ALL THE RIGHT REASONS.

BY PHILIPP MÜLLER

HONDA NSX, THE HYBRID SENSATION



ENGINE: 3.5-LITRE V6, 3 ELECTRIC MOTORS

POWER: 581 HP

0 TO 100 KM/H: < 3 SECONDS

BASE PRICE: 205,000 SWISS FRANCS

Tired of the Porsche 911 Turbo and Audi R8? Does the roar of the Mercedes GT S and Jaguar F-Type SVR leave you wondering what all the noise is about? Unimpressed by the pedigree of the Lamborghini Huracan and Ferrari 488 GTB? Not content with simply being able to afford a supercar, you're surely looking for something a bit more exotic... For those of you who are looking to try something new, the supercar market has just the car for you, tucked away at the back of the showroom, in the form of the Aston Martin DB 11, Corvette Z06, McLaren 570S or even the futuristic Honda NSX.

A direct descendant of the mid-mounted 2-seater from the '90s that broke all the rules set by its European competitors at the time, the new NSX doesn't go for a head-on attack in design-terms, but chooses a technological rear-guard approach instead by opting for a full electric hybrid solution. Whilst the essential sporty effect is guaranteed with the central turbocharged V6 engine and its 507 hp (7,500 rpm), the electric motor integrated in the dual-clutch, 9-speed gearbox and the two additional motors mounted on the front axle guarantee "silent running" for nearly two kilometres. The front motors, apart from improving perfor-

mance, make the handling extremely neutral and agile due to independent torque management. With active suspension, this Japanese-American model uses its 581 hp to reach a top speed of 307 km/h. Its carbon-ceramic brakes help you slow the car down as well as recharge the hybrid system, which also brings down average fuel consumption to 10 l/100 km! ▲



CHEVROLET CORVETTE Z06, BRUTE FORCE

In coupe or convertible, one of the best in terms of the price-performance ratio. The supercharged V8 6.2-litre engine produces 659 hp and 881 Nm of torque. It comes with a 7-speed manual or 8-speed automatic gearbox. Prices start at 128,900 Swiss francs



MCLAREN 570S, FINE BLADE

The jewel of the entry-level Sports Series range. Available in coupe or spider with carbon fibre cockpit and 3.8-litre V8 twin turbo 570 hp mid-mounted engine and dual clutch 7-speed gearbox. Prices start at 201,770 Swiss francs



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TRAVEL


Bavarian wonderland

Neuschwanstein Castle dominates the Bavarian landscape, proudly displaying its beautiful rococo exterior amidst the majestic snowy peaks of the German Alps. Visiting the castle is the perfect excuse to get out there and experience the magic of Bavaria.

BY SALOMÉ KINER



The fairy-tale-like
Neuschwanstein
Castle in Bavaria.



Once upon a time, there was a king who lived in a magical castle... At some point, all of us have dreamed of our favourite fairy tales becoming reality. But for Bavaria's fanciful and extravagant prince Ludwig II, they did.

Ludwig II was the favourite of his cousin, Princess Sissi. But, unlike her, he didn't quite fit the mould. He was fascinated by Germanic chivalry, the music of Wagner and the reign of the Sun King. All these influences can be seen in the elaborate architecture of the Neuschwanstein, Linderhof and

Herrenchiemsee castles. All three are hallmarks of German tourism—and all three were dreamt up by the wild imagination of Ludwig II. Having lost much of his power in 1866 to the Prussians, the frustrated sovereign decided to build his own empire. Only Linderhof Palace was completed before his death in 1886. But the biggest tourist attraction today is Neuschwanstein, nestled between the quaint town of Füssen and the emerald green waters of Lake Alpsee. And for good reason: the castle's slender silhouette and medieval turrets inspired the castle in Disney's *Sleeping Beauty*. ▸

But even though Neuschwanstein is an awe-inspiring sight for visitors of all ages, it's best to plan a variety of other activities to get the most out of your trip. Throughout the castle's seven floors, only six rooms were ever completed. And with about 8,000 visitors per day, guided tours are done in groups and at a pace worthy of Wagner's – *The Ride of the Valkyries* – a theme amply represented in the frescoes adorning the walls of the castle. Luckily, Neuschwanstein is only a one-hour drive from Munich, and the region offers plenty of other attractions as well.

John B. Wetstone is a tour guide with a website offering over 35 themed tours and an array of other

custom services. He recommends, among others, the Museum of Bavarian Kings: "The museum opened in 2011 in what used to be the Alpenrose Grand Hotel. Visitors can explore the history of the region's fabled dynasty amidst the royal castles and the snow-capped Alps. It's an interesting mix, where the medieval world meets cutting-edge museum technology."

Shifting gears completely, there's no better place to unwind at the end of the day than at the Kristall thermal baths in Schwangau. A far cry from the royal residences, the baths feature an unpretentious decor and lively ambiance – all at just the right temperature. That's important if you happen to find yourself in Bavaria in wintertime!

+++

Booking in advance recommended and guided tours possible.

Both the castle and museum are closed on 24 & 25 December and 31 January.

More info: schwangau.de,
kristalltherme-schwangau.de

Where to stay in Munich

Hôtel Opéra, from 220 Swiss francs per night for two people. For Gourmet or Spa packages, visit hotel-opera.de.

More info: hotel-opera.de

Where to stay in Füssen

Hôtel Schlosskrone, from 165 Swiss francs per night for two people.

More info: schlosskrone.de

Mittenwald, a picturesque highlight

If Neuschwanstein is often associated with Disney, Mittenwald is more closely connected with the Brothers Grimm. With its low houses decorated with frescoes and its traditional folk dress, this village of luthiers is perhaps the most quintessentially Bavarian of all. It is most charming during the Christmas market and the series of events that go along with it, from tastings and spiritual concerts to nativity scenes and storytelling for kids. It's the perfect place to stop and spend the night, far from all the excitement of the resorts.

+++

Where to stay in Mittenwald

Hôtel Drachenburg, from 115 Swiss francs per night for two people.

More info: hotel-drachenburg.de



Bavarians in traditional costume.

ANDREAS GEBERT / NEWS.COM

The white magic of Zugspitze

A panoramic view from the Zugspitze terrace, the highest point in Germany, at 2,962 m.

DANIEL BOSWALD

Just 60 km from the town of Füssen, Garmisch-Partenkirchen is the winter-sports capital of Germany. The ski resort made a name for itself by hosting the 1936 Olympics. In addition to its famous Kandahar slope, the resort offers 40 km of terrain for all sports, from downhill skiing, ski touring and snowshoeing, to snowboarding, freeriding and luge. Plus, there are a number of options to accommodate children who are hitting the slopes for the first time.

At Garmisch-Partenkirchen, you can also go up the Zugspitze-Germany's highest mountain, at 2,962 metres—for a spectacular panoramic view. A cogwheel train and cable car shuttle visitors up and down several times a day, stopping at the village of Grainau and Lake Eibsee before climbing the steep mountain to reach the glacier. At the top, you can relax and enjoy a delicious selection of local pastries. Alpspiz also offers breathtaking views – and with a dose of adrenaline to

boot. Also accessible by cable car, this 'X'-shaped viewing platform is suspended over a vertical drop of 1,000 metres at the summit of Osterfelderkopf. But perhaps the most adventurous way to view the Bavarian Alps and its castles is by paragliding. Paraworth offers tandem flights year-round from 165 Swiss francs. ▲

+++

Combined ticket for cable car or train ticket between Alpspiz and Zugspitze: 69 Swiss francs per person.

One-day ticket for Garmisch-Partenkirchen: 44 Swiss francs per adult, 35 Swiss francs per child.

More info: zugspitze.de, gapa.de and paraworth.com



The bridge at Alpspiz, suspended 1,000 m above ground.

FRANK FRIEDRICH

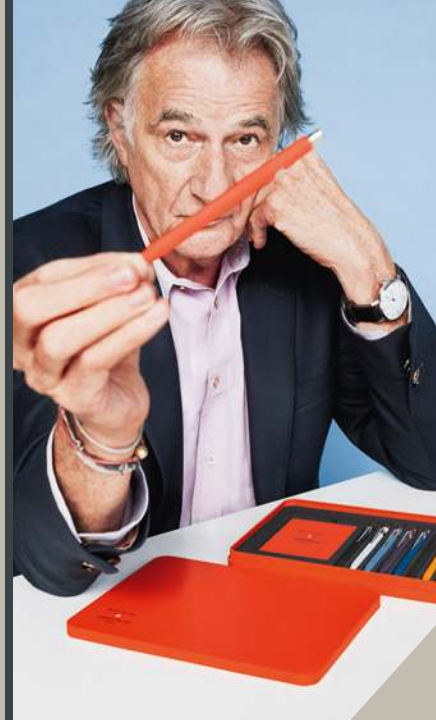
BOUTIQUE

LEVITATING PLANT

Swedish start-up Flyte has invented a flower pot that floats in mid-air. The Kickstarter-funded project harnesses the power of electromagnetic suspension...with gravity-defying results. Not only does it make for a stunning visual effect, it also serves an important purpose: the pot turns so that the plant can get the most sunlight possible.

www.flyte.se

195 Swiss francs



PAUL SMITH + CARAN D'ACHE

After a successful collaboration last year for its 100th anniversary, Geneva-based Caran d'Ache is teaming up again with the pre-eminent British designer Paul Smith. Smith has jazzed up the iconic 849 pen with his signature stripe pattern. Plus, the pens come in a limited edition case.

www.carandache.com

330 Swiss francs

POT OF GOLD

La Prairie, one of Switzerland's most stylish cosmetics labels, has designed holiday gift sets for its top-selling product lines. The Luxurious Radiance set features a collection of gold-infused anti-ageing skincare products: a day cream, cellular revitalising concentrate and eye contour.

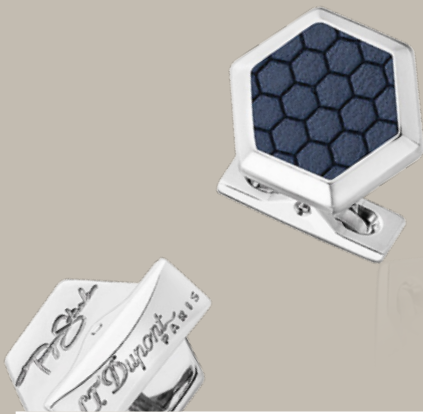
www.laprairie.com

1,642 Swiss francs

A MARVEL-OUS COLLECTION

S.T. Dupont teamed up with Marvel to launch a series of pens and accessories in honour of billionaire and genius inventor Tony Stark – aka Iron Man. Fashionable geeks will love the brass cufflinks, which feature a blue leather centre with a honeycomb motif. The superhero's signature is even engraved on the back!

www.ironman.st-dupont.com
380 Swiss francs



AVALANCHE AIRBAG

Mammut is the Swiss expert in mountain sports equipment. The company recently upgraded its latest hiking backpack to include a new ultralight Airbag 3.0 system. The bag has a capacity of 30 litres and weighs only 2,430 grams. It's perfect for hitting the slopes...and for giving yourself the best chance of survival in case of an emergency.

www.mammut.ch
900 Swiss francs



ETHICAL FUR

Can you wear fur and keep a good conscience? You can, in fact! Tallis is a Swiss brand that designs stylish winter accessories in cashmere trimmed with fur. The fur material comes from overpopulated species that threaten the ecosystem, such as the fox in Switzerland and possums in New Zealand. Tallis uses their coats that would otherwise be destroyed to make pom-poms for knit caps and elegant scarves.

www.thetallis.com
189 Swiss francs

WE'RE ALL ARCHITECTS

Who hasn't dreamt of building their own home? Arckit is a clever system featuring basic modular components that can be assembled to create model homes. The modelling kits, developed by an architect tired of working exclusively on 3D design software, do not require glue or cutting – a throwback to playing with Legos. The basic boxes do not indicate the number of rooms but the square metres you can build on a 1:48 scale.

www.arckit.com
107 Swiss francs



BOUTIQUE

WATCHLIST

THE ART OF MESH

The **Limelight Gala** embodies the distinctive Piaget style and established itself as one of the leading models of the '70s. With a round case enhanced by two asymmetrical elongated lugs, voluptuous curves highlighted on the bezel by a row of graduated, round diamonds and a dial with long Roman numerals, the watch now comes with a Milan mesh bracelet made entirely of pink gold, with an integrated sliding clasp engraved with the initials of the workshop in La Côte-aux-Fées.

www.piaget.com
37,300 Swiss francs



CHANEL IN TWEED

Drawing inspiration from her many trips to Scotland with the Duke of Westminster, Gabrielle **Chanel** designed a tweed fabric that made the house on rue Cambon famous. This year, Coco Chanel's material of choice appears in the motif on the Boy-Friend watch bracelet. The watch has both a masculine and feminine side and features a bare look which pays tribute to the emblematic Première collection.

www.chanel.com
4,600 Swiss francs



GEEK CHIC

De Grisogono, the Geneva-based jeweller, has teamed up with Samsung, the Korean giant, to create the most glamorous of all the smart timepieces. Made from rose gold, with black and white diamonds and a studded galuchat bracelet, this jewellery smartwatch offers a scrolling menu (that can be accessed by turning the bezel) and has 4GB of memory. It also has an accelerometer, a gyroscope and even a barometer, and you can download numerous other functions too.

www.degrisogono.com
14,600 Swiss francs



A PRECIOUS TROPHY

Designed by Gérald Genta in 1972, the **Royal Oak** turned luxury watchmaking on its head. It was the first luxury watch to incorporate a sporty style and established itself as a must-have with its octagonal shape and "tapisserie" dial. Originally designed for men, the range now comprises a number of models for ladies. We especially like the stainless-steel mounted quartz model with a white crocodile leather strap.

www.audemarspiguet.com
13,900 Swiss francs



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CAECILIA CHARBONNIER
CO-FOUNDER AND CEO
OF ARTANIM INTERACTIVE
BORN ON 7 DECEMBER 1981
IN GENEVA



Caecilia Charbonnier was a professional tennis player (WTA 256) until she was forced to end her career in 1999 due to a shoulder injury. She then retrained and became a successful entrepreneur. After obtaining several qualifications (an undergraduate degree in IT systems, a Master's degree in graphics and visualisation and a PhD in science), she co-founded the Artanim Foundation in 2011, dedicated to developing and promoting motion capture. In 2015 Charbonnier founded Artanim Interactive, a start-up that brings together motion capture technology and real virtuality, whereby the user can move around and interact with objects in a virtual environment. Artanim Interactive is one of the most promising companies in its field. The American actor Robert Redford described the technology as "Spectacular!" when he tested it during the 2016 Sundance Film Festival.

DR

DIVING, ICELAND AND VIRTUAL REALITY

A KEY EVENT FROM YOUR CHILDHOOD

There isn't one particular event that stands out but my tennis career really shaped my character, gave me plenty of determination and discipline, and honed my competitive streak.

THE PROFESSION YOU WOULD HAVE LIKED TO DO ?

I wanted to become a surgeon. I had enrolled in medical school but then I changed my mind. My whole family works in medicine, so I wanted to do something different.

YOUR SECRET HOBBY ?

If I told you that, it wouldn't be a secret...

SOMETHING THAT INSPIRED YOU RECENTLY ?

Diving with dolphins.

A PLACE THAT MADE AN IMPACT ON YOU – AND WHY ?

Iceland, between fire and ice. I was really struck by how many different landscapes there are in the world. A four-hour flight and you feel like you've arrived on the moon. It's definitely worth it.

SOMETHING CRAZY YOU DID RECENTLY ?

I created my start-up, which has been my biggest challenge to date.

THE FILM THAT YOU WOULD HAVE LIKED TO EXPERIENCE ?

Alice in Wonderland.

THE IDEAL WOMAN ?

She doesn't exist.

THE IDEAL MAN ?

The man that I share my life with.

THE IDEAL ANIMAL ?

Half man, half fish.

A SONG THAT SUMS YOU UP ?

Kao Bang by Indochine.

YOU WIN 5,000 SWISS FRANCS ON THE STOCK EXCHANGE.

WHAT DO YOU DO WITH THE MONEY ?

I'd head to a tropical paradise and go deep-sea diving or I'd treat myself to a photo safari in Africa.

A BOOK THAT YOU RECOMMEND ?

Scientific publications, my staple reading matter... only joking! *The Royal Game* by Stefan Zweig.

WHAT IS YOUR FAVOURITE WORD AND FAVOURITE SWEAR WORD ?

I've thought about it a lot, but I don't have a favourite word. My favourite swear word is "Muppet!" ("Grosse nouille!"). ▲

TO BREAK THE RULES,
YOU MUST FIRST MASTER
THEM.


THE VALLÉE DE JOUX. FOR MILLENNIA A HARSH,
UNYIELDING ENVIRONMENT; AND SINCE 1875 THE
HOME OF AUDEMARS PIGUET, IN THE VILLAGE OF
LE BRASSUS. THE EARLY WATCHMAKERS WERE
SHAPED HERE, IN AWE OF THE FORCE OF NATURE
YET DRIVEN TO MASTER ITS MYSTERIES THROUGH
THE COMPLEX MECHANICS OF THEIR CRAFT. STILL
TODAY THIS PIONEERING SPIRIT INSPIRES US TO
CONSTANTLY CHALLENGE THE CONVENTIONS OF
FINE WATCHMAKING.



ROYAL OAK
PERPETUAL
CALENDAR
IN STAINLESS STEEL

AUDEMARS PIGUET
Le Brassus

AUDEMARS PIGUET BOUTIQUES:
GENEVA | ZÜRICH



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in human nature

 ePrivate Banking

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This spacecraft was developed to broaden our horizons and create new opportunities. Swissquote's Robo-Advisor was developed to add a new dimension to asset management.

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