

SWISSQUOTE

FINANCE AND TECHNOLOGY UNPACKED

COVID-19
Interview with
Jean-Pierre Roth,
former chairman
of the SNB

MEYER BURGER
A phoenix
reborn

VIRTUAL EXHIBITIONS
Culture from
the comfort
of your home

DOSSIER

MUSK EMPIRE

How Elon Musk's companies are revolutionising industries

▶ TESLA ▶ SPACEX ▶ STARLINK ▶ NEURALINK ▶ OPENAI ▶ HYPERLOOP ▶

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A busy man



By Marc Bürki,
CEO of Swissquote

One million humans on Mars in 2050. This is just one of the crazy ideas proposed by Elon Musk in recent years. Others include connecting our brains to computers and transporting people through tubes at supersonic speeds.

The South African entrepreneur, who is followed by 39 million people on Twitter, is a purveyor of dreams left, right and centre. He's reached the point where his many projects sometimes seem puzzling and products of his own exuberance.

But that's only the most visible part of Musk's empire. Upon closer inspection, there's a certain consistency in all of his projects, with shared commonalities. For better or for worse, the CEO of Tesla can be viewed as a builder of infrastructure, gradually weaving together a network of companies that benefit each other.

SolarCity (owned by Tesla since 2016) manufactures the solar panels that are a direct source of energy for Tesla's electric vehicles.

Powerwall home batteries store and distribute the necessary electricity. And in the future, the narrow tunnels built under big cities by The Boring Company will transport Tesla autonomous vehicles. Starlink satellites will provide internet access all over the world – though not without impeding the terrestrial orbit in the process, provoking criticism from astronomers such as Swiss Nobel Laureate in Physics, Didier Queloz.

Musk's extreme perseverance and passion for the transportation of the future has reached its zenith with SpaceX. Just 10 years ago, very few people would have believed that a private company would be able to launch astronauts into space so quickly (and return them to Earth safe and sound). The mission was a success. The CEO has given himself 20 years to get a member of his team to Mars, as a first step towards building a colony on the red planet. His experience accumulated thus far in infrastructure development should be useful on Mars.

Happy reading!

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p. 36



ALPINE EAGLE XL CHRONO

The pure yet bold Alpine Eagle XL Chrono is a column-wheel chronograph equipped with a flyback function. Its 44 mm case houses the Chopard 03.05-C chronometer-certified automatic movement, for which three patents have been registered. This exceptional timepiece is forged in Lucent Steel A223, an exclusive ultra-resistant metal resulting from four years of R&D. Proudly developed and handcrafted by our artisans, it showcases the finest expertise and innovation cultivated within our Manufacture.

Chopard

THE ARTISAN OF EMOTIONS – SINCE 1860

COVID-19



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VIRTUAL EXHIBITIONS

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SCANS

e-commerce

AMAZON BREAKS INTO THE INDIAN PHARMACY MARKET



An Amazon India employee at the company's distribution centre in Bangalore.

MANJUNATH KIRAN / AFP

Jeff Bezos's company has launched its new service Amazon Pharmacy in Bangalore in southern India. Consumers can purchase over-the-counter and prescription medications online, as well as traditional herbal medicines and certain health devices. India - which has seen investments of \$6.5 billion - is one of Amazon's top foreign markets, and the US group is constantly seeking to

diversify its activities, as evidenced by its forays into car insurance and food delivery. But the competition is heating up: for example, Indian e-commerce site Flipkart, owned by Walmart, has expanded its offerings to now include alcohol delivery. Reliance Retail, the largest retail chain in India, has also begun testing its own online service.

AMZN WMT RELIANCE



"I don't see any positives [to working from home]"

Reed Hastings, CEO of Netflix, in an interview with the *Wall Street Journal* on 7 September

dating

TINDER EXPERIMENTS WITH VIDEO DATING



JAKUB PORZYCKI / NURPHOTO VIA AFP

Until now, getting to know someone via video chat wasn't very appealing to people using dating sites. But COVID-19 might have changed the game. Since the start of the pandemic, Tinder has been the leading dating app, but after the initial connection, users moved to third-party programs for their first virtual date. So Tinder implemented a video service, which is currently being tested. Both users need to be subscribers, and must also comply with basic conditions such as no nudity. This offering is being tested in countries including France, Spain, Italy, Australia and Brazil. MITCH

hydrogen

AFTER FORMULA E, WELCOME TO THE HYRAZE LEAGUE

The Allgemeiner Deutscher Automobil-Club (ADAC), the second largest auto club in the world, plans to create the Hyraze league starting in 2023, the first championship for hydrogen cars. To pique the interest of new generations, the race will be dual-format: each team will choose one driver for the road races and another for virtual races that will take place online. The results of the two competitions will be

added together. The cars must use green hydrogen, which is hydrogen produced in an environmentally-friendly manner (see our last issue). The ADAC has already found several partners that specialise in motorsport, technology and road safety. These include the competition department of the racing team that manages Mercedes (HWA) and the auto supplier Schaeffler, which are both publicly listed.

SHA H9W



LIGUE HYRAZE

Currently at the conceptual stage, hydrogen racing cars could become reality in 2023.

media

AUSTRALIA SWOOPS IN TO SAVE ITS PRESS

The Australian government is preparing to pass a law that would force Facebook and Google to share their revenue with Australian news media whose information is shared on those platforms. But Mark Zuckerberg's company has already threatened to stop public sharing of news content on Facebook and Instagram in Australia. Google has also warned that the quality of search results and recommendations would suffer, becoming "less relevant and less useful". In other words, if content from Australian media organisations can no longer be freely distributed on those platforms, it will be replaced with non-controlled content, opening the door to misinformation.

FB GOOG



"The longevity of oil companies is in question"

Patrick Pouyanné, CEO of Total, in an interview with *Le Monde*

RANKING

GLOBAL RANKING OF ECONOMIC RECOVERY POST-COVID (score out of 100)

| | |
|----------------|-------|
| 1. FINLAND | 79.03 |
| 2. NORWAY | 77.30 |
| 3. GERMANY | 76.28 |
| 4. SWITZERLAND | 74.73 |
| 5. AUSTRIA | 74.66 |

Source: Horizon Group study "Recover, (Re)build: Exploring Country Capacity Post-COVID"

CHANGE IN PERSONAL SAVINGS IN THE UNITED STATES DURING THE PANDEMIC (as a percentage of disposable income)

| | |
|----------|-------|
| FEBRUARY | 8.3% |
| MARCH | 12.8% |
| APRIL | 33.5% |
| MAY | 24.2% |
| JUNE | 19% |

Source: U.S. Bureau of Economic Analysis

TOP 5 PARENTAL CONTROL PROGRAMS AND APPS IN 2020

- QUSTODIO PARENTAL CONTROL
- KASPERSKY SAFE KIDS
- NORTON FAMILY
- MOBICIP
- BARK

Source: Comparitech



1 second

The time it takes to download nearly 4,000 films in HD, or the entire Netflix catalogue, with the 178 terabit (Tbit) per second fibre optic connection developed by researchers at University College London.

SCANS



+34%

The performance of gold since the start of the year (value calculated on 1 October).



“ETFs are the financial heroes of the crisis”

Andreas Zingg, head of Vanguard in Switzerland, in an interview with Swiss daily *Le Temps*

information technology

GOOGLE'S SUPERCOMPUTER IS SMASHING RECORDS



Artistic drawing of Sycamore, Google's quantum computer.

GOOGLE

Google announced the creation of a new supercomputer with unprecedented performance in the domain of machine learning algorithms. The first tests conducted were truly shocking. The most powerful configuration was able to process a standard algorithm in just 30 seconds, whereas the same process took more

than three weeks in 2015. In five years, processing has become 100,000 times faster. The total processing power is more than 430 petaFLOPS. The previous records were held by IBM's Summit (200 petaFLOPS) and Fujitsu's Fugaku (415 petaFLOPS).

GOOGL

food

CAFFE LATTE AND LOCKDOWN ARE A GOOD MATCH

Emmi was barely affected by the pandemic in the first half of the year. With revenue of 1.77 billion Swiss francs, the central Swiss dairy producer even saw growth of 6.6%. Of course, the Lucerne-based company was able to take advantage of higher milk prices, but most importantly, it benefited from increased demand in Switzerland as a result of border closures. This rising Swiss demand had an impact on the entire range of Emmi's products, particularly the Caffe Latte brand. Its five new acquisitions in the United States, Austria, Brazil, Italy and Chile also had a positive impact on revenue.

EMMN



Urs Riedener, CEO of Emmi, at a press conference on 2 March in Lucerne.

SAMIR TOUJISI / AFP

industry

NIKOLA, THE LORRY THAT DIDN'T DRIVE

The video was beautiful. On 25 January 2018, the start-up Nikola published a video on YouTube in which the Nikola One, its hydrogen lorry prototype, was driving on an empty road in the desert (see *Swissquote Magazine* of September 2020). But the articulated lorry wasn't actually functional. It didn't have an engine, so it was towed to the top of a hill and then pushed, with inertia carrying it downwards. The con was revealed by Hindenburg Research on 10 September. In a damning 67-page report, the investment company accused Nikola of being a "complex fraud based on dozens of lies". In addition to the lorry not actually driving through its own propulsion, the start-up exaggerated its technological advance and the performances of its vehicles. Following the publication of the report, Nikola's shares on the market plunged, which worked out well for Hindenburg Research. A "short-seller", the company actually bet that the share price would go down. Since then, trouble has only continued for Nikola: US markets watchdog, the SEC, opened an investigation, Nikola's founder and CEO Trevor Milton resigned and General Motors, which announced a partnership with Nikola on 8 September, has withheld its investment. To top it all off, Milton has now been accused of sexual harassment. NKLA



NIKOLA MOTOR

Billed as a working prototype of a fuel cell-powered HGV, the Nikola One was in fact just an empty shell.



2.2 BN

The amount in dollars that Daimler will spend to close the Dieselgate case in the United States.



“The strategy we chose was the right one”

Swedish Prime Minister **Stefan Löfven** on the pandemic, in the *Dagens Nyheter* newspaper on 21 August

KICKSTARTER



CELL

CELL

DISINFECTANT FOR YOUR SMARTPHONE

Developed by American start-up Ampere, Cell is a small device that can disinfect commonly-used objects such as smartphones, keys and headphones without touching them. The flexible rectangular box contains LEDs that produce a 360° ultraviolet light, as well as two chargers – one wireless and another with a USB-C connector. The light emitted from the device cleans the objects' surfaces, with the process taking less than one minute for a smartphone. The device can also be used for larger surfaces such as doorknobs, keyboards and packages. To expand the device, simply remove the smaller cover and unfold the box entirely to expand it. While it recharges, the expanded box can also act as a stand for your smartphone. Launched in the middle of a pandemic, Cell seems destined for success. The initial fundraising goal was exceeded in just seven days.

FUNDS RAISED \$133,232

AVAILABLE NOW



4.1 BN

The total in dollars of global venture capital investments in edtech (education technology) start-ups in the first half of 2020 – \$1.5 billion more than in the first half of 2019.



“This is about Disney needing to find a new way to do business that doesn’t require a lot of people to be in one place”

Lloyd Greif,

a banker specialising in Disney, in the *Washington Post*

video games

TENCENT ACQUIRES A FRENCH UNICORN



An image from the *Fire Balls 3D* game by Voodoo.

VOODOO

Chinese company Tencent has added a new star to its gaming empire, taking a minority stake in Voodoo, one of the largest producers of so-called hyper-casual games. The transaction amount has not been made public, but the value of the French company is estimated at between \$1.4 and \$1.6 billion. This transaction will allow Voodoo to grow

its presence in Asia Pacific's enormous gaming market. Voodoo has racked up a total of 3.7 billion downloads on iOS and Android, 25% of which are by users from the Asia-Pacific region. Tencent will inherit all of Voodoo's mini-games, an ideal complement to its WeChat messaging platform, which already includes a similar gaming platform. — 0700

THE FLOP

Virtual reality arcades

Even before the pandemic, virtual reality arcades equipped with headsets and other dedicated equipment were far from extremely successful. IMAX already closed its seven arcades in late 2018, after investing tens of millions in virtual reality.

Coronavirus could be the last straw for this type of activity. This summer, Disney ended its partnership with a start-up that offered a virtual Disney experience. Spaces, another start-up in the industry, was acquired

in late August by Apple and has pivoted its business model towards virtual environments for video conferencing software. And even as Facebook continues its efforts in this industry, this type of experience is clearly not a priority, as it has just pulled its flagship title *Beat Saber* from virtual reality arcades. But there could be a glimmer of hope from China or Japan, where these types of arcades seem to be becoming increasingly integrated into gaming culture.

— IMAX — DIS — AAPL — FB

THE PIONEER SPIRIT LIVES ON.

Commemorating the very first aviators and explorers sharing their heritage with Longines.



Howard Hughes, a famous inventive pioneer in the world of aviation, circum-navigated the globe in record time, using his trusted Longines aviation chronometers and chronographs to guide him safely over land and sea.

In 1935, **Howard Hughes** was the fastest flyer in the world. He set the airspeed record of 352mph (566 km/h). But what makes Hughes' story so especially impressive, is that the plane he flew in, was of his own design. Hughes was no ordinary record-breaking pilot – he was also an aeronautical engineer, business magnate and successful Hollywood movie producer. Yet it was his fighting spirit and courage in the face of the unknown, that compelled him to keep pushing forward. Just a few years later, Hughes circumnavigated the globe.

His journey took him only 3 days, 19 hours and 14 minutes... and of course, he was the fastest man to do so. Hughes always trusted his Longines astronavigation chronometer to determine the exact position of his airplane at night, in total darkness and over the many vast oceans he crossed.

How we face the fall is what separates the pioneer spirit from the rest. Falling with elegance, when all the odds are stacked against you. Trying, failing, fighting and triumphing with elegance. This is what's remembered, what remains – when all else has been stripped away.

The Longines Spirit Collection was crafted to embody precisely this. A careful blend of elegance, tradition and performance – with the same distinct features that were tailored to assist the very first aviators: from the proofed accuracy to the oversized winding crown, to be adjusted easily while wearing gloves; prominent high-contrast numerals; and hands with luminescent coating, for nighttime flying. A powerful reminder that the pioneer spirit lives on.

LONGINES

semiconductors

NVIDIA FLYING HIGH AFTER THE ACQUISITION OF ARM



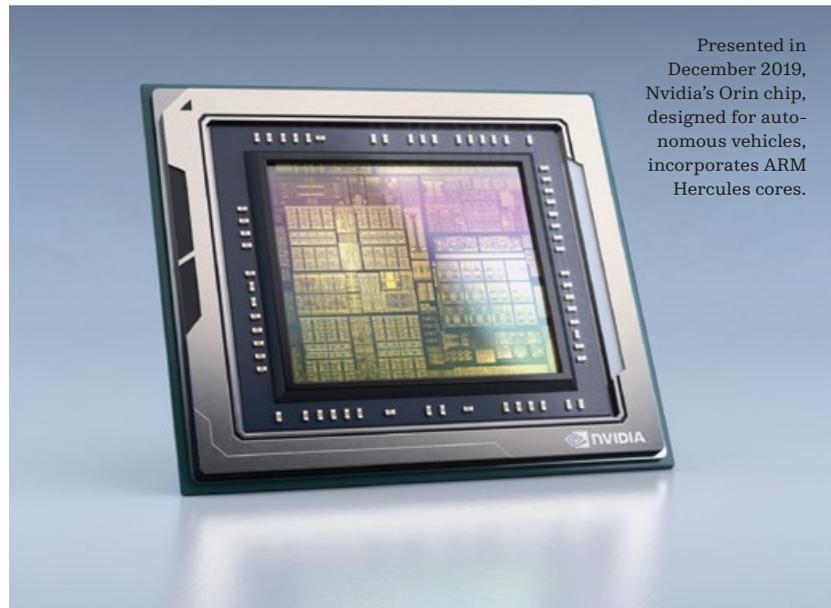
“It’s hard to believe we’ll be able to switch our model to full-time employment quickly”

Dara Khosrowshahi, CEO of Uber, in an interview with MSNBC, following a ruling by the California Supreme Court requiring Uber and Lyft to reclassify their drivers as employees



\$16.55 BN

The amount invested worldwide in the first half of 2020 in biotech and life science start-ups – approximately \$3 billion more than the previous year.



Presented in December 2019, Nvidia’s Orin chip, designed for autonomous vehicles, incorporates ARM Hercules cores.

NVIDIA

The deal made headlines in the technology sector. The California graphic chip manufacturer Nvidia announced in mid-September that it was acquiring ARM for \$40 billion. While fairly unknown to the general public, the UK company designs the architecture used in most of the chips that power smartphones and tablets (see *Swissquote Magazine* no. 3 2020). Its clients include companies such as Qualcomm, Samsung, Apple, and Huawei. Nvidia is also a client:

it uses ARM architecture to design its Tegra chips that are used mainly in the automotive industry and Nintendo Switch consoles. Together, Nvidia and ARM will create a tech giant that will be a heavyweight in promising domains such as artificial intelligence, autonomous driving, the Internet of Things, and 5G. Due to legal obstacles with competition laws, Nvidia is expecting the transaction to be completely finalised in 18 months.

— NVDA

THE IPO

PALANTIR LIFTS THE VEIL

One of the most famous big data analytics specialists has gone public on the NYSE, lifting the veil on its activities. Thus far, Palantir’s operations have remained a closely guarded secret, as its clients are primarily US government agencies, including the CIA, the NSA, the FBI, the Marine Corps and even the famous West Point military academy, among others. For its

IPO, the company chose the direct listing route, similar to the process adopted by Spotify and Slack. This process allows investors to sell their shares in the company from the first day, without having to wait for the lockup period to end. However, this means Palantir was unable to raise additional funds like they would have in a traditional IPO. — PLTR

3 DAYS, 19 HOURS, 14 MINUTES

That is how long it took for **Howard Hughes** to circumnavigate the world and become the fastest man in the air in 1938. He trusted his Longines astronavigation chronometer to determine the position of his airplane at night or over the ocean.



Howard Hughes



THE PIONEER SPIRIT LIVES ON.

5 5-YEAR WARRANTY
MAGNETIC RESISTANT
SI BALANCE-SPRING

LONGINES SPIRIT
COLLECTION

LONGINES

TRENDS



The figure

ANDERS OPEDAL

The CEO who loves oil and gas

Position
CEO

Age
52

Nationality
Norwegian

Anders Opedal is the first engineer to lead Equinor (formerly Statoil), the largest company in Norway. Before becoming CEO, he was executive vice president of Technology, Projects and Drilling. On 2 November, he will replace Eldar Saetre, who will retire after more than 40 years with the Norwegian giant. While large European companies such as BP

and Eni have promised reductions in their oil and gas production, Opedal has announced that Equinor is maintaining its objective to increase oil and gas production by 3% per year until 2026. However, the company will also seek to develop new activities in the hydrogen industry and in carbon capture and storage, as well as other low-carbon solutions [by reducing the cost of these technologies to make them commercially viable].



The country

CAMBODIA

The kingdom of microcredit

Bangladesh is considered the homeland of microcredit, but it is in Cambodia that microcredit has actually been the most successful. According to its central bank, there were more than 160,000 branches of microfinance institutions in 2016 – practically one for every square kilometer of Cambodia. The average debt is \$3,320, which is nearly double the GDP per capita, and credit is growing by 40% per year. This microfinance boom has resulted in several benefits. For example, the percentage of households using informal moneylenders has fallen from 32% to 6%. Microfinance has also improved agricultural methods and quality of life for Cambodia's poorest residents.

Unfortunately for the country's economy, the coronavirus crisis has impacted the entire textile industry, which employed some 740,000 people. One third of all factories have stopped production. Tourism, the second-largest industry in the country, has been hit even harder.

Population
16,486,542
(2019)

GDP per capita
\$1,643 (2019)

Growth
+7.1% (2019),
2020 estimate:
-1%

Main economic sectors
services, textiles, tourism, agriculture (rice, rubber, corn, etc.)



The innovation

ADIDAS FUTURECRAFT LOOP

Completely recyclable trainers

Adidas is currently developing a trainer made from a single material that can be recycled in its entirety, dubbed the Futurecraft Loop. The idea is that once the trainer has reached the end of its lifespan, it can be remanufactured to produce a new trainer that is identical to the original model, following the principle of the circular economy.

To achieve this, the Adidas teams use TPU, a thermoplastic polyurethane assembled by the hot-melt method, which can be shaped in

various ways to produce every component of a trainer. This isn't the first attempt by the German firm – in 2016 it presented the Futurecraft Biofabric, a trainer that was already partially recyclable, with the notable exception of the sole.

The new project is still being tested: 200 pairs were distributed to a panel of carefully selected wearers, and then returned to the factory to be recycled. New pairs were then produced from the recycled materials and will need to be tested.

According to Adidas, developing this project was the focus of nearly 60 employees across four continents over six years, with the main challenge being to successfully reduce the number of materials used. The Futurecraft Loop trainers are expected to be available in limited quantities during the spring/summer season 2021. Unfortunately, the sale price remains unknown for the moment.

Manufacturer
Adidas

Availability
spring-summer
2021

Price
not disclosed

ADIDAS

Europe on the sidelines of the SPAC revolution

It's the phenomenon of the 2020 market year in the United States: companies with no commercial operations go public for the sole purpose of acquiring another company to publicly list, with the IPO making this process easier. The lack of regulation is keeping this process from taking off in Europe.

BY ANGÉLIQUE MOUNIER-KUHN

A new fever has spread across the US markets – but, for the time being, it hasn't reached Europe. Time and again described as a “mania” or a “frenzy” by American media, the phenomenon is all about SPACs, an acronym for Special Purpose Acquisition Company, also known as a blank cheque company.

The concept is simple: a public listing vehicle, an empty shell with no history or activity, is introduced on the market with the sole purpose of raising capital. Anywhere from 18 months to two years later, that capital will be used to conduct a leveraged buy-out of a generally non-public target company that has actual business operations. Since the two entities are merged, the target company becomes publicly listed by default, without having to comply with the tedious and costly

regulatory procedures of a traditional IPO. “The benefits of an IPO with the flexibility of M&A!” says Chardan, a New York advising bank that claims to be the leader in helping SPACs get on the market.

In the United States, this concept is appealing to both sides of the equation. On the target company side, DraftKings, which specialises in sports betting, and Nikola, an electric vehicle manufacturer,

had explosive IPOs this year after being brought onto the market by SPACs. On the sponsor side, many celebrities have launched their own SPACs, such as Gary Cohen, ex-economic advisor for the White House, Paul Ryan, former Speaker of the US House of Representatives, and former baseball star Billy Beane. In July, billionaire investor Bill Ackman made headlines when he raised \$4 billion, an all-time record, with his SPAC Pershing Square Tontine Holdings, whose declared objective is to target a “mature unicorn”. This summer, rumours were flying that the SPAC was targeting short-term rental giant Airbnb, but that petered out.

Some thought that this was the start of a new bubble, or a “disruptive” fundamental trend for the IPO market, because it simplifies the

process and removes big investment banks from their very lucrative role as intermediaries and advisors – but this trend has barely affected the European financial scene.

It's true that blank cheque companies don't always get great media coverage, as their reputation has been tarnished by a series of scandals since they started appearing in the 1980s. It took a serious restructuring of the regulatory framework and years of recovery after the financial crisis of the late 2000s for these structures to timidly resurface on Wall Street, where they have since proliferated. As of mid-September, 95 SPACs went public this year, raising \$37.7 billion, according to the database SPACinsider.com, compared to 59 SPACs and \$13.6 billion in 2019, which was itself a record year. Proportionally speaking, nearly 60% of new listings on the New York Stock Exchange (NYSE) are now associated with SPACs.

company hoping to be listed must have at least three financial years audited, it would be impossible for a SPAC to be listed on the Zurich exchange.

The pan-European exchange Euronext counted five SPAC IPOs between 2007 and 2018, of which four are listed in Amsterdam and one in Paris. The latter, Mediawan, raised €250 million in 2016, to become a leading audiovisual group in Europe, after approximately 20 acquisitions and holdings. But since February 2018, there have been no SPACs among the fifty-odd companies that have gone public on the Euronext.

That said, Europe is not an indifferent counterpart to the United States' enthusiasm for this vehicle – in fact, far from it. A conference on the subject was supposed to be held in London this spring, but was cancelled due to COVID-19. Associate professor at Edhec Business School in Lille, Milos Vulcanovic has been studying SPACs for 15 years and says that his research articles “have been downloaded more times than ever this year and by people from around the world. It's a real boom!” According to Vulcanovic, in a context dominated by uncertainty, investing in a SPAC has the advantage of presenting no risks to the investor, at least until the acquisition of the target company. “The funds are secured in a trust and investors can withdraw these funds until the acquisition, which investors can also vote on,” he says. Once the merger is complete, the SPAC disappears because the target company is now the one listed. A significant proportion of SPACs are also liquidated if they have not found a target company within the allotted amount of time (24 months maximum).

Vulanovic's research shows that once target companies go public, they underperform traditional IPOs on average, but “that's why they need to be analysed on a case-by-case

basis, since confidence in the sponsor of the SPAC is a key factor.”

At the headquarters of the pan-European exchange, the phenomenon is regarded with both interest and envy. “SPACs are welcome on the Euronext markets,” says René van Vlerken, head of listing at Euronext Amsterdam. According to van Vlerken, the dynamics of different markets explain the contrast between Europe and the United States. In the United States, the success of SPACs seems primarily to be driven by demand from individual or semi-professional investors, whereas European markets are dominated by institutional supply and demand. Furthermore, “Europe cannot count on such full track records as in the United States,” adds van Vlerken. “We will need to see several successful transactions to attract attention and open the market, such as the SPAC Dutch Star Companies ONE, introduced in 2018, which successfully led telecoms company CM.com to an IPO in February.”

But according to Vulcanovic, without a specific regulatory framework, Europe is not close to making up for lost time, with the notable exception of Italy, where SPACs have a specific definition and there are now dozens on the market. Meanwhile, in the United States, the Securities and Exchange Commission has begun recruiting large numbers of SPAC specialists – proof that it expects this phenomenon to stick around. ▲

INTERVIEW

Bitcoin in the big leagues

The leading cryptocurrency has been quite resilient during the coronavirus crisis. It's becoming an increasingly reasonable investment, according to blockchain expert Roger Darin.

REMARKS COMPILED BY LUDOVIC CHAPPEX

The historic blow that destroyed stock markets between mid-February and mid-March due to COVID-19 did not spare cryptocurrencies. During that time, Bitcoin shares plunged, falling more than \$10,000 and landing under \$5,000 in less than a month. But while the fall was brutal, the subsequent ascent happened almost just as quickly. Approximately two months later, Bitcoin has returned to the \$9,000-\$10,000 range. The current period of relative calm is a great time for an update on the situation. Roger Darin, a man who wears many hats in the cryptocurrency industry – consultant at Inacta, product manager at start-up Inapay, community manager at Bitcoin Association Switzerland and guest professor at several universities and business schools in Switzerland, to name a few – shares his opinion with us.

What is your opinion on Bitcoin's price drop in February–March?

The fall was clearly due to liquidity needs from investors. Many had margin calls due to the global markets plummeting. The two most recent dips in the Bitcoin share price are because of this.

Bitcoin continues to clearly dominate the cryptocurrency market. Do you think that this situation will last in the months and years to come?

In terms of global capitalisation, I think so. Bitcoin is increasingly seen as a safe investment, including by institutional investors. On the other hand, in terms of transaction volumes, other cryptocurrencies are on the rise, particularly tokens associated with DeFi (ed. note: an acronym for Decentralised Finance, a trendy alternative finance based on block-

chain where individuals can create and access financial services). This sector has exploded in recent months and volume has doubled. The platform Uniswap, for example, is experiencing growing success. Security tokens are another new trend, as evidenced by the success of the token Tezos (XTZ).

Is the current economic situation still favourable for Bitcoin?

Yes, because at a time when governments are implementing potentially hazardous expansionist monetary policies, the intrinsic scarcity of Bitcoin gives it a certain value. The limited number of Bitcoin is a characteristic of the blockchain technology. This is a rare guarantee that traditional currencies do not offer. In that sense, Bitcoin is a real alternative to gold.

The share price of Bitcoin seems to settle rather solidly above \$10,000. That's 10 times higher than it was four years ago. However, it's still far from the stratospheric rise that the most keen experts were predicting...

And that's a good thing. Too much volatility is a difficult parameter to manage for asset managers. Instead, a progressive growth is preferred, so that Bitcoin can continue to gain credibility and lead in the finance world. ▲



ROGER DARIN
HEAD OF BLOCKCHAIN ADVISORY
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¹La valeur cible provisoire de 115 g/km de CO₂ selon le nouveau cycle d'essai WLTP correspond à la valeur cible de 95 g/km de CO₂ selon la procédure de mesure du NEDC.
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DOMINIC BÜTTNER

“We need to think of this crisis as a natural disaster”

The former chairman of the Swiss National Bank, Jean-Pierre Roth, gives his analysis of the current unprecedented economic situation.

BY ANGÉLIQUE MOUNIER-KUHN

An economics graduate, Jean-Pierre Roth spent the majority of his career at the Swiss National Bank (BNS) and was its chairman from 2001 to 2009 – so he was responsible for Swiss monetary policy when the 2008 financial crisis broke out. Twelve years later, as the global economy is once again in tatters, Roth – who is now on the board of several jewels of the Swiss economy – is optimistic about the outcome of this crisis that is like no other.

What is your perspective on the current global economic crisis?

We are dealing with the consequences of an abrupt production standstill, which has nothing to do with a cyclical economic downturn. That means that when the economy starts back up again, it will be able to do so with production potential intact. But the overall context will have changed: the economy has been weakened as corporate financial situations have deteriorated and public sector debt has increased. To give

just one example, France announced a recovery plan in which public debt will increase from 100% to 120% of its GDP. And yet, public debt reached just 75% of GDP during the 2008 financial crisis. Another aspect that will complicate recovery efforts is the travel restrictions put in place to limit the spread of coronavirus.

“Government debt has gone from worrying to unreasonable”

Since the start of the crisis, governments have decided to support their economies at all costs. Were there other options?

Countries clearly responded appro-

priately. When lockdown measures were implemented, governments had to prevent companies from experiencing a liquidity crisis, keeping them in a sort of artificial coma until they are able to recover. It was just as necessary to support wages to maintain demand. But the room for financial manoeuvre is slim. Just like the disaster film *The Perfect Storm*, we're now faced with a new crisis and we still haven't completely recovered from the 2008 crisis.

At the time, countries took on a lot of debt and central banks revised their interest rates to near zero to restart the economic machine. But this new crisis began at a time when this financial room for manoeuvre was starting to run out. Government debt has gone from worrying to unreasonable, because no-one had the courage to get things back on the right track sooner. Countries promised to stabilise their situations, but they didn't do so: it was likely ▶

a difficult political move, and it's quite tempting to continue taking on debt when rates are at zero.

Central banks have never had such expansionist policies as they do currently. Are they acting within their mandate when they buy back financial assets en masse?

The primary role of central banks is to ensure price stability and contribute to financial stability as a whole. As inflation was no longer the main issue, central banks have gradually abandoned their traditional role of establishing monetary policy and now focus more on financial management. They essentially don't do much more than that.

“Investors lack alternative investments to offset the zero interest rates, which encourages them to take even more risks”

In 2008, they all reacted the same way at the same time, lowering rates and adjusting liquidity. It wasn't because the central banks had a quick call and coordinated their plans. Their governors just all went to the same universities, where they were all taught that maintaining monetary and financial orthodoxy amplified the effects of the 1929 crisis. In 2008, the course of action followed one rule, to which central banks have remained faithful ever since: do not repeat the mistakes of the 1930s.

Now, with interest rates at zero, there's only one remaining option

to avoid adding a public debt crisis on top of the current situation: purchasing public debt securities. This will allow governments to finance their support programmes via additional debt, without the signature of these programmes being called into question.

But in the absence of historical precedent, central banks are navigating completely unknown territory.

Avoiding repeating the errors of the 1930s meant taking an unconventional approach. In the monetary domain, unconventional measures should not be long-term, because they could cause damaging secondary effects.

If we're lucky, we might be able to do away with unconventional measures if the economy recovers on its own. If not, we may need an exit strategy. Right now, we don't have one.

The minimum rate established between the Swiss franc and the euro between 2011 and 2015 is a good example of an unconventional measure. It was based on the assumption that the euro would gradually increase beyond 1.20 Swiss francs, which would have made the exceptional measure obsolete. But when the Swiss National Bank realised that this assumption was incorrect, as the euro would not recover due to a lack of the necessary macroeconomic conditions, it decided to abandon the strategy, which had become suicidal. That was the right decision.

In the current context, only an economic recovery would allow for monetary policy to return to normal. For now, there are no signs that we have reached that point.

You spoke about the harmful effects of unconventional monetary policy. What are these effects?

The most obvious is financial inflation: mortgage debt is increasing and

the markets are booming because stocks are the only assets that offer a return right now. Investors lack alternative investments to offset the zero interest rates, which encourages them to take even more risks. This is also what pushes investors towards private equity or other forms of more sophisticated investments. So the situation has become considerably riskier for investors.

Despite support plans and liquidity injections, there are no signs that inflation is returning. In fact, we're seeing deflationary pressure. How could that be?

We are in a tricky situation when it comes to liquidity. The zero or negative interest rates are supposed to encourage economic players to spend rather than save. But due to the uncertainty of the current situation and heightened concern over retirement as pension funds are increasingly unstable, people tend to hoard the funds they receive. Building trust doesn't happen just by lowering interest rates to zero.

So the real economy doesn't actually benefit from massive liquidity?

No, because demand doesn't pick up again unless it is driven by credit, i.e. real estate. Inflation will only occur if people stop storing cash under their mattresses and if consumer demand rallies. Because of the uncertain future, we haven't reached that point yet.

Will government recovery plans be able to create the necessary confidence shocks?

The recovery plans tend to be extraordinarily complex: they include support measures in every possible domain. But they are missing something vital: a feeling that there is light at the end of the tunnel. As long as question marks continue to loom over economic and public health concerns, companies will be hesitant to invest and consumers will avoid consuming beyond their usual habits.

But I refuse to be pessimistic, because, once again, the shock we are facing is technical and not cyclical. The economy is just waiting for confidence to return in order to climb out of this crisis. That is the delicate problem that governments must solve.

In more positive news, banks have been quite resilient. Is that the result of reforms established after the 2008 crisis?

Banks have been resilient so far because the risks associated with COVID loans granted to companies are guaranteed by governments. Banks are also better equipped to handle a crisis because their capital positions are much stronger than they were in 2008.

But we still don't know how the economy will react in the long term. The crisis began in February, and we will need at least a year before we can determine the extent to which bankruptcies and loan defaults have taken place.

The good news is that governments continue to be very attentive to what companies are going through.

They are doing everything within their power to prevent a corporate crisis in the wake of the coronavirus crisis, as such a crisis would be

“Building trust doesn't happen just by lowering interest rates to zero”

destabilising for the banking system. I have a feeling that a good portion of government-issued loans will turn into subsidies, simply because there are no other solutions. It would be absurd to let companies in debt go to the wall if they remain in a good place operationally – and the government wouldn't get its loans back in any case.

In fact, we need to think of the COVID-19 crisis as a natural disaster: there's no private insurance that you could possibly have against this

type of risk. The only possible entity that could provide insurance is the state. The risk should be distributed evenly across society as a whole rather than being concentrated on just a few economic players.

What do you think the global economy will look like after this crisis?

I think that people who are proclaiming the end of globalisation are wildly incorrect. Globalisation is a reality of our modern world and it is in all of our best interests for globalisation to continue. International work sharing is the best way to spread prosperity around the world. Falling back to protectionism would be ridiculous.

I am convinced that we will continue to operate on a global scale, even if we will likely do so more carefully: resilience must take precedence over seeking efficiencies, and some companies will in all probability consider the way they manage their risks. Finally, the biggest danger would be if Donald Trump gets re-elected to the White House and he continues his policy of further withdrawing the United States from the global economy. ▲

NINE YEARS AT THE HEAD OF THE SNB

Jean-Pierre Roth humbly admits that the current time period – which combines health concerns, market exuberance and economic disaster – defies logic. And this is coming from an experienced professional, who, as a central banker, had to handle several economic and financial crises, and who, over the years, was confronted with delicate issues such as saving UBS and

the revelations that the Swiss National Bank (SNB) purchased gold from the Hitler regime.

After completing a doctorate at the Graduate Institute Geneva (IHEID) and post-doctoral studies at Massachusetts Institute of Technology, Jean-Pierre Roth joined the SNB in 1979. He began as an economist before being elected to the governing board in 1996, first as vice-chairman and then as chairman from 2001 to 2009. The Valais native focused on strengthening the SNB's

international relations and was Switzerland's representative to both the IMF Board of Governors and the Financial Stability Board. He was also chairman of the board of directors of the Bank for International Settlements in Basel between 2006 and 2009.

Known for being reserved and always willing to mentor others, he left the SNB in 2009 and was chairman of the Geneva Cantonal Bank from 2010 to 2017. He sits on the board of directors of several major Swiss groups.

Disinfecting the world with ultraviolet rays

UV-C rays can disinfect objects, buses and even offices. This high-tech method is being used around the world to eliminate all traces of coronavirus.

BY BERTRAND BEAUTÉ

Strange little robots have been moving about the terminals of London Heathrow airport since July. Equipped with long bluish bulbs, they emit ultraviolet rays that disinfect corridors, lifts and escalators. "This technology is not new. It's been used for more than 30 years to disinfect water, particularly in pools to avoid the use of chlorine [see also p. 261]," says Benoit Gillmann, founder and CEO of the public company Bio-UV, which specialises in ultraviolet water disinfection technology. "But before the pandemic hit, we didn't use it very often to clean surfaces."

The SARS-CoV-2 coronavirus pandemic changed everything. "All of a sudden, UV rays have become popular," Gillmann says with a smile. To reduce the risk of infection, the entire world has been searching for the best solution to disinfect a wide range of surfaces, from office furniture to the interiors of buses, metro trains and planes. Even small objects need to be cleaned, as many shops want to disinfect – but not damage – smartphones and other products that are touched by potential customers.

And so ultraviolet rays quickly became the preferred option. Emitted at certain wavelengths (close to 250 nanometres, giving them the name UV-C), these rays are able to kill bacteria and viruses, including SARS-CoV-2. "Compared to other disinfection methods, particularly chemical methods, UV-C rays have an advantage in that they don't pollute, they don't leave behind toxic residue and in particular, they don't damage surfaces," says Gillmann. "Thanks to these qualities, the UV-C surface treatment market has skyrocketed since the start of the pandemic."

Boeing, for example, announced on 26 August that it was testing a portable UV disinfection solution developed by the manufacturer Honeywell. This weapon against COVID-19 is expected to appeal to many airlines, since chemicals cannot be used on certain parts of a plane, in particular the cockpit and its electronic components. In Shanghai (China), public buses are already being disinfected via this method, and closer to home, in Europe, several supermarkets are using UV-C rays to clean their shopping trolleys. ▶



After six of its doctors contracted COVID-19, the Abano Polyclinic in Italy chose to disinfect its rooms and operating rooms with UV-C rays, using robots from the Danish company UVD Robots.

Elsewhere, the largest European escalator manufacturers, Thyssenkrupp, Schindler, Otis and Kone, have begun testing and installing UV boxes on their escalators in shopping centres, hospitals and train stations. UV-C rays can also kill coronavirus in ambient air via machines that look like large air conditioners. The company UV-Germi, for example, has participated in a call for tenders in the Middle East to equip stations welcoming the public (bus stations and metro stations) with its Germi Airclean air purifying system.

“Demand is currently very high for UV sterilisation devices,” confirms Johann Carrier, an analyst at Invest Securities. “It’s reached such a point that it’s become a challenge for some companies in the industry to meet demand.” Enticed by this boom, many inexperienced companies have entered the sector. “A flood of cheap products has arrived on the market,” says Gillmann.

“But most of them are not certified and have not proven that they are effective against coronavirus.” Several alerts have been published around the world regarding

poor-quality UV lamps. In July, for example, Migros had to recall a “UV-C Mini 3” sanitising device from supplier Sonnenkönig of Switzerland, because the device did not meet the “electrical and photobiological safety requirements necessary under

Boeing announced that it was testing a portable UV disinfection solution

the current standards.” But this competition doesn’t worry André Bordas, CEO of UV-Germi, a public company that supplies the UV disinfection devices that are used in EDF Group’s nuclear power plants: “The invasion of cheap Chinese products is here. But they’re mainly targeting the consumer market, whereas our products target companies. And in any case, considering the current needs,

there’s room for everyone.” While demand for UV disinfection devices has soared during the pandemic, companies in the industry are cautious about the development of the market. “During H1N1, we developed an air purifying system using UV-C rays. But the crisis quickly passed and we didn’t sell any devices for the next 10 years,” says Bordas. “Now, people are fighting to buy our machines. We’ve started installing them in retirement homes and business premises. We’re struggling to meet demand. But what will happen when the pandemic is over? Given our experience of H1N1, I know that everything can end very quickly.”

But for Benoit Gillmann, the emerging UV-C decontamination market is here to stay: “I think that this pandemic will lead to a real awareness. In many industries, including hotels, restaurants, transport and commerce, companies are realising that they need to invest in hygienic solutions for their employees and clients. And in hospitals, UV disinfection could reduce hospital-acquired infections. In my opinion, the surface decontamination market is clearly what lies ahead. But it takes a particularly shrewd mind to judge the size of the market. Since it’s a new market, it’s very difficult to evaluate.”

Johann Carrier at Invest Securities, agrees: “After the 2003 heat wave, all retirement homes were equipped with air conditioners. They became a standard piece of equipment. I think we’ll see a similar situation after this pandemic. UV-C disinfection will become commonplace. What’s appealing to companies in the industry is that they generate a significant portion of their revenue (ed. note: approximately 30%) from consumables. For example, once a device is installed, you need to change the bulb regularly. That ensures predictable revenue over time.”

WATER: THE REAL CHALLENGE

While UV-C disinfection of air and surfaces is currently a hot topic, the traditional market for this technology is water treatment. “Ultraviolet rays are used to treat pools, aquariums and ballast water for ships,” says Benoit Gillmann, CEO of Bio-UV.

While the first two markets are mature, the third is growing. Since 2019, all merchant ships have been required to treat their ballast water – the water held in cargo holds for balance and to provide stability – in order to

prevent the spread of invasive species. In practice, the 50,000 ships in the global fleet have until 2025 to comply with the regulation, which represents a \$15 billion market. Half of this amount is expected to be spent on UV disinfection, whereas other ship-owners prefer electrochlorination technology. Companies expected to benefit from this windfall include Swedish group Alfa Laval, the global leader of UV-C disinfection for ships, as well as Canadian firm TrojanUV and French company Bio-UV.

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IN FIGURES

805

The current number of employees

-52.5%

The decline in sales for Meyer Burger in the first half of 2020. In 2019, sales had already fallen 22.1%

800 MW

The annual capacity of photovoltaic modules that Meyer Burger plans to assemble in Germany's Solar Valley. Last year, the global annual capacity was 594 GW

KEYSTONE

MEYER BURGER A PHOENIX REBORN

To survive, the Swiss photovoltaic supplier is changing its strategy by launching its own production of solar panels. The goal is to win back market share from China.

BY JULIE ZAUGG

Catastrophic results, arguments among shareholders, and a share price in free-fall. In March, the Thun-based group Meyer Burger seemed to be on the verge of collapse, ready to go under at any moment. At the tail end of winter, the solar energy specialist published a huge loss of 39.7 million Swiss francs, four times higher than expected. The future seemed even bleaker, as CEO Hans Brändle announced on the same day that he would be leaving the company at the end of March (see inset on p. 30). With no CEO and no profits, Meyer Burger's future was hanging in the balance and its share price lost more than half of its value.

The Swiss start-up could very well have joined the ranks of another failed German photovoltaic expert — SolarWorld — which went under in 2018. The situation was dire. But since the sombre month of March, the tides seem to have turned for Meyer Burger. In May 2020, Gunter Erfurt, the new CEO, an-

nounced a radical strategic change: Meyer Burger, which previously supplied machines to make solar panels, would now produce its own photovoltaic modules. "We realised that Meyer Burger, as a machine supplier, was unable to turn a profit, despite its leading technological advances," said Meyer Burger CEO Erfurt as he justified the strategic change.

"By deciding to keep its equipment internal and use it themselves to make solar panels, the company can better protect its intellectual property"

Eugen Perger, analyst at Research Partners

The shift was due to the fact that the Thun-based group had to contend with infringement and copying. "Each

time Meyer Burger developed a new generation of machines, the technology was copied and reproduced in China two or three years later, which destroyed its main competitive advantage," said Eugen Perger, analyst at Research Partners who covers the company. "By deciding to keep its equipment internal and use it themselves to make solar panels, the company can better protect its intellectual property."

To successfully carry out this ambitious, unprecedented change of direction in the solar industry, Meyer Burger raised 165 million Swiss francs in July via a capital increase. The company also sold off several subsidiaries, including German microwave and plasma manufacturer Muegge, which was classified as "non-strategic" and was sold in early August for 24 million Swiss francs.

These funds will be used to develop the necessary manufacturing facilities in Germany's Solar Valley, >

an industrial region located along the motorway between Berlin and Leipzig. This now struggling region was the birthplace for the German photovoltaic industry in the early 2000s. During those prosperous years, the region employed 3,500 workers who specialised in photovoltaics.

But the emergence of the Chinese solar industry has put a brutal end to this growth by inundating the market with inexpensive solar panels, causing prices to drop 80%. Between 2004 and 2014, the production of Chinese solar cells increased by a factor of 100, according to a study published in *Nature*. In Germany's Solar Valley, China's rise to power has led to a wave of bankruptcies.

The CEO of Meyer Burger now hopes to revive the region: "The factories for making photovoltaic cells and modules are already in place, as are the supply chains. There are also many experts and qualified workers that have expertise in the solar

industry." Higher salaries were long considered a hindrance, but they are no longer an impossible obstacle. "Today, photovoltaic plants are for the most part automated, which reduces workforce costs," said Edurne Zoco, expert in renewable energies at IHS Markit.

"Solar energy is the fuel of the future. So it is vital that we keep the keys to this market in Europe"

Gunter Erfurt, CEO of Meyer Burger

For the new CEO of the Thun-based company, fighting China's hegemony is also an ideological battle: "Letting China produce all of the world's solar

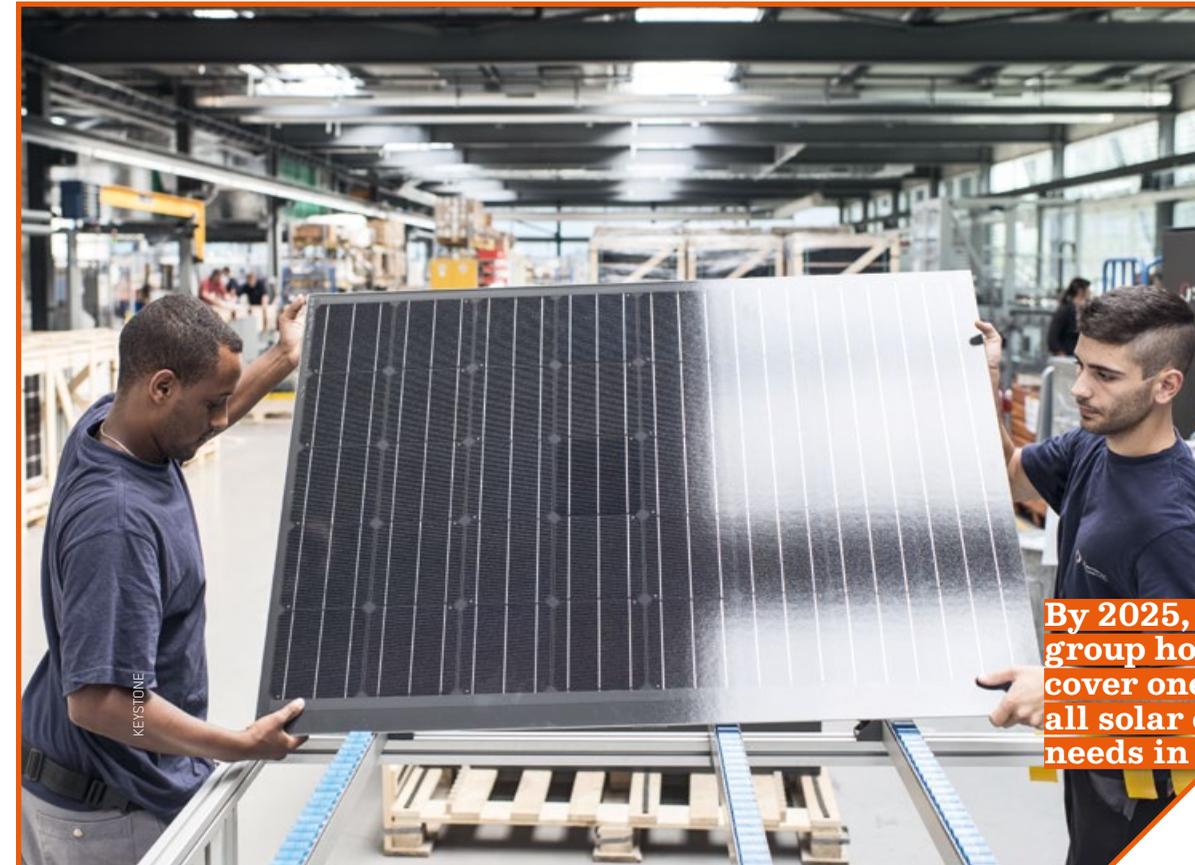
panels is problematic," he said. "Solar energy is the fuel of the future. So it is vital that we keep the keys to this market in Europe."

In Bitterfeld-Wolfen, in the heart of Solar Valley, Meyer Burger will rent 27,000 sq. metres of factory space that was once used by the German photovoltaic cell producer Sovello. In Freiberg, 150 kilometres away, the company will build an almost entirely automated module production line in premises of 19,000 sq. metres, purchased from German group Solarworld, which went bankrupt in 2018.

To not meet the same fate, Meyer Burger – which will keep its research and development branch in Switzerland, particularly at its Hauterive (NE) location – is relying on its cutting-edge SmartWire heterojunction technology. This production method will now be kept internally and no longer sold to third-parties, which should give Meyer Burger a net advantage over the competition. "This technology is more lucrative and efficient than other solutions currently on the market," said Erfurt. "It will significantly increase the quantity of energy produced per square metre, without generating high production costs."

To confirm this, the Swiss company asked the German research organisation Fraunhofer Institute to analyse it. "The photovoltaic modules from Meyer Burger are 5% to 10% more efficient than the competition," said Ralf Preu, head of the photovoltaics division at the Fraunhofer Institute. "This advantage is even more pronounced at high temperatures, when other solar cells lose some of their efficiency."

The expert believes the Meyer Burger solar modules are approximately three years ahead of Mono-PERC cells, which currently dominate the market and are mass produced in China. The Meyer Burger cells are



Meyer Burger employees prepare the packaging for a solar panel at the group's Thun factory.

By 2025, the Swiss group hopes to cover one-third of all solar energy needs in Europe

INTERNAL POWER STRUGGLES

The transformation of Meyer Burger is the result of a war of influence between the main shareholder of the group and its former executive team. This change of direction was decided upon long ago by Sentis Capital, an activist fund led by Russian businessman Pyotr Kondrashev, who holds an approximately 8% stake of the Bern-based group. But Kondrashev was disliked by former CEO Hans Brändle and President of the board of directors Remo Lütolf. The two men preferred to focus on a strategy based on supplying machines to a handful of trusted clients, such as Norway's REC Solar and UK-German group Oxford PV.

Tensions reached a breaking point in autumn 2019, when

Sentis Capital tried to elect one of their own to the group's board of directors. This dispute led to an extraordinarily contentious general meeting in which a majority of the 391 shareholders voted against the nomination of Mark Kerekes, the co-director of Sentis Capital, to the Meyer Burger board of directors.

But in March of this year, the company quietly announced that Hans Brändle would be replaced by Gunter Erfurt, a physicist who started at Meyer Burger in 2015 and who led the group's initiative for its cutting-edge technology. "We are now engaged in a constructive conversation with Sentis Capital," the company stated in a press release, noting that Mark Kerekes would rejoin the board of directors.

also less expensive to produce than other premium models, such as those from US company Sun Power and Japanese group Panasonic, because they contain approximately 30% less silver.

Individuals are the target market

The target market for the Swiss group is individual households that want to equip their homes with solar panels. "Individual buyers generally have limited roof surface area," said Preu. "So its essential that they have solar panels that are very energy-efficient, in order to maximise the use of space and minimise energy costs."

Meyer Burger will initially focus on the European market, which is expected to see strong growth in coming years due to the EU's climate change commitments. For the 2020-2024 period, 140 gigawatts of solar energy are expected to be installed

in Europe, according to a prediction from IHS Markit. Comparatively, the EU increased its capacity by 16.7 gigawatts in 2019.

Meyer Burger expects that its first photovoltaic modules will be available for sale by mid-2021. By 2025, the Swiss group hopes to cover one-third of all solar energy needs

in Europe. To do so, it needs to win back market share from China. "That will not be easy," said Zoco from IHS Markit. "Meyer Burger cannot compete with China in the long term when it comes to price, and will continue to depend on China to supply its silicon wafers, an essential material that is almost exclusively manufactured in that country." ▲

ANALYST ADVICE

THE CLIENT BASE NEEDS TO EXPAND

Meyer Burger's new strategy is promising, according to analyst Eugen Perger of Research Partners. The Bern-based group owns a cutting-edge technology that its competitors can't match. But the success of this change in direction depends on the development of a large base of individual clients, Perger believes. This is a significant challenge for a company that is used to selling its machines to a handful of carefully selected industrial buyers. "Without individual clients, it will be difficult to convince banks and investors to allocate capital to finance new projects," said the analyst, who nevertheless recommends purchasing shares in Meyer Burger, which, in his opinion, are currently under-valued.

— MTBN

DOSSIER

THE MUSK EMPIRE

Both idolised and detested, Elon Musk revolutionised the payments market with PayPal, shook up the automotive industry with Tesla, and took control of space with SpaceX. And his other ventures, such as Hyperloop and OpenAI, also seem intent on changing the world.

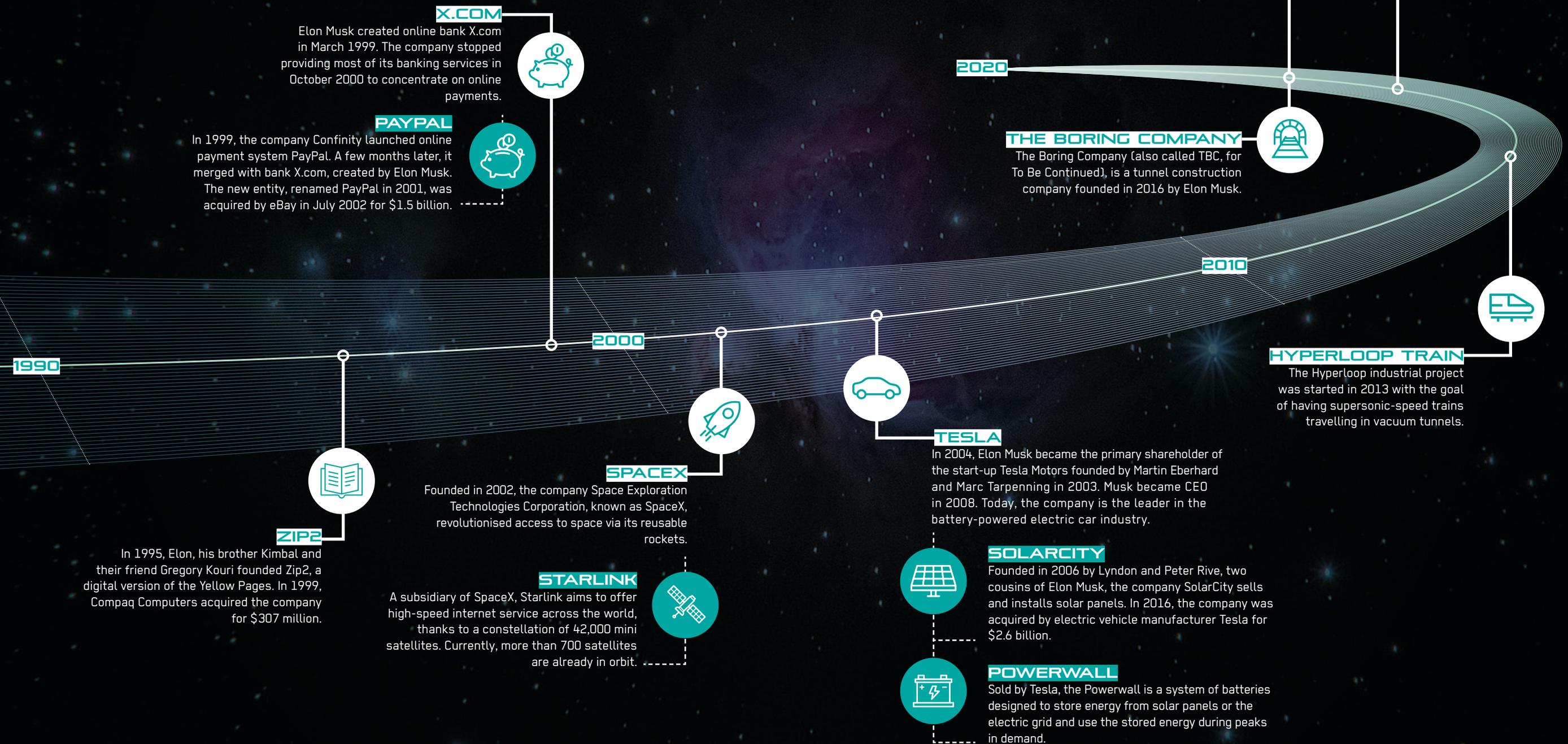
BY BERTRAND BEAUTÉ, LUDOVIC CHAPPEX AND ANGÉLIQUE MOUNIER-KUHN

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- 58.** Why Elon Musk's companies are transgressive

Elon Musk's red Tesla Roadster was launched into heliocentric orbit by the SpaceX Falcon Heavy rocket on 6 February 2018. It is now the first interplanetary advertisement in history. Starman, a mannequin in a spacesuit, sits in the driver's seat and listened to "Space Oddity" by David Bowie on repeat until the radio battery ran out.

THE ELON MUSK GALAXY

As a serial entrepreneur, the CEO of Tesla has successfully created and acquired many companies. We take a closer look at them.



SPACE X: THE GOAL IS MARS

In less than 20 years, Elon Musk has made SpaceX a major player in the space industry as he pursues his childhood dream: attempting to conquer the red planet. Here's the story.

BY BERTRAND BEAUTÉ

SpaceX's SN5 prototype during landing after a short 150-metre test flight, on 4 August.

“Hello everyone. I am the founder of SpaceX. In five years, you will be dead.” This friendly warning was the start of Elon Musk's speech at the Satellite Lounge space conference in Washington. It was March 2006, and the cheeky confidence of the young entrepreneur, then 35 years old, made conference attendees burst out laughing. Everyone in the room knew that this millionaire in jeans and a t-shirt had boundless ambition. Four years earlier, he had made \$180 million from selling PayPal to eBay and immediately announced that he was focused on conquering Mars.

“WHAT ELON MUSK HAS DONE FOR THE AMERICAN SPACE PROGRAM IS HE HAS BROUGHT VISION AND INSPIRATION THAT WE HADN'T HAD”

Jim Bridenstine, NASA CEO

But no one really took him seriously. Experts believed that it was simply impossible for a newcomer to lead as complex a sector as the space industry. Especially because the young CEO had an ambitious flight plan: the rocket, called Falcon 1 in homage to the Millennium Falcon from *Star Wars*, was scheduled for take-off only 15 months after the company was created. “People thought we were just crazy. [...] We] were going to make a low-cost rocket from scratch with a small team. People just didn't think it could be done,” said Tom Mueller, a SpaceX engineer, as quoted in the biography of Elon Musk written by American journalist Ashlee Vance. ▶



An expert in publicity stunts, Elon Musk did not hesitate to send a red Tesla roadster into space in February 2018.

But the experts were wrong. Just 18 years after it was founded in 2002, SpaceX became the first private company to send astronauts into space, in May 2020. "What Elon Musk has done for the American space program is he has brought vision and inspiration that we hadn't had since the retirement of the space shuttles in 2011. He is brilliant," said NASA CEO, Jim Bridenstine, the day after this historic flight. This time in Cape Canaveral, everyone was taking Musk very seriously.

THE COLUMBIA EXPLOSION

"SpaceX has had impressive levels of success," says Maxime Puteaux, a consultant specialising in the space industry for the firm Euroconsult. "The company has completely disrupted an industry that until now was controlled by a handful of traditional players." To make a success of this amazing feat, SpaceX benefited from a combination of favourable factors. Surprisingly, the first was a disaster: on 1 February 2003, the space shuttle Columbia disintegrated while

re-entering the atmosphere, resulting in the deaths of all seven crew members on board. "The Columbia explosion was a turning point," says Puteaux. "NASA realised that its shuttles were too expensive and too dangerous and as a result, they were abandoned."

To replace the shuttles and continue to resupply the International Space Station (ISS) with astronauts and equipment, NASA had to create a new programme. But in 2004, US presi-

dent George W. Bush, seeking glory, announced a return to the moon by 2020, but didn't grant NASA the additional funds to do so. The US space agency was trapped, financially unable to pursue the two objectives at the same time.

But rather than participate in the call for bids, the two giants decided to partner that year and combine their space activities within the co-enterprise United Launch Alliance (ULA), creating a de facto monopoly.

BY REUSING ITS ROCKETS, SPACE X CLAIMS THEY ARE DRASTICALLY REDUCING THE PRICE OF ACCESS TO SPACE

So the decision was made to pass the torch entirely to private companies, which would develop launchers and vessels designed to resupply the ISS so that NASA could focus on the moon landing. The COTS (Commercial Orbital Transportation Services) call for bids was opened in January 2006. In theory, it should have been won by long-time industry giants Boeing and Lockheed Martin, which already produced the Delta and Atlas rockets, respectively, used by NASA.

But that did not please Michael Griffin, the then-administrator of NASA, as he wanted to increase competition between companies to reduce launch costs. So he decided to open the call for bids to other companies. And it worked: in the early 2000s, a myriad of start-ups – including Jeff Bezos's Blue Origin, Elon Musk's SpaceX, and Richard Branson's Virgin Galactic – were all dreaming of lowering the cost of access to space. NASA could take their pick.

In August 2006, the space agency chose two start-ups for the COTS programme: Rocketplane Kistler and SpaceX. "The stars kind of aligned. SpaceX came onto the scene with a fierce desire to innovate, right at the time when NASA was questioning the established order. While there was lots of scepticism regarding SpaceX's ability to accomplish its mission, NASA had carefully calculated the risk: the agency split the contract into pieces, with no guarantee that the contract would be continued until the end," explains Puteaux. "For SpaceX, winning the contract changed everything. Before NASA, it had no clients. And all of a sudden, it became a credible company."

In addition to collecting public funding, the company benefited from many of NASA's technologies. Even so, the beginning was quite chaotic. Between March 2006 and August 2008, the first three launches of the Falcon 1 rocket all failed, and SpaceX only had enough money for four launches.

The last try was on 28 September 2008. The launch was successful ▶



Two months after reaching the ISS aboard SpaceX's Crew Dragon, astronauts Bob Behnken and Doug Hurley returned to Earth in the same capsule on 2 August.



An artist's impression of the Martian city imagined by Elon Musk. According to the SpaceX boss, it will take at least a thousand spaceships to build it.

and SpaceX was now in orbit. While the company was on the brink of bankruptcy, NASA was pleased with the launch and provided more funding on Christmas Eve 2008, ordering 12 re-supply flights to the International Space Station for \$1.6 billion. In 2014, the two parties signed a new contract for \$2.6 billion to transport astronauts to the ISS. With this manna of public funds, Musk could finance the second phase of his project: developing a reusable launch system – a ground-breaking revolution in the space industry that would allow the company to drastically reduce its launch costs.

EN ROUTE TO MARS

Despite two explosions in mid-2015

and summer 2016, SpaceX reached a milestone in December 2015, when the first stage of the Falcon 9 rocket made a successful return landing. Since then, landings for SpaceX rockets have been quite routine. “It’s starting to feel kinda normal to reuse rockets,” said Musk in a 2017 tweet. “Good. That’s how it is for cars & airplanes and how it should be for rockets.”

But the reuse is not just for show. By reusing its rockets, SpaceX claims they are drastically reducing the price of access to space. “Cost reductions depend on the number of times each module is reused. Currently, SpaceX has used its rocket six times, but the company is aiming for

10 reuses,” says Puteaux. “The other key element is the maintenance cost between two flights. SpaceX hasn’t said much about this yet.”

**“I’D LIKE TO
DIE ON MARS,
JUST NOT ON
IMPACT”**

Elon Musk

According to a report by the US Federal Aviation Administration (FAA), launching a Falcon 9 rocket cost \$61.2 million in 2017, compared to \$92 million on average for

its competitors. But it is difficult to know just how much of a role reusing rockets really plays in SpaceX’s advantage over competitors. “SpaceX has introduced other innovations that are much less visible than reusing rockets, but they are just as important,” says Puteaux. “Its factory, for example, is completely integrated: raw materials come in one door and rockets go out the other, whereas competitor facilities are spread out across multiple locations. That also reduces costs.” With its lower prices, SpaceX burst into the lucrative market of commercial satellite launches. In 2017, it became the global leader in the industry, ahead of European group ArianeSpace (see also p. 42).

But Musk isn’t stopping there. “SpaceX wasn’t created to launch satellites,” says Puteaux. “Elon Musk’s objective was always Mars.” To conquer the red planet, engineers will have to transport tonnes of material, which requires building bigger and bigger launchers. The first, called Falcon Heavy, successfully made its inaugural voyage on 6 February 2018. On board, the company placed a Tesla Roadster, which now travels in a heliocentric orbit between Earth and Mars. The second launcher, the Starship-Super Heavy, was in flight for one minute in August. “Mars is looking real,” tweeted Musk following this test flight.

“The only drawback of this spec-

tacular success is that Elon Musk wasn’t able to influence NASA’s agenda,” says Maxime Puteaux. “The US space agency has scheduled a return to the moon for 2024, but Musk prefers Mars. This dream comes from a lack of understanding of the Apollo mission. After man walked on the moon, an entire generation believed that this was the start of a space odyssey and that humans were going to conquer other planets. That was not the case.” Musk, who calls himself an “Apollo 11 orphan”, wants to remedy this misunderstanding and is focused on putting humans on Mars at all costs. In one piece, if possible. During a conference in 2013, he joked: “I’d like to die on Mars, just not on impact.”▲

SPACE X SENDS ITS ADVERSARIES INTO ORBIT

The competition prepares to take on SpaceX, which became the world's number one satellite launchers in 2017.

BY BERTRAND BEAUTÉ

With many successful launches, the partially reusable Falcon 9 rocket from Elon Musk has completely changed the game, and private satellite operators now enjoy 50% lower launch costs. This has shaken all the players in the industry: United Launch Alliance (Atlas and Delta launchers) from the US, Russian companies (Proton and Soyuz) and especially Europe's Ariane-space (Ariane 5 and Vega), which has long been an industry leader. In 2017, SpaceX outranked Europe's space giant for the first time, with 18 launches compared to Arianespace's 11.

In order to conserve its market share, Russian agency Roscosmos announced in April that it would lower its prices by 30%. Arianespace will launch two new rockets in 2021: Ariane 6 (in two versions, one with two engines and one with four) and Vega C. "Compared to its predecessor, Ariane 6 should allow for a 50% reduction in launch costs," said Daniel Neuenschwander, director of space transportation at the European Space Agency (ESA). Is that enough to compete with the bold American group? With an entry price estimated at 70 million per launch for its two-engine model, Ariane 6 is not as competitive as it may like to be. Currently, SpaceX prices some of its launches under 60 million.

Has the window of opportunity already come and gone for the future European rocket (since it's not reusable)? "Ariane 6 and Vega C are Europe's best answer to SpaceX in 2014. But of course, the competition has progressed since," said Neuenschwander. "The biggest goal in the coming years will be to reduce our launch costs. That means we must innovate at every level, including materials, fuel and manufacturing processes."

"SPACE X BENEFITS FROM LUCRATIVE GUARANTEED PUBLIC CONTRACTS AND CAN THEN LOWER PRICES ON THE PRIVATE MARKET"

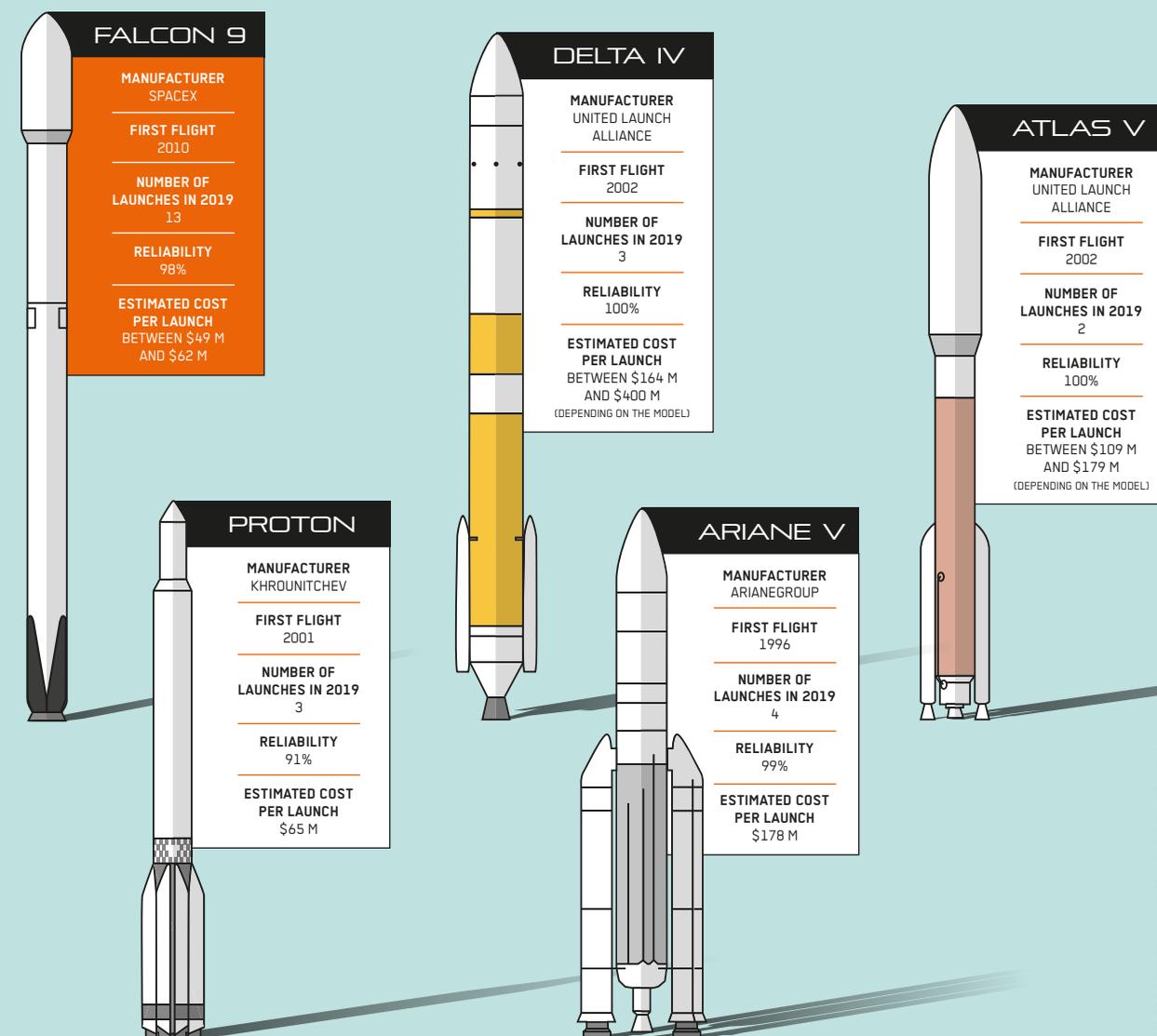
Daniel Neuenschwander, director of space transportation at the ESA

This is an urgent task, as SpaceX is the tree that hides the forest, drawing attention away from new companies ready to strike. For example, Blue Origin, founded in 2000 by Jeff Bezos, has expanded beyond the space tourism market. In 2018, the com-

pany signed its first satellite launch contracts for its reusable rocket New Glenn, which is scheduled to launch for the first time in 2021. "Unlike Elon Musk, Jeff Bezos is making progress discreetly," said Maxime Puteaux, specialist in the space industry for the firm Euroconsult. "He deliberately adopted a slower pace than SpaceX so that he would be ready on launch day and not have to experience the same failures that Musk did."

And lest we forget the reaction from long-time industry player United Launch Alliance. While it was previously only present in the military satellite market, the co-enterprise of Boeing and Lockheed Martin is now focused on the civil sector. Its rocket Vulcan is expected to make its first launch in 2021 and aims to be less expensive than SpaceX. Chinese companies are working on the partially reusable Long March 8 launcher. The Indian space agency Isro is also a rising player to watch in this industry.

Why is there such excitement for launchers? "The space industry is expecting an explosion in the number of satellites going into orbit," said Puteaux, "particularly because of constellations from Starlink and Amazon (see also p. 44)." It remains to be seen if there will be enough room for all these rockets. "The space industry is booming, with increased demand for satellite launch-



es," said Neuenschwander. "But supply is increasing faster than demand. In the end, I think new players will emerge and others will disappear. The most flexible and reactive companies are the ones that will come out on top."

While the price wars have already begun, the dice do seem loaded. "SpaceX is selling its launches at a very high price to the US government, which means it can offer very low prices on the commercial market," said Neuenschwander. This is due to the fact that the market for satellite launches is split between public satellites and private satellites. When

it comes to public satellites, countries have national preference, which means that SpaceX benefits from lucrative guaranteed public contracts and can then lower prices on the private market. While the commercial price of a Falcon 9 rocket launch is around \$60 million, NASA pays two to four times that. "Instead of an honest competition (...), they are tanking prices with absolutely no consequences," accused Dmitry Rogozin, director general of the Russian Space Agency, in April 2020.

Of course, Arianespace and Soyuz also benefit from public contracts. But the size of the US institutional

market tips the scales: in 2018, public orders made up 34% of the demand for satellite launches in Europe, compared to 73% in the US. To compete in this environment, Arianespace wants to focus on its strong points: "Price isn't everything," warned Neuenschwander. "Many clients are ready to pay higher prices for reliability, and Ariane 5 has proven itself to be very reliable." But this argument is becoming increasingly obsolete. It's true that in 2016, the Falcon 9 rocket exploded on its launch pad, also destroying an Israeli satellite worth more than \$200 million. But since then, SpaceX hasn't had any disasters. ▽

THE INTENSE BATTLE FOR SATELLITE INTERNET

With its Starlink project, SpaceX wants to offer high-speed internet all over the world. Amazon and OneWeb are trying to do the same.

BY BERTRAND BEAUTÉ

There are 2,666 functional satellites currently in orbit around Earth, according to the Union of Concerned Scientists (UCS). While this number is already staggeringly high, it's nothing compared to how many there will be in years to come. SpaceX plans to send 12,000 satellites into orbit by 2025 as part of its Starlink project, and even up to 42,000 satellites in the following years. The goal is to create a fine-meshed network in space to provide high-speed internet access around the world, particularly in the most remote areas of the planet.

Currently, there are already more than 700 satellites in orbit in the Starlink fleet. According to the company, this should make it possible to launch the service in the United States and Canada by the end of 2020, and then expand service coverage to the rest of the world in 2021. According to an internal document published by the *Wall Street Journal*, SpaceX estimates that this project

could generate \$30 billion in revenue in 2025, and \$10 billion is needed to deploy the constellation.

"STARLINK IS THE RIGHT KIND OF BUSINESS THAT WE CAN GO AHEAD AND TAKE PUBLIC"

Gwynne Shotwell, SpaceX president

And these sums are attracting quite the competition. On 31 July 2020, Amazon announced that it would invest \$10 billion to launch 3,236 satellites as part of its Kuiper project, and UK company OneWeb is planning a fleet of 5,260 satellites, 74 of which are already in orbit. Rumour has it that Apple may join the race, but Google is focusing more on stratospheric balloons. In total, there are at least 10 different projects

around the world, including official state programmes from the Russian and Chinese governments. Why the sudden boom? Thanks to satellite internet technology, these companies could become global operators, competing with every other internet service provider around the world.

In a tweet posted on 3 September, SpaceX announced that the first tests of its system showed "super low

latency and download speeds greater than 100 mbps". As a comparison, the average download speed in Switzerland in Q1 2019 was 89 Mbit/s across all technologies. Fibre optics (FTTH) can reach speeds of up to 375 Mbit/s, according to the nPerf report.

In developed markets, Starlink will have to compete with traditional providers that are busy launching fibre optics and 5G. In developing

countries, where the majority of the 3.7 billion people without internet access live, it's not clear if residents will be able to pay for this service for which there is no consumer apparatus available. Moreover, Starlink is already targeting customers with the deepest pockets. In May 2020, the US Army signed a three-year agreement with SpaceX to test its satellite network, which could be extremely useful in military operations.

While SpaceX isn't expected to go public for years – Elon Musk always says that won't happen until there are regular flights to Mars – its subsidiary Starlink could do so in the next few years. "Starlink is the right kind of business that we can go ahead and take public," SpaceX President Gwynne Shotwell told investors in February 2020. The goal of such an IPO? To finance the conquest of Mars. ▲



Through the Starlink satellite network, the world's most remote regions could have high-speed internet by 2025.

"ELON MUSK ACTS LIKE A COWBOY"

The constellation of 42,000 satellites that Starlink plans to launch into orbit concerns scientists. Astrophysicist Didier Queloz, winner of the 2019 Nobel Prize in Physics, explains why.

BY BERTRAND BEAUTÉ



On the left, Didier Queloz, 2019 Nobel Laureate in Physics. On the right, the light trails left behind by Starlink satellites, captured here by the Inter-American Observatory at Cerro Tololo (Chile), in November 2019.

On 23 May 2019, the Starlink project – via US company SpaceX – launched approximately 60 satellites at once, lighting up the night sky. All of a sudden, astronomers from around the world saw a multitude of white lines through their telescopes. Since June, the International Astronomical Union (IAU) has been concerned about the subsequent light pollution.

Elon Musk's response went viral on Twitter: "I am confident that we will not cause any impact whatsoever in astronomic discoveries. Zero," declared the CEO. "I'd be impressed if somebody can actually tell me where all of them are. [...] It can't be that big of a deal." For Professor Didier Queloz, an astrophysicist at the University of Cambridge and the University of Geneva, Elon Musk's behaviour is unacceptable. The winner of the 2019 Nobel Prize in Physics (for discovering the first extrasolar

planet) believes that society needs to have a discussion about this. The future of the skies depends on it. We interviewed him.

Why are astronomers concerned about the launch of the Starlink constellation?

The Starlink satellites reflect light from the sun, which makes them very easy to see, even to the naked eye. As a result, some telescopes are losing the ability to observe space for several hours each night, because these satellites are leaving long trails on astronomical images to the point where the images are now unusable. Of course, satellites existed before SpaceX came along. But there were only a few thousand. Since the launch of Sputnik, humans have launched fewer than 10,000 satellites. Musk wants to launch 42,000! And he's not the only one: if we include Amazon, OneWeb and the other companies, the number of artificial stars could explode in coming years.

Quite simply, we could lose the sky. What's shocking to me is Elon Musk's attitude. When astronomers warned him about the problem, he didn't care. He claims to be a scientist, but in reality he doesn't care.

Is this a problem that only affects astronomy?

Obviously, I'm preaching to the choir. But the problem is much larger than that. Launching that many satellites will overload low Earth orbit and increase the risk of collision between satellites. In 2019, the European Space Agency already had to move one of its observation satellites to avoid a potential collision with one of Starlink's satellites. If the two collided, the resulting pieces would increase the amount of space debris in orbit around Earth.

But the idea of providing internet service to the entire world is admirable...

I like the thought of WiFi being

available everywhere. It's a brilliant idea. But we have to stop saying that Elon Musk is a philanthropist who will selflessly provide internet to developing countries. He's going to sell it as a service. It's a business. We now have people making money off the sky. I don't see that as a problem in itself, but I don't like that Elon Musk is the one making decisions. We need to start a discussion as a society to determine whether it's more important to be able to watch Netflix films anywhere in the world, or if we should protect the sky. Elon Musk can't make this decision all by himself.

Since you started the debate in 2019, have things evolved?

Having a Nobel prize offers some visibility, but not enough. The politicians that I spoke with told me that they can't do anything, because there are no international regulations, apart from the requirement to obtain a radio frequency from the Inter-

national Telecommunication Union (ITU). Space is starting to look more and more like the Far West, in which there is no sheriff and Elon Musk is a cowboy.

But SpaceX has promised to make its satellites less bright in the future...

You're right, we have discussed that with SpaceX. We'll see where it goes, but the real question remains: to whom does space belong and what are we allowed to do in it? With the democratisation of access to space, anyone can now launch whatever they want into the sky. Some companies are already offering to send ashes of deceased people into space... That could quickly result in millions of trips.

Finally, do you think that the democratisation of space enabled by SpaceX is a bad thing?

No, SpaceX's aeronautics programme is very interesting. As it got older,

NASA became a paralysed giant that lost its effectiveness. SpaceX revived this market and researchers are benefiting from it, because the cost of access to space has also been reduced for scientific research. I also think that the buzz and current excitement around space is very beneficial. But we need to regulate the market to avoid catastrophes.

You co-discovered the first exoplanet, which won you a Nobel Prize. Elon Musk's project to send humans to Mars must be a dream for you...

The idea that humans could one day walk on Mars is fascinating, of course. But I would prefer an exploratory scientific mission. Elon Musk wants to conquer the red planet to be buried there, similar to how Christopher Columbus conquered America. This conquistador attitude seems very childish to me. I don't see anything positive or scientific about it. ▀

TESLA IS IN RACE MODE

The California company continues to work at a breakneck pace: new batteries, advancements in artificial intelligence, facilities built in record time... Here's an overview of its recent projects.

BY LUDOVIC CHAPPEX

Maintain control, dictate the pace, keep competitors at bay. Tesla's agenda is and always will be focused on innovating at the double. The California group is well aware that its "first mover" advantage in the electric vehicle market will not last forever. In fact, its rivals are preparing for battle. But it's true that Tesla has truly

mastered its industry thus far. Driven by excellent sales of its critically-acclaimed Model 3 saloon, the company has launched its brand essentially everywhere, including in markets that traditionally were loyal to European manufacturers. According to a McKinsey report published in July, Tesla increased its domination of the global electric vehicle market

in 2019. Its market share is now 16.2%, up from 11.8% last year. Behind Tesla are Chinese companies BYD (10.0%) and BJEV (7.1%), followed by BMW (5.9%) and Nissan (3.9%).

In order to keep its top spot, Tesla is playing up its strengths as much as possible. Here are at least three of those advantages.

TESLA

2020 Annual Shareholder Meeting and Battery Day



Elon Musk on stage during "Battery Day" on 22 September. The event, hosted by Tesla at its Fremont, California factory, had its share of tech announcements.

IT'S THE BATTERY, STUPID

This is what really sets an electric vehicle apart from the rest. The battery is the keystone that everything else depends on: driving range, charging time, power-to-weight ratio and a substantial percentage of the vehicle's manufacturing cost – between 30% and 40%, according to estimates. Tests conducted by car magazines have shown that Tesla has a bit of a head start in this domain, as its vehicles offer a particularly high driving range compared to other brands. How is this possible, you may ask? Although Tesla works with external suppliers of battery cells, such as Panasonic (Japan), LG Chem (South Korea) and CATL (China), it handles all the assembly internally. That strategic decision, coupled with high-performance software management, plays an important role.

But Tesla hopes to go a lot further than that. On 22 September, at

"Battery Day" – a tech event aimed at investors – Elon Musk gave a preview of the brand's future products. He focused on two major objectives, boldly scheduled for 2022: completely autonomous battery production and a reduction in manufacturing costs of over 50%.

"WHAT'S VERY IMPRESSIVE IS TESLA'S AMBITION TO MANAGE THE ENTIRE PROCESS"

Ferdinand Dudenhöffer, director of CAR-Center Automotive Research in Duisburg

This desire to be freed of traditional battery suppliers isn't unique to Tesla. Several manufacturers, including BMW, General Motors and PSA, have announced similar strategies

over the past few months. But as usual, Tesla is the one leading the pack and dominating media coverage, thanks to its eccentric CEO and his 39 million Twitter followers. As a comparison, BMW has just over 2.1 million followers.

And Tesla wants to move fast – very fast. Its goal is to reach an annual production capacity of up to 100 gigawatt hours (GWh) in the next two years, and then increase production to 3,000 GWh by 2030. To put things into perspective, LG Chem, currently the world's largest battery supplier, has planned to increase its production capacity to 100 GWh by the end of this year, which is enough to equip approximately 1.7 million electric vehicles.

During his presentation, Musk promised a 54% increase in driving range with future Tesla batteries, a spectacular feat due in part to new >

cells that are larger and more energy-dense, but also a complete rework of the composition of the batteries and how they are integrated into vehicles. Charging time will also be drastically shorter. The much-heralded reduction in costs will be the result of no longer using cobalt, a very expensive element.

However, Musk said himself that the new cells are still in the prototype phase, and much work remains to be done before large-scale production is reached. In the aftermath of the conference, many experts were disappointed at the lack of technical information. The markets also reflected this oversight (see article on p. 53).

Two days after the event, prominent engineer Venkat Viswanathan,

professor at Carnegie Mellon University in Pittsburgh, said that he still had not fully digested all that Musk presented and it would likely require a range of battery experts to analyse fully.

More broadly, much criticism was given to the seemingly very optimistic time frame Tesla presented, but there was little pushback on the company's ability to carry out the project. "What's very impressive is Tesla's ambition to manage the entire process, from the complete design of batteries to mass production," says Ferdinand Dudenhöffer, a renowned expert in the automotive industry and director of CAR-Center Automotive Research in Duisburg, who followed the video conference live on 22 September. "Such integration would

give Tesla a huge advantage over its competitors."

Is this the key to offering an electric vehicle in the near future that is cheaper than a combustion vehicle with equivalent performance? Musk didn't hesitate to bring up price on Battery Day, announcing a future model at \$25,000, but with no further details on an exact date.

To mark the occasion, the company found yet another way to flex its muscles at the event, unveiling an ultra-sporty version of the Model S, called Plaid. Sales will begin in 2021 at a base price of \$140,000. It delivers 0 to 60 mph (96 km/h) in less than 2 seconds, a top speed of 321 km/h, and an almost indecent range of 830 km.

BUILDING FACTORIES, VIDEO GAME STYLE

Tesla decided to build its Gigafactory 4 near Berlin, in a leafy location in the Grünheide forest. The new factory will make it possible to manufacture and sell the Model Y, the brand's new mass-market SUV, in Europe. After being delayed by various objections, in particular due to its environmental impact, this spring the project underwent the double setbacks of the pandemic and the discovery that the ground was looser than expected, which delayed the

laying of the building foundations as initially planned. Would this significantly hold up the opening of the factory and the manufacturing of the first Teslas made in Europe? Not really.

In fact, the US company is surprising everyone by sticking to its original schedule, and the building is taking shape unconventionally quickly. Tesla announced that production would begin as planned in July 2021, just over one year after construction began. In comparison, it took two-and-a-half years for the first Mercedes-Benz vehicles to roll off the assembly line at the company's new facility Factory 56 in Sindelfingen, which began production in September. And there weren't even any delays.

welded and cast hundreds of wall and roofing components at their own production sites. The parts were then transported to the Tesla site to be assembled Lego-style in just a few weeks. The chief construction architect even tweeted his admiration for the project as well as the management in August: "They call us every day from the United States for a very detailed update. It's impressive."

"Such a fast construction speed is made possible by Tesla's internal structure," says Dudenhöffer, director of CAR-Center Automotive Research. Since the entire structure revolves around Elon Musk, important decisions can be made extremely quickly, whereas in more traditional companies, decisions take much longer.

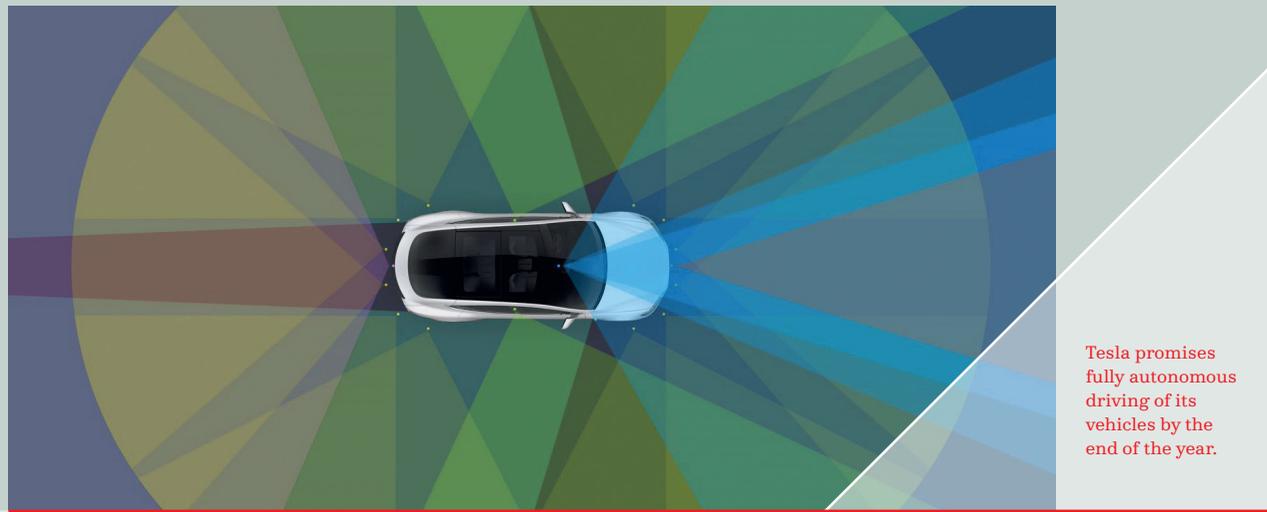
THE US COMPANY'S STRATEGY IS TO COMPLETE ALL THE WORK SIMULTANEOUSLY. EVEN BEFORE THE FINAL AUTHORISATIONS WERE SIGNED, DOZENS OF EXCAVATORS WERE ON SITE, READY TO DIG

The RBB, the leading public media covering the Berlin region, took a close look at Tesla's construction, offering a better understanding of the goings-on behind the scenes of the operation. The US company's strategy is to complete all the work simultaneously. Even before the final authorisations were signed, dozens of excavators were on site, ready to dig. And even as construction vehicles were still removing tree trunks from the site, blast furnaces were already warming up. The two companies that typically build large warehouses for DHL and Amazon

The process seems to be well established, as evidenced by Tesla's simultaneous construction of another Gigafactory in Austin, Texas, which began in July 2020 – and Elon Musk teasingly let slip during Battery Day that construction on the Austin site was advancing quicker than in Berlin.

The Berlin Gigafactory site on 20 September. The factory rose from the ground in just a few weeks. The Tesla Model 3 and Model Y will be produced there starting next summer.





Tesla promises fully autonomous driving of its vehicles by the end of the year.

SOFTWARE ENGINEERING AT WORK

During the World Artificial Intelligence Conference (WAIC), held virtually in Shanghai in early July, Elon Musk made a few announcements. By the end of the year, he said, Tesla vehicles would be equipped with a 100% autonomous driving mode – i.e. level 5 autonomous driving, the highest level under the standards drawn up by the Society of Automotive Engineers. It's a landmark development, and of course it's one that is partly symbolic due to legal limitations of using such a system on the open road. But it solidifies Tesla's role as a technological pioneer in the industry. While the major German manufacturers already have similar prototypes (see *Swissquote Magazine* no. 4 /2020), none have progressed as quickly in terms of driving assistance technologies.

Musk is well aware of this and used Battery Day on 22 September to drive his point home: "[In terms of] the probability of injury, [our priority is to be] 10 times better than the industry average," he said, praising in particular the ability of Tesla cars to avoid crashes.

The reasons why Tesla is so advanced in this field lie in its unique approach in the automotive industry. The company develops its own technical solutions where other manufacturers depend on specialised external suppliers, particularly for electronic control units (ECUs) and the software component.

SUCH A LEVEL OF INTEGRATION WILL NOT BE AVAILABLE FROM TRADITIONAL MANUFACTURERS UNTIL 2025

Media outlet Nikkei Business Publications had a learning experience in February, when it completely disassembled a Tesla Model 3 in the presence of engineers from major automotive brands, including Volkswagen and Toyota. Regarding the vehicle's central control unit, a module that Tesla calls Hardware 3,

one of the participants summed up the situation by saying: "We cannot do it." The module in question, designed internally, is made up of two AI chips linked to a software program that manages autopilot and infotainment features.

Using artificial intelligence helps to constantly improve assisted driving performance. This learning process is based on real driving situations, transmitted by Tesla vehicles to a computer that processes the data with help from the company's human engineers.

According to the specialists interviewed by the Japanese publication, such a level of integration will not be available from traditional manufacturers until 2025. "Tesla has an enormous advantage in terms of electronic components and software," says analyst Nevine Pollini of UBP, who is nevertheless critical of the company's share price, believing it is disconnected from reality (see p. 53).

| | |
|--------------|-------------------|
| FOUNDED | 2003 |
| HEADQUARTERS | PALO ALTO (US) |
| EMPLOYEES | 48,000 (2019) |
| REVENUE | \$24.58 BN (2019) |
| | TSLA |

ANALYSTS ARE STUNNED BY THIS STOCK MARKET RALLY

Is Tesla's share price doomed to collapse, as analyst David Trainer, founder of the US research centre New Constructs,

believes? "Tesla's stock is traded at 159 times forward earnings," said the analyst during an interview with CNBC in early September. "We think this is a big, big – one of the biggest of all time – houses of cards that's getting ready to fold."

As incredible as it may sound, the current capitalisation of the California manufacturer is higher than the combined capitalisation of the Toyota, Volkswagen, Daimler and BMW groups. In other words, Tesla's capitalisation is five times higher than Volkswagen's, even though it sells 20 times fewer vehicles (see infographic below). It's rather flattering for a company that's been said to have recorded a loss of \$862 million last year.

How does such a market anomaly happen? "Tesla has become a cult

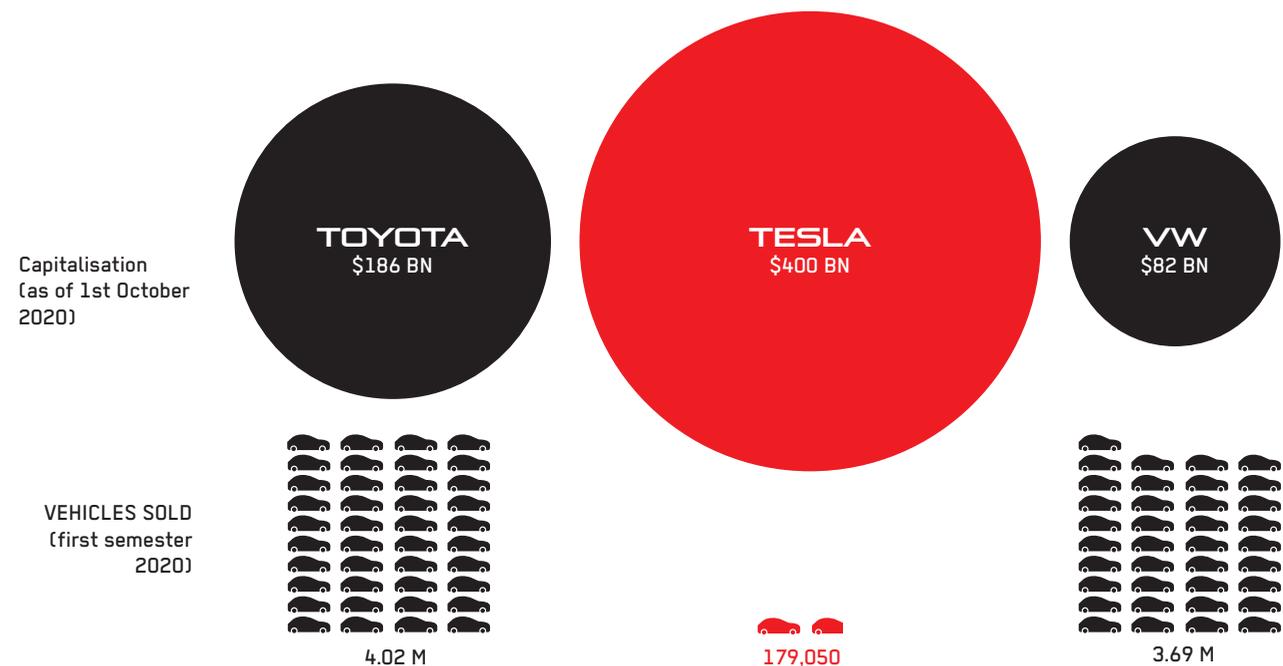
stock," says Nevine Pollini, an analyst at Union Bancaire Privée (UBP). "Young private investors, who are increasingly looking to make stock market investments, are quite fond of this type of tech leader. What's more, the stock ticks almost all the boxes in terms of environmental, social and governance (ESG) criteria. Tesla can be found in all ESG funds. More broadly, the post-pandemic environment is very favourable for electric vehicles. There's enormous media hype and governments have massive recovery plans."

But like Trainer, the UBP analyst agrees that Tesla's valuation is based on margins and volumes that do not reflect reality. "The market is based on what could happen by 2025, or even 2030, in the most optimistic scenario. And the competition is quite impressive," says Pollini. "Many underestimate Volkswagen, which is already right on Tesla's heels with the Porsche Taycan, Audi e-tron and VW ID.3 and ID.4. With an R&D budget of \$91 million over five years, the German group clearly has the funds to be a contender. And Chinese manufacturer BYD, which is practically a state company,

has significant power." And that's not counting the other market giants, including BMW, Daimler, Volvo, GM, Renault-Nissan and Jaguar, as well as fiercely ambitious newcomers such as US group Lucid Motors.

It goes without saying that Elon Musk's ambition – on full display during Battery Day on 22 September – to produce 20 million electric vehicles per year in 2030 leaves many experts sceptical. In comparison, Volkswagen produced a total of 10.8 million vehicles last year, whereas Tesla barely reached 365,000 units.

So the American group is facing a massive challenge, but it has many supporters. To sum up analysts' positions, half currently recommend holding shares, one quarter recommends selling and the remaining quarter advises buying Tesla shares. After all, while the brand is known for its over-the-top optimism in terms of sales volumes and timelines, it also has the reputation for delivering what it said it would in the end. One thing is certain: very few companies are as divisive as Tesla at the moment. The year to come will be fascinating. ▲



ELON MUSK

A MAN WITH NO LIMITS

The dashing billionaire is eccentric, bold and always makes headlines on the stock market. We take a closer look.

BY ANGÉLIQUE MOUNIER-KUHN

Elon Musk nervously nods his head and his mouth begins to tremble. On the leading news platform “60 Minutes” from the network CBS, Musk was invited to react to the irrevocable contempt from US space veterans Neil Armstrong and Gene Cernan regarding Musk’s company SpaceX and his desire to make space accessible to everyone.

This was in 2012. At that point, the company was 10 years old, with many failures and only a few rare successes to its name. “I was very sad to see that, those guys are heroes of mine. It’s really tough,” said Musk, and a tear begins to form in the corner of his eye. A bit later in the interview, the journalist attacks again: “Have you thought about stopping everything?” Musk sat

up straighter, with a determined look. “I don’t ever give up. I’d have to be dead. Or be completely incapacitated.”

Everything, or almost everything, you need to know about this troubled Goliath is contained in this scene: his childhood dreams that become extravagant ambitions as an adult, his bravery when faced with obstacles and distrust, his determination to accomplish almost messianic missions that he devotes himself to, and his impulsive nature. There’s also a certain vulnerability to Musk, who flirted dangerously with burnout in summer 2018. He was going through yet another difficult period. Except this time, the SEC, the watchdog of the US markets, got involved.

“This past year has been the most difficult and painful year of my career. It was excruciating,” said Musk in an interview with the *New York Times*, regretting the harmful effects of his 120-hour work week on his personal life. A few days earlier, Musk – who is very active on Twitter with 39 million followers – posted what remains to be his most explosive tweet to this day: “Am considering taking Tesla private at \$420. Funding secured.” Attacked by short-sellers, the share price of the car manufacturer had skyrocketed, leading to raised eyebrows at the US Department of Justice and subsequent legal proceedings by the Securities and Exchange Commission for fraudulent declarations.

The consequences of a power struggle with the market watchdog: \$40 million in fines and Musk being required to have a competent judge confirm all of his messages about the financial health of his company before he published them. But did he learn

his lesson? Not really: in May, the CEO returned to his old ways and tweeted that the share price of Tesla was too high. The share price temporarily fell 10% before sky-rocketing again.

Nearing his fifties with a still-smooth complexion, Elon Musk became the third-richest man in the world this year, with a fortune close to \$95 billion – essentially made up of shares of his companies. But nothing seems to tame his no-filter temperament, which captivates his groupies and horrifies sceptics who are convinced he will soon fall from grace.

**“I DON’T
EVER GIVE
UP. I’D HAVE
TO BE DEAD”**

This spring, the uncompromising CEO, who wished to keep his production lines open at all costs, deemed the COVID-19 quarantine measures “fascist”. Dr Elon & Mr Musk, as he was called by monthly magazine *Wired*, also announced in a tweet that he had sold off all his real estate holdings. This move angered Grimes, a singer with unusual style who is Musk’s latest partner. Seventeen years his junior, the Canadian musician gave birth to Musk’s sixth child, curiously named X AE A-Xii.

Musk himself grew up as a privileged but tormented child. In South Africa, where he was born in 1971, he used books, role-playing games and the nascent world of computers as a reprieve from bullying from other children his age and psychological ne-

glect from his father. At just 17 years old, he escaped to Canada where he worked odd jobs before going to university, receiving a dual degree in economics and physics from the University of Pennsylvania.

What happens next is well known, as Musk is possibly the most written-about business magnate in contemporary history. His entrepreneurial frenzy started by co-founding Zip2, which earned Musk his first millions just before the burst of the dot com bubble. Then he created online bank X.com in 1999, which acquired payment company PayPal in 2000. In July 2002, eBay acquired PayPal for \$1.5 billion. At 30 years old, Elon Musk found himself with \$180 million in his bank account.

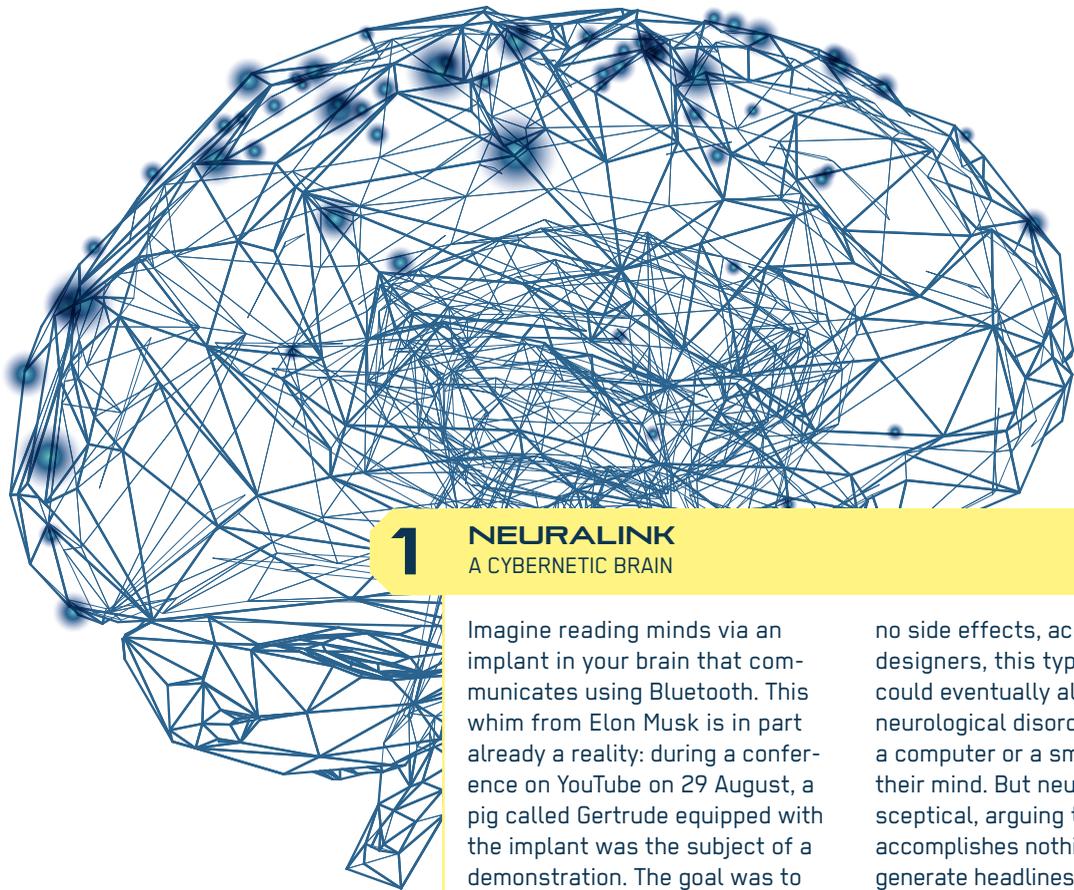
But the young entrepreneur wasn’t fond of early retirement. Rather than resting on his mountains of cash, he began a wide array of projects that would become today’s empire: Tesla and its subsidiary Solar City, SpaceX, The Boring Company and its utopia Hyperloop, Open AI, and Neuralink. With these companies, the no-limits businessman is convinced that he can disrupt numerous industries such as transportation, energy, artificial intelligence, telecoms and healthcare.

Of all the journalists who have followed his story, Ashlee Vance, a Silicon Valley expert, has done it the best, but his writing may be slightly biased. An assumed admirer, the journalist puts Elon Musk on a pedestal in a glorifying but carefully-documented biography published in 2015: *Elon Musk: Tesla, SpaceX, and the Quest for a Fantastic Future* [the French version of this best-seller is titled: “L’homme qui va changer le monde”]. ▲

3 WILD PROJECTS

Elon Musk's bizarre start-ups sometimes border on dreams and outrageousness.

BY LUDOVIC CHAPPEX



1 NEURALINK A CYBERNETIC BRAIN

Imagine reading minds via an implant in your brain that communicates using Bluetooth. This whim from Elon Musk is in part already a reality: during a conference on YouTube on 29 August, a pig called Gertrude equipped with the implant was the subject of a demonstration. The goal was to measure the pig's interactions with its environment based on neurological signals. The device is developed by start-up Neuralink, launched in 2016 in San Francisco and largely financed by Musk himself. Easily removable and with

no side effects, according to the designers, this type of implant could eventually allow people with neurological disorders to control a computer or a smartphone with their mind. But neuroscientists are sceptical, arguing that the project accomplishes nothing more than to generate headlines. But that hasn't stopped Musk from thinking much further ahead: among other futuristic goals, he hopes to use the implant to improve the functions of the human brain and even store memories that can be downloaded to a machine.

2 THE BORING COMPANY TUNNELS UNDER THE CITY

Elon Musk is convinced that the solution for urban car traffic is to create a network of tunnels under large cities for cars to travel underground. Founded in 2016 with the ironic name The Boring Company, Musk's construction company wants to be revolutionary. The goal is to tunnel up to 10 times faster in order to drastically reduce underground construction costs, thereby making the operation profitable. The originality of the concept lies in the small diameter of the tunnels, in which autonomous electric vehicles in automatic driving mode can travel at high speeds. The first tunnel of this kind is under construction in Las Vegas and there are plans for tunnels in other cities, including Los Angeles. Also within the high-speed transport industry, Musk is simultaneously pursuing another dream with the Hyperloop project, which is building a train that travels in a tube at supersonic speeds. The goal is to reduce the travel time from Los Angeles to San Francisco to less than 30 minutes.

3 OPENAI AI REPLACES HUMANS

Ensuring that artificial general intelligence benefits all of humanity is the mission of this capped-profit company founded in 2015. A recent example of its work took the form of an article published on 8 September in the UK daily *The Guardian* – which was unique because it was written by an artificial intelligence language generator called GPT-3. The article was titled “A robot wrote this entire article. Are you scared yet, human?”.

To write the article, the AI received the following instructions: Please write a short op-ed around 500 words. Keep the language simple and concise. Focus on why humans have nothing to

fear from AI. GPT-3 produced various different outputs. “Each was unique, interesting and advanced a different argument,” according to the editorial board of *The Guardian*, which was clearly impressed. *The Guardian* explained how it reorganised and edited the text in the same way that it would edit an op-ed written by a human journalist, adding that the piece took “less time to edit than many human op-eds.”

On 22 September, Microsoft announced it had negotiated a business license with OpenAI, with the intent of using the GPT-3 language generator for its products and services.

"ELON MUSK'S COMPANIES ARE TRANSGRESSIVE"

Michaël Valentin, associate director of the strategy consulting firm Opeo, believes that the digital tools and atypical personality of Elon Musk are currently leading the fourth industrial revolution. Find out more in this interview.

BY ANGÉLIQUE MOUNIER-KUHN

First there was Fordism in the early 20th century. Then came Toyotism in the 1970s. Are we now entering the era of "Teslism"? According to Michaël Valentin, partner-founder of the Paris-based strategy consulting firm Opeo, we indeed are. Following several on-site visits to the Musk galaxy in California, this engineer by training, with experience in the automotive industry, has analysed the operating principles of the Tesla model. He believes that the operating method dubbed Teslism is becoming the standard organisational model of the fourth industrial revolution. Author of the book *Le modèle*

Tesla - Du Toyotisme au Teslisme: la disruption d'Elon Musk (The Tesla Model - From Toyotism to Teslism: the Elon Musk disruption) published by Éditions Dunod, Michaël Valentin spoke with *Swissquote Magazine*.

What circumstances laid the groundwork for the emergence of Teslism?

It came as much from Elon Musk's clear, strong vision as from the ecosystem in Silicon Valley. Elon Musk is both very much a geek as well as an engineer, which means he has solid scientific and technical expertise. These two facets provide the perfect background to tackle the industry's

What was originally an Elon Musk joke on the internet has finally turned into a real object. In December 2018, the tunnel construction company The Boring Company marketed a flamethrower, as its boss had promised.

ROBYN BECK / POOL / AFP

Isn't that precisely one of the strengths of Tesla and SpaceX: knowing how to attract top people, as shown in survey rankings of young graduates?

This ability to attract talent in a job pool where competition is fierce between pure digital players is one of the benefits of Elon Musk's story-making. In other words, he can create energy around a motivating goal both within the company and in society at large. Elon Musk doesn't just tell a captivating story, he's also part of the action.

Tesla's mission is to "accelerate the world's transition to sustainable energy". This vision, part of a much more inclusive and inspiring project than pure business objectives, is alluring to young graduates. And Tesla doesn't hesitate to use social media to draw top talent through outside games and competitions.

Yet, the tough working conditions at Elon Musk's companies and his unrealistic demands are notorious...

Like any management model, Elon Musk's has its limits. He is driven by a project to contribute to changing the world. Those who believe in his vision are welcome at the company. No one else has to be part of it. For people who adhere to the idea, participating in the transport revolution is a powerful source of motivation. That means nurturing a mindset of constant questioning, which is not for everyone.

But there's another important factor. These companies belong to Elon Musk. He is not a manager, appointed by a board of directors to lead the company. His management style falls more within the realm of startup leadership. He himself never takes holidays and works relentlessly, including weekends. He gives 100% to each new project, and his ambition always sets the bar very high.

As a boss, he understands what his teams are doing and the interfaces

they have between one another. When he takes part in meetings to address an obstacle, he brings real added value. "No" is never a valid answer for him. But he's also the kind of coach/boss who stays focused in a crisis. That reassures his teams, even when projects are teetering on the edge of an abyss or have missed out on timing.



"TESLA'S INNOVATIONS IN AUTONOMOUS DRIVING FLIRT WITH THE LIMITS OF THE LAW"

Michaël Valentin, associate director of strategy consulting firm Opeo

How does this management style translate into organisational hierarchy?

Elon Musk encourages staff to behave in a horizontal manner. He himself walks through his factories and prefers direct contact with people in order to challenge them every day. He expects as much from his management team.

In fact, the only thing that counts for Musk is speed. If you're a line operator struggling with a problem, and it's faster for you to deal with it by going to a manager three levels higher than you or to an engineer, rather than talking about it to your direct manager, then that's what you should do. At more traditional companies however, information has to go through each reporting level, and ▶



An employee at the Gigafactory 2 in Buffalo, New York.

that takes time. And it takes even longer for a decision to be made.

Continuous learning is also an important principle in the Musk galaxy.

The approach is valid for both individuals and the organisation, which is constantly improving. That allows for sometimes getting things wrong, as that in itself is a source of learning. When you react and learn fast, you can let yourself take risks, because you know you can make adjustments if you need to.

When Tesla wanted to launch Model 3, teams were confronted with production problems because too many robots were used at the factory. Nothing worked. The solution they were forced to go with was to install a huge tent in the factory's car park and reintroduce some manual operations for the vehicles to get built. But the robots were not a complete waste. They were

redesigned and installed at Tesla's Gigafactory in Shanghai.

Another aspect of Tesla is that it has pushed vertical integration as far as possible. Is that to stay independent?

Vertical integration is most likely a way of guarding its independence. Tesla manufactures its dashboards and seats internally, and they are virtually the only ones in the automotive industry to do that. But the main reason integration was pushed to its highest point is that it provides the means to develop new technologies very rapidly. As soon as Elon Musk spots a cutting-edge company, he buys it for a competitive edge.

With its highly integrated model, Tesla can bring innovations to most of the features on its vehicles. Traditional automakers source many components from suppliers scattered around the world. For example,

the software embedded into cars is developed externally. But Tesla understood that software is the core of the vehicle, so it is designed and coordinated internally.

"ELON MUSK WOULD NEVER HAVE BEEN ABLE TO GO SO FAR WITHOUT THE RESOURCES ON HAND IN SILICON VALLEY"

Do Elon Musk's erratic behaviour and his feverish tweeting serve a purpose in Teslism?

That aspect of Elon Musk's personality fuels the buzz, but I see it as relatively trivial. It's like not seeing the forest for the trees. What's important is that the forest is there.

We might consider his quick-to-tweet behaviour as additional proof of his open-mindedness. If you're a Tesla customer and call out to Elon Musk on Twitter to report a technical problem or make a suggestion, he will take your tweet seriously if he thinks it's interesting and improvements are likely to come from it.

I've also noted that innovating sometimes means transgressing, and Elon Musk's companies tend to push that concept to its limits. Let's take the example of Autopilot, which allows the driver to steer the car without having to hold the steering wheel. That's a very important goal towards developing fully self-driving cars. Tesla's innovations in this area flirt with the limits of the law, as laws are harder to change.

Once you've taken that first transgressive step, it's tempting to do so in other areas. After all, that's how you change the world. ▽

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BETTY IMAGE

Delivery Hero: the glory days for Food Tech

The German food delivery expert, which now boasts a truly worldwide presence, is benefiting from the pandemic. And to do this, it relies on the latest logistical tools. We take a closer look.

BY ANGÉLIQUE MOUNIER-KUHN

IN FIGURES

600,000

The number of restaurants around the world that partner with Delivery Hero

25,000

The number of employees

€1.2 BN

The 2019 turnover. The company expects to double this amount during the current financial year

€3.6 BN

The cost of the acquisition of South Korean group Woowa last year, which is pending approval from competition authorities

2011

The year the company was founded in Berlin

The Berlin-based company Delivery Hero entered the DAX on 24 August, surprising observers and sparking a flood of comments in Germany. The reason for the surprise is twofold. The first is that this champion of the disruptive economy has been publicly listed for a mere three years. The second: its ranking among the top 30 leading companies on the Frankfurt exchange is due to the demise of another iconic start-up, the payment platform Wirecard, which fell from grace after word got out that it manipulated its balance sheet, shocking the public.

Was it because the German media was so taken aback by this scandal that it treated this newcomer with extra caution? In any event, Delivery Hero's IPO was met with hesitation. But this pillar of Food Tech, which brings customers and restaurants together via its online platform, has seen its share price increase nearly 30% since January.

That said, cautious commentators are asking some legitimate questions. The company co-founded and led by Niklas Östberg, a Swedish entrepreneur who attended EPFZ, is now almost on equal footing with Deutsche Bank and tyre manufacturer Continental in terms of capitalisation (around €18 billion) – but Delivery Hero hasn't generated any profits since it was founded.

Delivery Hero first predicted that it would be profitable in 2018, but since that did not happen, it now avoids setting precise objectives: "We'll balance out when we're big enough," said Östberg tersely in an interview this spring.

Delivery Hero itself owns a portfolio consisting of about 20 foreign brands (Foodora, Domicilios.com, Mjam, Foodpanda, etc.) and boasts a strong presence in 39 of the 44 countries in which it is established all over the world. Until now, it has stayed away

from two seemingly impregnable markets: the United States and China.

The platform, which originated in Berlin, is particularly ambitious in Asia, with the continent already generating more than half of Delivery Hero's total customer orders. In South Korea, one of the most dynamic markets in the world, Delivery Hero hopes to receive the green light from competition authorities by the end of the year to finalise the acquisition of Woowa, the country's leading food delivery app. This transaction – totalling €3.6 billion – is the largest acquisition in Delivery Hero's history. The company, which has its own fleet of delivery couriers, also announced in early summer that it would soon arrive in Japan, where it hopes to dethrone Uber Eats with an initial investment of between €20 and €30 million.

“Younger generations order online and want their food delivered within half an hour”

Sarah Simon, senior analyst at private bank Berenberg

“The platform economy is the type of business where the winner takes all,” says Lars Schweizer, professor of strategic management at Goethe University in Frankfurt. But he adds: “Investing in a start-up is always a gamble on the future, but I personally don't quite understand how Delivery Hero has already achieved such a capitalisation with such substantial losses.”

In 2019, the platform recorded €648 million in operating losses, compared to €242 million the previous year, while at the same time doubling its revenue to €1.2 billion. In other >

words, as Östberg's company gains revenue, it also increases its losses.

That's not surprising for a growth share, as evidenced by the mostly favourable consensus from analysts. Delivery Hero saw its first-half sales grow 93% year on year, particularly thanks to lockdown and quarantine, after an increase of more than 80% in 2019. The company now processes more than four million orders per day.

And it's not going to stop there, according to Sarah Simon, senior analyst at private bank Berenberg, who wholeheartedly recommends purchasing shares. "It is difficult to quantify the growth potential in the food delivery industry," says Simon. "But one thing is certain: the trend is here and the COVID-19 pandemic has only amplified it. Once upon a time, people would do a large shop once a week. We then adopted the habit of doing more frequent smaller shops several times per week, and then we got used to having items delivered the next day. Now, younger generations cook less often at home. They order online and want their food delivered within half an hour."

Beyond this fundamental trend, Simon believes that Delivery Hero has perfectly mastered its strategy.



Niklas Östberg, co-founder and CEO of Delivery Hero, in the company's Berlin offices (2017).

Some upset investors are surprised to see the platform listed on the DAX because it completely abandoned the German market in late 2018. Was it because the company couldn't per-

form in its home country? "Absolutely not," says Simon. "Delivery Hero dominated the German market. But its competitor Takeaway countered with such an attractive offer for its entire business (ed. note: €930 million at the time of the transaction, with a portion in Takeaway shares) that Delivery Hero decided to take the deal and refocus the funds on more promising markets. In doing so, it is allocating its resources in a much more optimal way."

Matthieu Vincent, co-founder of Digital Food Lab, a consulting firm specialising in Food Tech, highlights another of the Berlin-based company's competitive advantages: its technological and operational superiority. "Delivery Hero is one of the first players in the industry to understand that the most important thing is to become a logistics compa-

ny," he says. The key is the algorithm, which optimises delivery route timing based on the location of customers, delivery couriers and restaurants.

The key is the algorithm, which optimises delivery route timing based on the location of customers, delivery couriers and restaurants

"With this expertise, the company can focus on growth markets. This is also what allows it to manage so many subsidiaries all over the world from its Berlin headquarters," says Vincent.

Delivery Hero also hopes to capitalise on its technological expertise to allow it to become a key player in Q-Commerce (quick commerce), a nascent segment of e-commerce that is expected to grow very quickly over the next decade, according to the company's management. Q-Commerce involves developing partnerships with local merchants in order to offer consumers fast delivery for certain types of goods – flowers, medicine, food and electronics – in under an hour.

On paper, the challenge for Delivery Hero is to compete with Amazon, by way of a much lighter system than the gigantic warehouses owned by the Seattle group. But in reality, this new e-commerce concept still needs to prove itself: "The platforms that have taken the leap in this sector haven't really been successful yet," notes Vincent.

REVOLT OF THE COURIERS

In its path to profitability, Delivery Hero is also targeting small margins, an inherent weakness of the industry, which contends with high distribution, innovation and marketing costs. The wild race for market share must also be analysed in this context: securing a spot as a top player in a country means having to hold back on raising delivery prices. In the same vein, and to throw a bone to impatient investors waiting on the company to rise out of the red, Sarah Simon believes Delivery Hero should now concentrate on "consolidation" operations that encourage organic growth such as economies of scale, rather than investments looking to further expand business lines.

Self-driving vehicles could alleviate pressure on margins by cutting delivery costs to as low as possible. But it will still be years before these futuristic vehicles are on our streets handling deliveries. In the meantime, Delivery Hero will remain dependent on two-wheeled deliveries by couriers, who are all independent contractors.

But protests are threatening to erupt on social media regarding the status of vulnerable workers. Around the world, independent contractors are denouncing their working conditions and demanding to be reclassified as salaried employees. Uber Eats employees have already been successful in California, and more recently in Geneva.

In Canada, delivery couriers from Foodora, a Delivery Hero subsidiary, won the right to unionise this past winter – a first in the country. Two months later, Foodora shut down in Canada, claiming market saturation. But the fact remains: "The industry potential remains immense. We continue to grow exponentially. This is just the beginning," said Östberg in a tweet the day the company went public on the DAX index. ▲

ANALYST ADVICE

MARKED GROWTH ACCELERATION

"Encouraging commercial activity," said Silvia Cuneo, analyst at Deutsche Bank in a note dated 28 July on the food delivery specialist. Cuneo reaffirms her recommendation to purchase Delivery Hero shares, with a price target of €120, at the high end of the range agreed upon by analysts (€80 to €135). In good news, the analyst highlights the increased revenue growth in Q2 2020, up 96.2% to reach €612.1

million. This performance can be explained primarily by the significant uptick in orders, which should allow Delivery Hero to generate between €2.6 and €2.8 billion in revenue in 2020 – almost double what it made in 2019. With €4.1 billion in cash, the company is well capitalised and has the means to fuel its organic growth or to finance potential acquisition projects.

— DHER

“The current context favours stocks”

Jürg Schwab, head of Trading at Swissquote, explains why now is a good time for a Lombard loan.

Many Swissquote clients have taken out Lombard loans in recent months. How has the COVID-19 epidemic influenced investment behaviours?

It's true that the situation has changed considerably with the pandemic. Many, many more people are now managing their own investments. During lockdown, they've had time to focus on them. At Swissquote, we opened 55,000 new accounts in Q1 2020. Our clients are realising that the potential is high right now.

Shares of certain companies have soared in recent months. Isn't it a little late to start investing?

The situation varies significantly depending on the countries and industry sectors. The tech and digital

sectors have seen a boom, but cyclical industries such as finance and tourism have suffered tremendously. There are very good opportunities available. At the moment, an appealing option is to target companies that were affected by the crisis but have good fundamentals, such as defensive stocks.

Moreover, the fact that governments are injecting an enormous amount of money into the financial system is encouraging for investors. If you then add very low interest rates to the equation, which make the bond market unattractive – particularly in Swiss francs and euros with their negative return – you can see that the current context clearly favours stocks. In theory, we should see an increase in stock prices in the coming years.

Should investors be concerned about a strong market correction in the short or medium term?

The market will undergo periods of decline, of course. But the big drop happened between February–March 2020. Coronavirus is now priced into the market. If there's a second wave, the correction will not be as significant as it was in the first wave, since the pandemic situation is no longer unprecedented. Instead, we're expecting market fluctuations to be used as opportunities to invest and diversify one's portfolio. ▲



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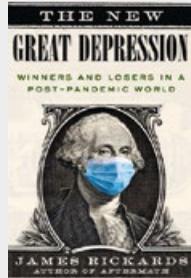
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THE NEW GREAT DEPRESSION WINNERS AND LOSERS IN A POST-PANDEMIC WORLD

By James Rickards

As the pandemic continues to spread around the world, some economists are envisaging disastrous financial consequences. American James Rickards is one of those economists. In his latest book, the crisis specialist casts a harsh light on the upcoming economic crisis, which he predicts will be worse than the 2008 and 1929 crises due to massive government debt, mass unemployment and a banking collapse. Rickards also offers investment strategies in these troubled times.

JULIA CAGÉ

The Price of Democracy

HOW MONEY
SHAPES POLITICS
AND WHAT
TO DO ABOUT IT

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THE PRICE OF DEMOCRACY

HOW MONEY SHAPES POLITICS
AND WHAT TO DO ABOUT IT

By Julia Cagé

In theory, the basic tenet of democracy is simple: one person, one vote, where each citizen has the same amount of power as anyone else. In practice, however, political and financial involvement is a significant determining factor. The reality then becomes "one dollar, one vote," in which electoral results depend largely on investments made. This corruption of democracy is highlighted by Julia Cagé, an economics professor at Sciences Po Paris. In her book, Cagé offers solutions to make our western democracies fairer, more participatory, and less dependent on financial lobbies.



App Store,
Google Play,
Free

PRIIV: PRIVACY MANAGER ULTIMATE CONTROL OF YOUR PRIVATE DATA

Many apps promise to protect your privacy and personal data, but only a few provide real added value. *Priiv: Privacy Manager* is one of the select few. The vast array of configuration options and permissions controls for both Android and Apple will satisfy even the most paranoid users.



Google Play,
App Store,
Free, in-app
purchases

COUNTTHINGS

COUNT OBJECTS WITHOUT MAKING MISTAKES

It's so simple you'll wonder why you never thought of it: the aptly-named *CountThings* counts the number of objects in a photo. It's very useful for taking a quick inventory without giving yourself a headache, such as counting the number of bottles in a wine cellar. It can also be used for more professional purposes, such as counting the number of pieces of material, logs, bricks, etc.



Google Play,
Free

ARCORE DEPTH LAB

THE FUTURE OF AUGMENTED REALITY

With the latest augmented reality app developed by Google engineers, you can add various objects or effects to your environment in real time. The app demonstrates the current abilities of AR (augmented reality), foreshadowing its integration into other domains by Android developers.



App Store,
Google Play,
Free

REFACE

BECOME A MEME

Reface is the latest face transformation app that everyone is buzzing about. The idea is simple: Reface takes a photo of your face and then uses it to replace actors' faces in short clips from famous films, resulting in gifs or short videos where you are the star. The very realistic result is hilarious.



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AUTO

The euphoria of summits

BY RAPHAËL LEUBA

Modern sports cars are so efficient that they tend to conceal the sensations of driving. But the lightweight Alpine A110 S runs counter to this trend, masterfully handling mountain roads. We take a road test.



ALPINE A110 S

ENGINE:

IN-LINE FOUR-CYLINDER, TURBO, 1,798 CM³

POWER:

215 KW (292 HP) AT 6,400 RPM

ACCELERATION:

0 TO 100 KM/H IN 4.4 S

PRICE:

FROM CHF 74,800.-

In the 1960s and 1970s, just like Matra did in Formula 1 and in endurance, Alpine proudly represented France in motorsport. In 1973, the year after Renault acquired the Dieppe-based manufacturer, the slender A110 won the first ever World Rally Championship, 11 years after the model was released. The A110 would remain in production until 1977, and its longevity turned the “Berlinette” into an icon. The rebirth of the model, decided upon 40 years later in the Ghosn era, is no accident: the “new age” A110 is an image builder, a little like a Porsche 911 à la française.

Praised since its release in 2018 by the trade press, the new Alpine got its career off to a flying start (between 4,000 and 5,000 units produced each year) but the longevity of the brand, ensured by Renault CEO

Luca de Meo, will rely on developing the Alpine line and probably a return to competition. Before the arrival of further models, the brand is first offering a particularly sharp A110 S.

The “new age” A110 is an image builder, a little like a Porsche 911 à la française

Despite the increased performance, the neo-retro lines remain fluid, without any additional aerodynamic artifices. The round headlights immediately inspire affinity and curiosity. Visually, the difference

compared to the standard A110 (Pure) can be seen in the details, like the oversized brakes with orange callipers. The carbon roof and forged wheels give the vehicle an irresistible “cheeky” look despite the extra 3,700 Swiss francs. At Alpine, performance means being sharp and compact, since the brand identity is closely tied to light construction (now in aluminium) and a rear-engine architecture. But the four-cylinder is brought to the centre to make the handling more balanced and subsequently free up space for the minuscule rear boot. A larger boot is located in the front. The 1.8L Renault turbo engine gives 292 hp to the Alpine A110 S, compared to 252 hp for the A110 Pure, while the maximum torque remains steady at 320 Nm to avoid overloading the six-speed dual-clutch automatic gearbox, which is attached to two large metal paddles.

The keyless entry card, identical to that of the 2005 Scenic, will not induce jealousy. But it does open the door to the stunning interior, split by a floating console that serves as a backdrop to the three buttons to select the gear. The rear view isn't great, but that doesn't matter: it's always better to look ahead, beginning with the steering wheel and the start button that kickstarts the car with an evocative roar.

The standard bucket seats are generously upholstered and surprisingly comfortable, though the seat back cannot be adjusted. The digital display imitates traditional needle counters, with the advantage of being able to display engine rpm and the engaged gear in large figures. It has to be said that turning tends to feel a little too sudden, and the ignition cut-off is reached quickly, even though the engine benefits from a little more extension in the S version (6,850 rpm). While “Track” mode isn't very useful for a road test, we immediately enjoyed the intermediate “Sport” mode, which

gives the driver the sense of truly being one with the car. Accelerating, changing gears, braking and decisive steering – the Alpine is pure spontaneity. Not to mention the reinforced chassis, which handles beautifully – as if the car defies the laws of physics. It's a dream. The Alpine displays all the data you need to understand its incredible agility, engine state and top-class form,

thanks to the collection of accelerometers, thermometers (water, motor oil, transmission fluid) and all other sensors. The average fuel consumption that we observed was 8L per 100 km (factory: 6.5L), which proves – if proof was needed – the advantages of a smaller size and lighter weight (1.1 tonnes empty), which prohibit neither versatility nor the habitual comfort settings. ▲



TOYOTA SUPRA PREMIUM COUPE

A two-seater from a line of front-engine coupes. In-line six-cylinder 3L turbo 340 hp engine from BMW, converter box and eight gears. Lots of torque (500 Nm) and serious weight (1.5 t). 0 to 100 km/h in 4.3 s, top speed of 250 km/h. Extensive standard features, no additional options. 188 g/km of CO₂. CHF 81,000.-

ALTERNATIVES



PORSCHE 718 CAYMAN

A two-seater which is conceptually similar to the Alpine. Four-cylinder boxer 2L turbo centre engine, seven-speed gearbox with optional dual clutch. Slightly slower acceleration (0 to 100 km/h in 4.9 s) but faster overall (275 km/h compared to 260 km/h for the A110 S). Larger (4.38 m long vs 4.18 m for the Alpine), weighs a couple of hundred kilos more, and CO₂ emissions of 201 g/km compared to 146 g/km for the French model. 300 hp and PDK gearbox. CHF 73,540.-

CULTURE

Cultural experiences from the comfort of your own home

Until you can jet off around the world once more, travel with your eyes: here are five free exhibitions you can explore via the internet.

BY SALOMÉ KINER

C OVID-19 has changed the way we experience culture, at least temporarily. For now, we must explore the art world from the comfort of our own screens. The general public was hesitant at first, but is now warming to the idea as they discover the advantages of viewing exhibits online. Never-before-seen content, 360° panora-

mas, artist interviews, 3D reconstructions and slideshows are now all over the internet. Let's look on the bright side: at least you don't have long queues to get into museums. The most famous works of art in global history are now just a click away. Art aficionados can discover new treasures, such as African comics and sounds from rare birds. ▶

Harry Potter celebrates 20 years

The British Library exhibition's magical voyage

In 2018, early fans of the series will suddenly have felt old: the year marked the 20th anniversary of the release of the first Harry Potter book. To celebrate the occasion, the British Library in London dedicated a large exhibition to the adventures of the young wizard and to the history of magic. Anyone who missed the exhibition (which was virtually sold out) can now view it again online: *A History of Magic* is now a 360° exhibition available via Google Arts & Culture. What makes the exhibition so engaging is the fact that it is designed for both young audiences and white-haired alchemists. Videos, articles and artwork are carefully curated to provide a completely immersive experience, and you'll need several hours to look at all the content in detail. The exhibition includes original illustrations from the artist Jim Kay, potion recipes, Hogwarts-style spell-casting lessons and highly detailed information on the symbols in the Potter universe. For example, visitors will learn that the phoenix comes from Arabia and lives for 500 years, but takes just nine days to be reborn from its ashes. The genesis of the saga is also explained; the idea came to JK Rowling as she was on a train from Manchester to London. Good news: you don't need to be a huge Potter fan to enjoy the visit – contemporary wizards and self-taught sorcerers will also be interested.

artsandculture.google.com/project/harry-potter-a-history-of-magic   Multilingual

The Great Animal Orchestra

Bringing animal sounds to human ears



Listen with headphones to help you relax or concentrate

SHUTTERSTOCK

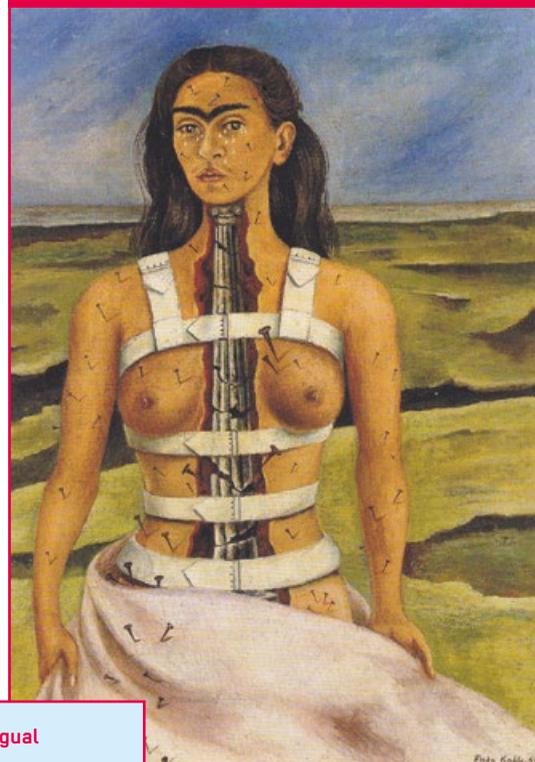
American Bernie Krause has been recording the sounds of animals for more than 50 years. Some 15,000 marine and land species, some of which are now extinct, have been immortalised thanks to this genius musician and bioacoustician. This exceptional heritage was featured in an exhibition in 2016, following which the *Fondation Cartier* (Cartier Foundation for Contemporary Art) decided to create an interactive website to showcase his work. Unlike other interactive visits, *The Great Animal Orchestra* has an aesthetically pleasing, harmonious interface that makes use of innovative technologies, rather than simply imitating the physical space of a museum in digital form. As you listen to Canadian wolves, a natural orchestra in Zimbabwe or animals of the Pacific Rim, there are quizzes and commentary to help guide your auditory explorations. Listen with headphones to help you relax or concentrate, or share the experience with your children so they can learn about the wonders and fragility of our ecosystems and their animals. This site is a must-have addition to your favourites.

 legrandorchestredesanimaux.com

 English, French

Faces of Frida

The 1,001 faces of Frida Kahlo



Her flower crown, dark unibrow, determined expression: objects inspired by Frida Kahlo's likeness are now available everywhere and have turned the Mexican artist into a pop culture favourite, albeit a sugar-coated version. But who was Frida really – the fervent communist, notorious anti-conformist and defender of her country's cultures? To explore this question, Google Arts & Culture offers a virtual retrospective with seemingly almost unending content. To celebrate “the life, art, love and heritage of Frida Kahlo through the eyes of experts and individuals who were influenced by her artistic talent”, no fewer than 33 art centres and national museums participated in Google's project, which includes more than 800 paintings, photographs and drawings, as well as her famous traditional artisanal clothing, her passionate correspondence and an interactive visit to Casa Azul, the workshop where she lived and worked in Mexico City. Visitors can build their own tour, and the original thematic approaches (such as her relationship with nature, her influence on LGBT+ artists and her legacy in the music world) will surprise even Frida's biggest fans.

 artsandculture.google.com/project/frida-kahlo

 Multilingual

Afropolitan Comics

A history of Africa in colourful comics



AFROPOLITANCOMICS.COM

 afropolitancomics.com

 English, French

“Education is the most powerful weapon which you can use to change the world,” said Nelson Mandela. Nigerian artist Tayo Fatunla turned this phrase into an artistic vision. His series of comics *Dur Roots* (Nos Racines) revisits major moments in Black history, from the Ashanti wars to the first African bobsled team and musician Fela Kuti. His colourful panels can be found in the *Afropolitan Comics* exhibition. Originally set to debut at the Angoulême comic festival, this ground-breaking project on pan-African graphic novels and comics reinvented itself as an online event to offer visitors a peek into the vibrancy of the “ninth art” on the African continent. *Afropolitan Comics* is a showcase of humour, incredible creativity and a strong sense of cultural heritage. The comics (mostly in English) are curated into three themes: “Autobiography”, “Heroes and history” and “Folklore and future”. The comics are immediately addictive teasers of longer stories, leaving readers wanting more. The site also offers enlightening information about the works as well as filmed interviews with the artists.

Rembrandt's “The Night Watch” is the star of the collection at the Rijksmuseum in Amsterdam, seen by millions every year. Even Barack Obama has visited it. This masterpiece, which caused a scandal in its day, was an important milestone in the history of painting: this was the first time that an artist had painted realistic figures in action rather than traditionally posed aristocrats. But the painting still holds many mysteries, and *Experience the Night Watch* helps to shed light on some of them. This interactive guided visit of the giant painting, which measures 4.38 m by 3.59 m, is as gripping as any page-turner. After finding out about all the characters – rich and powerful merchants, a child with an angelic face, an anonymous tambourine player – visitors can learn about several aspects of the movement and composition of the painting. They will discover that Rembrandt's genius lies in his use of movement and colour, his ability to manipulate the viewer and his playful spirit: “The Night Watch” continues to reveal its secrets and inspire new interpretations. All of these stories and more make this a fun and well thought-out interactive visit, and a children's version is also available.

This interactive guided visit of the giant painting, which measures 4.38 m by 3.59 m, is as gripping as any page-turner

Experience the Night Watch

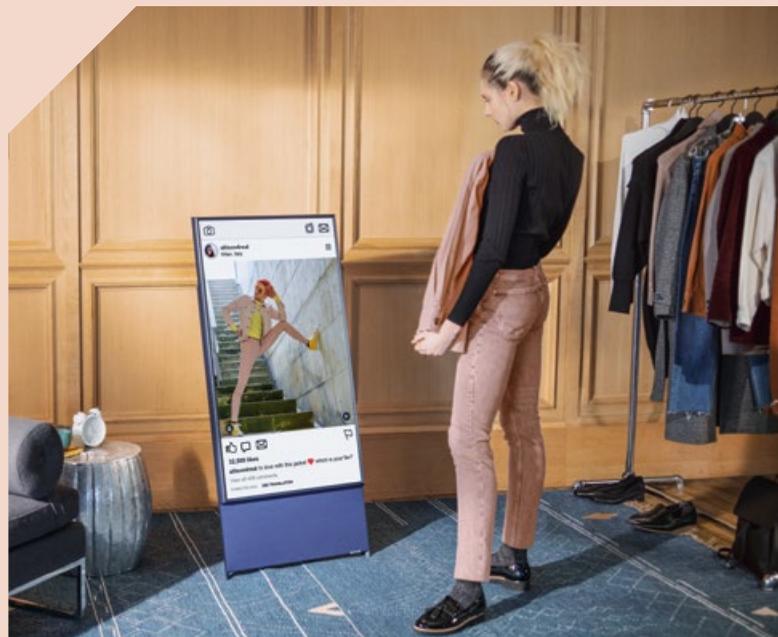
Behind the scenes of a Rembrandt masterpiece



 nightwatchexperience.com

 English, Dutch

BOUTIQUE



HORIZONTAL OR VERTICAL

After making headlines at CES in Las Vegas, the “Sero” (which means “vertical” in Korean) has arrived in Switzerland. What makes Samsung’s latest QLED 4K connected televisions groundbreaking is that they can be used in either portrait or landscape mode. Depending on the type of content you’re viewing, you can choose the orientation of the 43-inch screen and the entire display will pivot 90 degrees in just a few seconds.

samsung.com
CHF 1,699.-



MAKEUP FOR MEN

Never say never... In 2018, Chanel released Boy, its first line of makeup for men. There’s no hot pink blush or lip gloss, but rather camouflaging products that hide imperfections so that men can look their best discreetly. The line was so successful that the iconic midnight blue packages now include an anti-wrinkle cream, hydrating gel, a 3-in-1 eye pencil and two nail polishes, one in nude and the other in black. Ready for a manicure?

chanel.com
From CHF 38.-

EVERYTHING MADE OF CORRUGATED CARDBOARD

Berlin-based start-up Room in a Box creates furniture made of 100% recyclable cardboard. One of the eco-friendly brand’s best-sellers is the bed frame, which can be folded and unfolded in just a few seconds thanks to its patented accordion structure. With a minimalist design, it is available in five colours: natural cardboard, sage, pebble grey, black and white, as well as in three sizes to fit mattresses for one or two people.

roominabox.com
CHF 99.90.-



THE TASTE OF CANADA

Swiss start-up Happy Maple offers three varieties of its maple syrup: delicate, rich or robust – and all three are 100% natural and certified organic with no additives. Each variety – determined by whether the syrup was harvested early or late – is suited to a particular use, including sweetening tea or pancakes, adding to a sauce or using as a marinade for meat. It is a staple in Canadian cuisine as a replacement for sugar.

fr.happymaple.ch
From CHF 12.-



THE POWERFUL SMART ASSISTANT

With its retro-chic frame, the Marshall Uxbridge Voice smart speaker combines the aesthetic and the musicality of the legendary British label with the practical features of Alexa or Google Assistant – including voice command. Available in white or black, the connected speaker is equipped with a 30 W class D amplifier and adjustable bass and treble controls.

marshallheadphones.com
CHF 219.-

INFLATABLE CHAIRS

Created by designer Thomas de Lussac and osteopath Kevin Rayess, the Bloon ball chair offers ergo-dynamic seating to prevent the harmful effects of sitting for a long time. This feather-light chair (2 kg) is filled with air and is both elegant and practical. It can be moved with just one hand, which is useful for impromptu meetings. It can also be used for a muscle training or stretching session. A pump is included and the removable cover is machine-washable.

bloon-paris.fr
From CHF 195.-



THE FAIR SMARTPHONE

This is the latest release from Dutch company Fairphone, known for focusing on environmental sustainability and fair trade in all of its products. The Fairphone 3+ is made with 40% recycled plastics and is equipped with a 5.65 inch Full HD display and 48 megapixel and 16 megapixel cameras. In line with the brand’s principles, the device’s modular design means that it can be repaired easily.

fairphone.com
From CHF 499.-



TRIED AND TESTED

FLOATING
WEIGHTLESSLY

BY GÉRARD DUCLOS

Swissquote Magazine tried meditative floatation, a practice that involves sitting in a bath of warm salt water in complete darkness.

A therapeutic practice that began as a result of the work of American researcher John C. Lilly in the 1950s, sensory deprivation by way of floatation consists of removing all external stimuli to reach a state of profound relaxation, similar to a meditative experience. In reality, this means sitting in a water solution whose high salt content allows you to float with no effort whatsoever, a bit like in the Dead Sea. You can choose between a closed chamber or an open pool. It doesn't matter which, as long as all sources of light and noise are eliminated.

According to enthusiasts, this practice has many benefits for the body and mind: reduced stress, a stronger immune system, improved mood, memory and quality of sleep, and it also alleviates back pain, as well as offering many other advantages.

The Namaka Float centre, which has just opened in Geneva, was the perfect place to try it out for myself. I made an appointment for a one-hour floatation session and chose the "open pool" option rather than the completely closed chamber. You can never be too careful, after all.

When I arrived, I was led to a large, rather cosy private room that looked like a chic spa, with showers and a large pool filled with water. The very simple instructions essentially boiled down to informing me of which button to press to turn the lights on if I wanted to leave the pool before the end of my session. Everything else was automatic.

Very soon I reached a state of profound relaxation and meditative sleepiness

The door closed, I entered the pool of warm water, and the meditation began. At the start, I could still see a few dim red lights and hear the calls of wild animals, as if I was in a primal forest. Then, I was plunged into total darkness and absolute silence. As promised, the salt allowed me to float naturally and effortlessly. My body felt weightless. It felt strange to be deprived of my senses even though my brain was still thinking.

I thought an hour of this could end up being very long indeed... But very soon I reached a state of profound relaxation and meditative sleepiness. With no external stimuli of any kind, I floated in a sort of formless ether, losing all notions of time and space. The only issue I encountered was that I was almost cold at times, since the water was only just warm enough and the air was a bit chilly. That was a shame, because with no exterior stimuli, the sudden feeling of cold disrupted the experience a bit, reminding me of my corporeal existence. When I asked about it, the staff assured me that the air and water temperatures would be increased for the upcoming winter season.

If you're interested, here's a pro tip: make sure you remember where the bottle of fresh water is located next to the pool. It's very useful if you get salt in your eyes – and you will. After an indeterminate period of time, which seemed both long and very short, my session came to an end the same way it began, with soft light and a tropical soundtrack. I left feeling very relaxed, covered in salt, and with the desire to try the closed chamber – which bears the elegant name of "cocoon" – next time. ▲

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