In London, Professor Michael Mainelli has been working on the technology of the hour since 1995.

Page 4

“Blockchain won’t wreck the financial industry.”
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Businesses today have to be agile and flexible, delivering maximum performance while not missing market niches. Infrastructures, in contrast, call for stability. How does SIX reconcile both? Read about 20 years of continual advancements in a history of time.

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Machine ethicist Oliver Bendel meets automotive visionary Frank M. Rinderknecht

4 Blockchain
British academic Michael Mainelli has been concerning himself with blockchain-like technologies for over 20 years. He recommends using them to develop new applications, rather than to replace old ones that still work.

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No one knows what customers want better than customers themselves. So SIX queried its clients. This resulted in the creation of the myAnalytics data analysis tool, a service that enables SIX’s clients to learn more about their own customers on the basis of their card purchases.

30 Autonomous Driving
Automotive visionary Frank M. Rinderknecht and machine ethicist Oliver Bendel are in agreement that self-driving cars would need a set of rules. But they state that in the subjunctive because no one is in a position to formulate one.
The Right Reaction to the Chain
Everybody is talking about “blockchain,” but is that the right term in the first place?

Michael Mainelli It, in fact, isn’t entirely logical that the industry and the media use the term so expansively. The term “blockchain” originated from the bitcoin context even though the word never appears in Satoshi Nakamoto’s 2008 bitcoin white paper. He did, however, speak of blocks that get chained together. I personally prefer the term “mutual distributed ledger” – MDL for short – because it encapsulates the essential features of the technology we’re talking about here. “Ledger” stands for a permanent record of entries. “Distributed” describes the architecture: The ledger is distributed across multiple computers. And “mutual” describes the ownership structure: The ledger is the property of the public domain. But I can understand that the term “blockchain” is a bit easier to market.

You mentioned bitcoin and the 2008 white paper that described it. Did that mark the birth of MDLs?

No. The technology isn’t new. More than 20 years ago our firm had already developed an MDL application for a company in the health care sector. We had a distributed architecture, a copy of everything resided on each computer, and everything was encrypted. Back then we still synchronized via cables or floppy disks, whenever two company staff members met. Like with bitcoin today, we used a mathematical formula to convert entries into a numerical code – a hash – and integrated it into the subsequent entry. We called that “sleeving” and spoke of “stacks” rather than “blocks.” But what we got was a chain – a blockchain, if you will.

Why didn’t this idea catch on back then?

First of all, we weren’t the only ones working on MDLs. But the world just wasn’t ready for them yet, as the saying goes. That’s a typical phenomenon. Internet protocols, for instance, already existed in the 1970s. And e-mail has been around for longer than just since the mid-1990s. But it took time for both to catch on. It’s the same with MDLs. Digitization is really just starting to boom. It’s only just recently that everything and everyone is online. Furthermore, in the 1990s, systems distributed across multiple computers were considered to be extremely unsecure.

But euphoria now appears to have arrived. Some people reportedly are even saying that MDLs will change our world more than the Internet has.

That comparison is senseless because MDLs are inconceivable without the Internet. Besides, all groundbreaking advancements are driven by the motto “smaller, cheaper, faster.” That doesn’t apply per se to all MDLs, as evidenced by the bitcoin example. The virtual currency isn’t innately trustworthy. For that reason, “miners”
verify the legitimacy of bitcoin transactions. They apply mathematical formulas to blocks of transactions. They hash the blocks. This validation process takes time, and the calculations devour a lot of energy. Our planet can perhaps sustain one or two more MDLs the size of bitcoin. The resource consumption also costs a lot of money. With bitcoin, the cost is between USD 0.10 and USD 2.00 per transaction; with Ethereum, the cost is twice that amount. Smaller, cheaper, faster? Hardly.

And third, they safekeep assets and log their history. The architecture of MDLs predestines them to take over tasks two and three: Everyone holds a copy of everything and the “chain” is inalterably updated. Validation, on the other hand, best remains the job of a TTP. As explained before, that would save energy and costs. There is no need for public mining. The MDL wouldn’t be permissionless like it is with bitcoin; it would be permissioned: It would authorize only a restricted number of validators.

What’s the benefit then?
Don’t misunderstand me, if mining can be done away with, an MDL will instantly become efficient. The term “MDL” says nothing about the validation mechanism, it only says something about the structure of the data and the form in which it is recorded. It can be an MDL even without mining and coins. But what remains are logs in a ledger, numbers in a database. It sounds almost banal. So the primary benefit of MDLs doesn’t have to do with efficiency. Centralized databases can be just as fast. The main benefit lies in the potential to curtail the natural monopolies of trusted third parties (TTPs). TTPs are everywhere. Think not just of banks and stock exchanges. Think, for example, of the attorney who safeguards your will and executes your estate after your death. He, too, is a TTP. Is he necessary any longer in a world of MDLs?

And? Is he needed anymore? Are TTPs necessary any longer, for clearing and settling securities transactions, for example? They absolutely are. From my standpoint, TTPs currently fulfill three tasks in securities transactions. First, they validate the buyer and seller and the assets involved. Second, they verify that assets aren’t double-sold. And third, they safekeep assets and log their history. The architecture of MDLs predestines them to take over tasks two and three: Everyone holds a copy of everything and the “chain” is inalterably updated. Validation, on the other hand, best remains the job of a TTP. As explained before, that would save energy and costs. There is no need for public mining. The MDL wouldn’t be permissionless like it is with bitcoin; it would be permissioned: It would authorize only a restricted number of validators.

What else makes a case for TTPs?
The retention of a form of hierarchy, something I dub “community management.” This also includes involving regulators. This is also helpful when anomalies arise in an MDL. An incident like the DAO mishap on the Ethereum platform could be cleared up much faster by a TTP. The diversion of USD 50 million wasn’t a hack. The code worked as programmed. And thanks to the MDL, everyone knew where the money was at all times. It therefore must be possible to occasionally suspend an algorithm in extreme cases. Furthermore, countless MDLs will exist alongside traditional centralized ledgers. Just as much as it makes sense for all users of the MDL to hold copies of all numerical data, it makes no sense to duplicate memory-intensive documents like a copy of an ID card. TTPs can play a role here as an archivist or arbitrator. Bitcoin is fascinating, the mining concept is fascinating, but I wouldn’t overstate these achievements. At bottom we are only exchanging numerical data. A TTP is still needed to convert bitcoins into a boat or a bond.

You touched on the DAO incident. Is a blockchain, too, only as strong as its weakest link?
The chain per se actually proved to be very secure, even in the DAO case. The MDL logged everything correctly. What happened was actually envisaged in the code of the smart contract employed. Smart contracts are not part of an MDL, but can utilize it. That makes me skeptical. Smart? The term is misleading. I think something like “executable code process” would be more appropriate – something to be executed sometime in the future. That can turn dangerous if the necessary input comes from external sources, such as weather data, for instance, in an insurance claims
case. External data can be faulty, incomplete or even manipulative. We use such codes – we call them “sprites” – in our MetroGnomo time stamp project. The only inputs are data from the MDL itself and the time. As you see, we are taking things slowly. We presently are working on ledgers that are “boring,” but which function well and are easy to grasp. In the aftermath of the subprime crisis, I advise the financial industry to take the same approach toward MDLs. What we all don’t want anymore is complicated technology that gets used by many but is only really comprehended by precious few.

Do you have any other recommendations for the financial industry?

Don’t fix what isn’t broken. Allow MDLs to settle stock sales in real time? Sure, but present systems can already do that. The reasons why it currently takes two days for a stock trade to settle aren’t technical ones, but have to do with current business processes. The leverage that MDLs provide would be wasted here. Particularly in the area of securities trading, centralized ledgers will remain the first-line choice in most cases. Financial institutions and financial services providers would be far better advised to think about where they can offer customers added value through MDL-based services. That, above all, would be anyplace where multiple parties could work more efficiently together. Compliance checks for the onboarding of new clients come to mind here, for instance. Blockchains won’t ruin banks, just like they won’t wreck securities exchanges, data suppliers and payment transactions. But they all do face a challenge to work toward new solutions. And that can’t be a bad thing.

Lexicon

**Mutual distributed ledger (MDL)** A ledger is a registry of transactions akin to an account book. A mutual distributed ledger (MDL) is an account book that is not managed centrally by a trusted third party (TTP), but is instead distributed and stored across multiple locations in a way that gives everyone the same access to the same data.

**Bitcoin** Bitcoin is a virtual currency that has been in existence since 2009. It is based on a form of MDL called a blockchain.

**Blockchain** The bitcoin blockchain exemplifies a functioning MDL. All bitcoin transactions are inalterably recorded in the blockchain dating back to the cryptocurrency’s inception. The term “blockchain” comes from the blocks that hold batches of transactions. Any user can see the transactions, but no one knows who executed them. Bitcoin is thus both transparent and anonymous. In this narrow sense, the term “blockchain” applies only to bitcoin, but in the broader sense it is used as a synonym for any kind of MDL.

**Miner** Bitcoin miners validate the transactions in a block. To do that, they have to apply a mathematical formula to the block, which creates a hash. Theoretically, any bitcoin user can become a miner, but in actual practice, doing so requires a lot of computing power.

**Hash** A hash is a series of letters and numbers. It is calculated by miners by means of a mathematical formula and is stored at the end of a block. Once the hash is created, the block is then attached to the blockchain and is thus logged in the ledger. Miners receive bitcoins as payment for doing this work.

**Trusted third party (TTP)** Trusted third parties (TTPs) validate transactions, log them and allow other parties to view the transaction ledger if necessary. As centralized agents, TTPs facilitate a relationship of trust between two or more parties. An MDL can take over one or more of the tasks performed by TTPs. Bitcoin, for example, disintermediates banks.

**Smart contract** Smart contracts emulate the logic of a contractual agreement in programming code. Clauses automatically execute when predefined events occur. Some MDLs utilize smart contracts. Ethereum does, for example.

**Ethereum** The MDL Ethereum has been in existence since 2015. It utilizes smart contracts and its own virtual currency called ether.

**DAO** The decentralized autonomous organization (DAO), a virtual investment fund with no human management, was integrated into Ethereum via a smart contract. On July 17, 2016, a flaw in that smart contract allowed USD 50 million worth of venture capital to be hijacked. Given the absence of a TTP, it took weeks until a decision was made to shut down the DAO and to refund the money.
The Picture “Where’s Waldo?” can’t be the question here because there are nothing but Martins in the photo. German artist Martin Liebscher self-portraits himself – a hundred times over – in his “Family Pictures”. After having staged himself in settings like Milan’s Scala opera house and the Hamburg Casino, he chose SIX Swiss Exchange as the venue for one of his large-format photomontages.

The Date

June 1, 2017

A New Museum Opens in Zurich

The museum for historical bonds and shares run by SIX is moving from Olten to Zurich. With a new exhibition concept, the museum will become the reference site dedicated to the history of the Swiss financial industry and how it works, as spelled out by its new name – Swiss Finance Museum. The first guided tours of the multimedia exhibition will be held in June 2017.

→ More information: swiss-finance-museum.com

The Question

Why Is SIX Swiss Exchange Courting Indian Enterprises?

“First off, there is a certain degree of demand for direct investments in Indian companies. Second, the Indian market is growing rapidly, but lacks capital to finance the growth. And third, Switzerland offers Indian enterprises an attractive and, above all, stable environment for expanding their international operations.”

Marco Estermann, Head Strategy & Innovation, SIX Swiss Exchange

Did you know that, to date, SIX Swiss Exchange has listed ten bond issues by eight Indian companies with a total volume of around CHF 2 billion?

→ Send your question to us at: RED@six-group.com
The Financial Market Infrastructure Act (FMIA) entered into force in Switzerland in January 2016. It sets new rules for the financial industry and requires SIX Swiss Exchange, for instance, to reapply for a securities exchange license. And in order to keep operating on the European stage, SIX Swiss Exchange must additionally comply with the European Union’s MiFID II guidelines, which must be implemented by January 2018. Together with an interdisciplinary project team, Christin-Isabell Henn, a senior project manager at SIX Swiss Exchange, is concerning herself with the regulatory impacts that the FMIA and MiFID II will have on SIX’s securities exchange and other trading systems. The more than 2,500 statutory articles and the accompanying annexes add up to around 4,000 pages of regulations that have to be read and implemented.

Switzerland has digital catching-up to do

Switzerland is one of the world’s most competitive economies, possesses good infrastructure and is highly innovative, but hasn’t been able yet to translate these strengths into a digital leadership role. To make that happen, society, lawmakers, government agencies and private-sector companies would have to work closely together, the École polytechnique fédérale de Lausanne (EPFL) writes in a study titled “Switzerland’s Digital Future – Facts, Challenges, Recommendations.”

The study, commissioned by SIX and Swisscom, recommends specific actions to take: Switzerland should continue to pursue agile, flexible infrastructure assets, should market itself worldwide as a secure custodian of data and should support start-ups with better funding options and amended tax laws. Furthermore, automated open-data-based services should be implemented to disencumber public authorities and private enterprises. The key prerequisite to that, according to the EPFL, is digitally literate citizens.

“We don’t just collect data. We correct it, normalize it, enrich it, and thus create an added value.”

Robert Jeanbart, Division CEO SIX Financial Information

→ All of the study’s findings and recommended actions: six-group.com/digitalch
Focus:
20 Years of Continual Advancements

Speeding
SIX has been propelling Switzerland’s financial industry forward for two decades and is now stepping on the gas again. RED reveals where speed works for Switzerland’s financial-market infrastructure and explains when it’s better to wait.

Text  Franziska Garbe

June 24, 2016. It’s been clear for a couple of hours now that the UK will leave the EU. Stock and currency prices are nosediving, politicians and the media are in an uproar, and the telephones at SIX Swiss Exchange are ringing off the hook. Otherwise, there is nothing in the Zurich stock exchange building that betrays any indication of the tensions behind the scenes. Today the big display board in the foyer is the only visible sign of ongoing trading. Securities tickers and numbers rhythmically scroll across it at a moderate pace – electronically, continually and silently.

Gabriela Rytz remembers when things were different. In the mid-1980s, the then 20-year-old used to sprint up and down a steep staircase a hundred times a day at the old Zurich stock exchange on Bleicherweg. As a “ticket runner,” she shuttled phoned-in buy and sell orders from her bank’s office on the first floor down to the trading floor, where the floor traders clustered around the ring, deafeningly shouting out prices for the orders handed to them. “Not every security was continuously traded during open outcry sessions,” Ms. Rytz recounts. “As a ticket runner, under no circumstances could you miss a time slot. When the alphabetical sequence came to a non-continuously traded security and an order for it was pending, I had to rush it down to the ring.”

Fast and at the Best Price

Incoming orders – information transmission – trade execution: What was once purely physical in 1985 is today taken care of by computers. SIX Swiss Exchange’s electronic platform executes trades in the blink of an eye, reliably and always in line with the same rules. The elapsed time is measured at a constant 37 microseconds. The bustle on the trading floor and the shouts of traders are a thing of the past. “Our electronic trading system is predictable and ultrareliable,” Swiss Exchange Division CEO Christoph Landis says. “No trader needs to price in risk premiums for uncertain information. Bid and offer prices correspond to supply and demand.”

There are two crucial factors for price formation on the securities exchange today: The speed at which price information reaches traders, and the speed at which traders can react to that information. The story of broker Jim Fisk (see box on page 15) shows what happens when there’s a snag somewhere along the line: The price turns out wrong. Electronic trading on SIX Swiss Exchange prevents such price distortions. “The predictability of our system democratizes the market,” Mr. Landis asserts. State-of-the-art infrastructure enables SIX Swiss Exchange to currently provide the European Best Bid and Offer (EBBO) for more than 80% of the securities it trades daily. “This is so good that no trader searching throughout Europe for the best trading venue for a deal can ignore us.”

A trading system that works reliably, quickly, and with consistent stability even for large transaction volumes is vital to upholding the ambition of being a reference market, particularly in times of financial-market turbulence. Neither the post-Brexit referendum turmoil in June nor the historically high trading after the Swiss National Bank’s decision to scrap the EUR/CHF...
exchange-rate floor ruffled SIX Swiss Exchange’s trading system, let alone pushed it to its capacity. But what if that were to happen? “Prices would get distorted, and we would no longer be able to guarantee certain parameters,” Mr. Landis says. “That would include, for instance, not being able to clear all trades for settlement within the same day.”

In the Beginning There Was Paper Chaos
Everything that takes place after a stock-market transaction is agreed – risk management between the parties to the trade, settlement of the trade and centralized safekeeping of the securities involved – is fully automated in Switzerland today. SIX manages the entire value chain consisting of trading, clearing, settlement and custody.

A look back at the past illustrates how safe and efficient this is. In the early 1970s, the sheer volume of securities transactions that had to be cleared and settled manually plunged Wall Street into a dire crisis. Within a short space of time, trading volume on the New York Stock Exchange had rocketed from 5 million to 12 million transactions per day. The back offices responsible for settling stock-exchange transactions were buried under an avalanche of paper. This resulted in delayed deliveries of securities and an exceptionally high error rate, which caused enormous costs. In a span of two years, a sixth of all NYSE trading members disappeared from the scene – none of them had their accounting under control. It took the deployment of computers and the resulting nascent automation of processes to stabilize the situation.

Swiss Chain Reaction
The various infrastructure operators in Switzerland interlinked their IT systems in 1996. Years later, in 2008, they merged to form Switzerland’s central financial-market infrastructure under the name SIX. The Swiss value chain (see box on page 17) was absolutely unprecedented in the mid-1990s. It enabled end-to-end data processing of everything from order entry to central safekeeping. The star attraction was the integration of the Swiss Interbank Clearing (SIC) system into the value chain. Trading banks from then on used it to square their open positions through their sight deposit accounts at the Swiss National Bank.

“As a ticket runner, under no circumstances could you miss a time slot. I had to sprint down to the ring each time.”

Gabriela Rytz, former ticket runner at the Zurich stock exchange
This substantially increased their liquidity and consequently accelerated payment settlement.

**In Step: Switzerland and Europe**

Today it takes just seven seconds for a transaction to pass through the entire Swiss value chain. Theoretically. In reality, throughout Europe, two working days stand between the execution of a stock-exchange trade and the final transaction settlement. Long gone are the days when the Swiss financial market could be viewed in isolation, let alone operate in isolation. So SIX’s clearing operations process trades executed not just on SIX Swiss Exchange, but also on the London Stock Exchange, and on a number of other trading platforms in Europe. “The trades executed throughout Europe continuously reach us in real time,” says Christian Sjöberg, the Head of Clearing at SIX Securities Services. This means that approximately two million times a day, SIX acts as a central counterparty, calculates the risks inherent to the parties to the trade in real time, and thus minimizes the risk of default. After the final bell has sounded at the last stock exchange to close, all of the transactions in a given security are offset against each other. “At the end of the day, just a single settlement order per clearing participant is transmitted to the corresponding securities custodian,” Mr. Sjöberg explains. This modus operandi makes the processing of transactions highly efficient. Expanding volume, high volatility, countless different financial instruments: “We take care of all of it,” the clearing expert assures.

**Infrastructure Takes Time**

In Europe today there are more than 100 regulated trading venues and more than 30 recognized clearing houses and central securities depositories, as well as other custodians and banks that provide safe-keeping services. All of them are networked differently. The fragmentation of the European market fosters price competition between the infrastructure operators. At the same time, there is mounting pressure to harmonize systems, processes and regulations.

A number of harmonization projects are currently underway. They are complex, costly and very time-consuming. Below are just two examples: In 2007,
“It isn’t IT that provides the answer to the challenges posed by the market, it’s the business model utilizing IT that does.”

Henning Kagermann and Hubert Österle, book authors

the European Central Bank began preparatory work on a pan-European securities settlement platform known as TARGET2-Securities (T2S). The aim of T2S is to enable harmonized, centralized delivery-versus-payment settlement of securities transactions in central bank funds across the whole of Europe. European central securities depositaries are in the process of migrating to the Eurosystem’s T2S platform in stages over a two-year period. Since the next migration wave has been delayed, the platform has yet to undergo meaningful stress tests. SIX was part of the initial migration wave in June 2015 and is the only major central securities depository to date to have fully implemented T2S.

Another significant infrastructure project in Switzerland was completed in April 2016, when SIX successfully migrated the Swiss Interbank Clearing (SIC) system onto a new, modern platform. The old system had been in round-the-clock operation for almost 30 years, and the new SIC platform is likewise designed to stay operational for a long time to come, for a life span of at least 15 years. The platform is scalable, is capable of handling multiple currencies and, as the first system of its kind in Europe, is based on the ISO 20022 messaging standard, which is the international standard for harmonized cashless payment transactions.

But is a planning horizon spanning more than a decade actually even tenable for a technology-driven company operating in a highly dynamic environment? In today’s fast-paced information age, there are mounting examples of former world market leaders whose business models suddenly became outdated; Kodak, the one-time leading supplier in the photography industry, failed to adapt in time to digital photography; Nokia’s mobile telephones were best sellers until the first smartphones hit the market; and AOL, the default Internet homepage for so many during the 1990s, let itself be supplanted by Google.

The speed at which organizations recognize changes in the market and implement innovative business concepts is often the game changer. “It isn’t IT that provides the answer to the challenges posed by the market, it’s the business model utilizing IT that does,” write Henning Kagermann and Hubert Österle, who jointly authored a book on the transformation of business models.

Value Creation through Network Effects

Kagermann and Österle envision a broadening of the value chain into an ecosystem. They write that “fast, secure and inexpensive execution of orders was the driver behind the reorganization of in-house processes in the 1990s; order execution will also be the driver of cooperation processes across company and enterprise boundaries.”

The idea of value creation through network effects is not a principle that is new to SIX. The company is owned by around 130 banks operating in the Swiss financial market, each reaping cost and efficiency advantages by jointly using centralized infrastructure. SIX is working on further enlarging those advantages through new infrastructure services for financial-market participants. For instance, SIX’s existing infrastructure enables the company to execute a variety of internal bank processes – in the area of compliance matters, for exam-
Trading members send their buy and sell orders to SIX’s electronic trading platform. Trades are executed automatically in accordance with precisely defined rules.

Clearing
Trading parties deposit collateral at SIX’s clearing-house. SIX acts as the central counterparty between buyers and sellers and guarantees the settlement of outstanding claims.

Settlement
Two days after the trade takes place on the securities exchange, SIX automatically and irrevocably delivers the securities and executes the payment.

Custody
Centralized electronic custody of securities facilitates other administrative services such as carrying out equity splits, capital increases and dividend payments.

The Swiss Value Chain

Trading
Exchange members send their buy and sell orders to SIX’s electronic trading platform. Trades are executed automatically in accordance with precisely defined rules.

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Transformation by Collaboration
In addition to volume-driven networks geared toward the efficient processing of transactions, there are also a growing number of collaborations focused on the early stages of value creation, such as joint research and development. Here, SIX works together with start-up firms. With their flexible enterprise structures and their greater willingness to take risk, start-up companies often have an edge when it comes to quickly advancing products to market readiness. SIX expects these collaborative efforts to yield ideas for innovative products and services, and to improve time to market.

Through all of these activities and dynamics, the Swiss value chain is being built out vertically as a value chain and horizontally into a network – a profound transformation. How successful this transformation turns out to be will ultimately be decided by SIX’s clients. “Customers put their trust in the first ecosystem to attain critical mass,” Kagermann and Österle write. The race for scale is only just getting started.

More stories about the Swiss Value Chain:
six-group.com/fintech#swiss-value-chain
We encounter Urs Rüegsegger in Shanghai, China’s financial metropolis, in his chairman’s role with the Working Committee of the World Federation of Exchanges (WFE). The Group CEO of SIX is the first Swiss national to ever head this central committee. The WFE represents around 60 regulated securities exchanges worldwide. Its Working Committee is composed of those exchanges’ representatives and advises the WFE’s board of directors on issues pertinent to the securities exchange industry. But Shanghai isn’t just a meeting place. It is also becoming an increasingly important partner for SIX Swiss Exchange via the Shanghai Stock Exchange. The two exchanges laid the cornerstone of a forward-looking collaboration through a memorandum of understanding signed in 2015. Moreover, SIX is capable of giving the Chinese market access to Switzerland and the rest of Europe through its infrastructure. SIX is helping to establish Switzerland as a regional hub for cross-border financial transactions denominated in Chinese renminbi.
Switzerland is one of the world’s major trading venues for capital and commodities. The Swiss financial center is extremely attractive for domestic and foreign companies seeking capital because of its manageable size, tightly woven networks, and international orientation. Switzerland’s banks have ample financing and placement capacity.

SIX Swiss Exchange’s trading platform brings market participants together and connects companies from around the world with international investors and trading participants. Providing a gateway to the capital market and acting as a trading venue are SIX Swiss Exchange’s two most important functions.

Gateway to the Capital Market for Companies

**Listing** When a company plans to make a major investment, it often needs outside capital providers. Turning to the stock market is a logical move because that’s where capital seekers encounter outside investors. A “listing” is an admission of a security for official trading on a stock exchange.

**Capital**

The company receives capital in exchange for its ownership shares issued. It can use that capital to fund major investments.

**Security**

An investor in the equity capital of a company receives a certificate called a security. Ownership of a security accords the investor certain rights, such as voting.
IPO
The first sale of a company’s shares to the public on a stock exchange is called an initial public offering (IPO).

Monitoring
The autonomous SIX Exchange Regulation division is in charge of monitoring and enforcing compliance with the established rules for all market participants. It ensures that trading proceeds in an orderly and equitable manner and protects market participants from manipulations.

Share price
The price of a share as determined by supply and demand.

Bull and bear
A protracted period of rising prices is referred to as a bull market. The opposite – a protracted period of falling prices – is called a bear market.

Index
An index comprises a portfolio of stocks, bonds, commodities or other asset types. The prices of the individual assets (the index components) are added together – usually according to a certain weighting, such as by market capitalization – and yield the total value of the index. Changes in the index value act as a barometer of the market that the index is designed to represent. The most well-known Swiss indices are the Swiss Market Index (SMI), the Swiss Leader Index (SLI), the Swiss Performance Index (SPI) and the Swiss Bond Index (SBI).

Transaction For more than 20 years now, trading, clearing and settlement on SIX Swiss Exchange have been conducted fully electronically with a single click of the mouse.
LAUSANNE
Ice cream
Boat cruise

MORGES
Overnight stop

BERN
Bärengraben
Zytgloggenturm
Swissminiatur in Melide in the morning, the Lion Monument in Lucerne in the evening. In between, two hours’ time on the Stanserhorn, Titlis or Pilatus. For a Chinese tourist, the first day of a two-day tour of Switzerland looks something like that. Two days for all of Switzerland? That has to suffice because many Chinese receive just ten vacation days a year. That makes them all the more generous with their spending.

Chinese tourists in Switzerland spend CHF 330 per day on average. German tourists, for example, spend less than half that amount. Alpine funicular operators have a keen interest in those CHF 330, or at least in the portion that they pocket.
The magazine from SIX on the mountain peak. They take a precise interest in those two hours during which Chinese tourists enjoy the Alpine panorama. During that brief time, they want to perfectly cater to the tourists’ wishes. To do that, they need to know their preferences. Finding them out has become a lot easier since May 2016, when SIX began offering a new service – myAnalytics – to merchants equipped with the appropriate terminals.

Funicular operators aren’t the only ones who receive valuable information about their business and customers through their online client portal. myAnalytics delivers answers to numerous questions pertinent to businesses, like: What countries do my customers come from? How much do they buy from my competitors? How loyal are they? When do they do most of their shopping? What are my best sales channels?

Feedback on my clients – and competitors
Which brings us back to our Chinese tourists. They have many ways to spend money in the Swiss Alps: on the ride to the peak with the funicular, on dining in restaurants, on souvenirs, and on attractions like toboggan runs, rope courses, or scooters for the descent. With myAnalytics, funicular operators can discover more than just which of those sales channels brings them the most revenue; they can also see where they stand compared to the competition. myAnalytics doesn’t compare apples with oranges, it compares restaurants with restaurants, hotels with hotels, and so on.

“The diversified set of offerings was one of the reasons why we conceptualized the myAnalytics prototype in 2014 in close collaboration with a funicular operator,” explains Christine Ruckenbrod, a senior product manager at SIX Payment Services. “That way we could integrate the

Design Thinking
With Clients for Clients
SIX adopted a design-thinking approach to develop myAnalytics. Design thinking employs interdisciplinary teams that put their focus on the needs of the client. This creative process is aimed at delivering fast results and takes place on a recurring basis. myAnalytics started out as a team of three consisting of a marketing strategist, a product manager and a software developer. Away from their everyday duties, geographically removed from their usual workplaces and with a four-figure budget, they began by analyzing client needs.

The team conducted multi-hour-long interviews with selected clients and concurrently invited 2,800 clients to participate in an online survey. The qualitative and quantitative findings were funneled into a one-day workshop (speed creation) involving other SIX specialists. The prototype was then built.

After a developmental stage taking a total of three weeks (sprint), SIX was already poised to present clients with an operational version. Using the feedback received from clients, in a second sprint the by-then five-member team advanced myAnalytics to market readiness. The first available version of myAnalytics deliberately does not yet include all of the functionalities of the prototype in order to speed time to market, which is a typical feature of design thinking.

myAnalytics is the second service (after the mobile payment solution Paymit) that SIX Payment Services has developed with the aid of design thinking. SIX is now employing the design-thinking principle in the innovation process in all of its business areas. The sprints take place at F10, the fintech incubator that SIX established in 2015 in Zurich, away from everyday duties, geographically removed from usual workplaces.

→ More information: six-group.com/fintech

LUGANO
Breakfast
Green tea

MELIDE
Swissminiatur
Lunch
Ready for PRIIP KID compliance?


You can count on SIX.

The PRIIP KID service from SIX Financial Information provides automated generation, maintenance, archiving and reporting of legally compliant Key Information Documents. Integrated directly into your systems, our PRIIP KID service paves the way to compliance for investor protection under MiFID II.

www.six-financial-information.com/priip-kid
competition comparison for multiple sectors in one swoop.” When the project was just three weeks old, the target group of funicular operators were given a first opportunity to try out the new possibilities themselves. The feedback then flowed directly into the development of further versions (see box on page 24).

Planning staffing, retaining customers
Of course, funicular operators aren’t the only ones with a keen interest in learning more about customer behavior, Ms. Ruckenbrod adds. Fifty-seven percent of merchants affirmed this in a survey that SIX conducted at the outset of the myAnalytics development process. “The percentage of affirmers among larger-scale businesses was even higher.”

SIX’s market leadership, with 2.6 million card transactions per day, is what makes serious data analysis possible in the first place. “By working up anonymous data from card purchases, SIX can create genuine added value for merchants,” Ms. Ruckenbrod says confidently. This means, for example, that a merchant sees exactly when and where “something is happening” and where to best deploy staff. Or the merchant receives enough pertinent information to create a customer retention program attuned to actual spending habits.

Satisfied guests return. But on mountaintops, the weather gods also have a say in the matter. So today, funicular operators and all other merchants can already look forward to a further advancement of myAnalytics. SIX is working on, among other things, incorporating weather data into the analysis, which, by the way, was already envisaged with the 2014 prototype.

myAnalytics is integrated in the myPayments online client portal. Its benefits are available at present to clients in Switzerland. A rollout to Austria and Luxembourg is in the planning stage.

→ More information and a demo version: six.swiss/aboutmyAnalytics

What are Chinese tourists’ favorite activities?

The Great Wallet of China

* The top 10% of highest-spending Chinese tourists

Shopping 62%
Sightseeing 56%
Dining 48%

Source: China International Travel Monitor 2015
Behind Every Savvy Investor There Now Stands a KID

KIDs for PRIIPs As of 2017, issuers of complex investment products will be required to declare the features, benefits and risks of their products in plain language that is clear and understandable to the general public.

Text Iris Kuhn-Spogat

The wheels of government turn slowly but surely. In the aftermath of the 2008 financial crisis, in 2014 the European Union enacted a set of regulations to address one of the problems that caused the collapse of the financial markets: investments in financial products poorly understood by laypersons and retail investors. Many of those investors paid dearly for their naivety and carelessness. The resulting resentment has been fierce, and trust has been lost. The government-prescribed cure? Transparency.

In the European Economic Area (EEA), every PRIIP will thus require a KID effective as of January 1, 2017. PRIIP stands for “packaged retail and insurance-based investment products.” PRIIPs encompass, inter alia, investment funds, options, derivatives and unit-linked life insurance policies, which sometimes are highly complex securities under which the amount repayable to the retail investor is subject to fluctuations. KID is an acronym for “key information document,” which serves the same purpose as the patient information leaflet included in medication packages: to make investors aware of the features, benefits and risks of a PRIIP so that they know what they are letting themselves in for. To ensure this awareness, KIDs are required by law to be worded in plain language that is easy to understand, devoid of technical jargon and fine print. Furthermore, the product description must be no more than three A4 pages in length, and for its content and form there is a detailed template with prescribed headings. One noteworthy side effect of KIDs is that they enable life insurance policies, options and the like to be compared against each other throughout Europe and across all sectors.

Issuers of investment products are responsible for publishing KIDs. They must disclose all of the direct and indirect costs associated with the PRIIP and must simulate and declare the return possibilities and the risks of incurring losses. This means simulating and illustrating a variety of “what if” scenarios for each PRIIP. Last, but not least, the product’s past performance must be disclosed. Client advisors are required to hand out KIDs to private investors, and KIDs must also be made available for PRIIPs distributed online without advice.

KIDs for PRIIPs play a key role in the EU’s efforts to protect private investors, who in the future should even be able to understand PRIIPs without much difficulty and without possessing specialist expertise, and should thus be capable of making calculated purchase decisions.

PRIIP KID Service from SIX

The Countdown Is On. Are You Ready?

An improvement for investors, a challenge for issuers and investment advisors: The PRIIP directive goes into effect on January 1, 2017. Whoever fails to take action now faces lost revenue or even lawsuits. The actions required are complex, time-consuming and cost-intensive. The risks and return of a PRIIP change over its term to maturity, so a onetime download of the mandatory key information document is not sufficient. The system provided by SIX therefore continually updates KIDs in compliance with law in all languages relevant to the EEA. SIX also takes care of distributing the documents to all sales outlets. With more than 85 years of experience in providing high-quality market and reference data, and with a staff of in-house compliance experts and a global network of partnerships, SIX is the one-stop shop to turn to for comprehensive PRIIP KID services.

More information: six.swiss/PRIIP-KID
Safe and Secure

1. Federal Council bunker, Gotthard, Switzerland
The Swiss National Redoubt returns to new glory in the form of an array of maximum-security data centers. The former Federal Council bunker dating back to 1942 also safeguards precious metals, diamonds, jewelry, artworks and vintage cars from all adversities.
→ swissdatasafe.ch

2. Parksafe, Derby, England
The “safest car park in the world” uses cameras, sensors and bar code scanners to register every movement at entryways.
→ parksafesystems.com

3. Central vault of SIX, Olten, Switzerland
This hermetically sealed maximum-security vault, featuring one of the most advanced systems for safekeeping and administering securities, stores securities and precious metals.
→ six.swiss/vaultsystem

4. Safe House, Warsaw, Poland
When danger arises, roll-down doors, a drawbridge and movable wall elements that completely seal off windows turn this residential house into an impenetrable monolith.
→ kwkpromes.pl/safe-house

5. Global Seed Vault, Spitsbergen, Norway
Beneath the permafrost on Spitsbergen Island lies a vault storing Earth’s most important DNA: the seed stock of our crop plants, so that we don’t starve in the event of a doomsday catastrophe.
→ croptrust.org

Smartphones Are Turning into Wallets

According to a study conducted by Visa Europe, the number of people making daily usage of mobile payments will double by 2020. More than half of the survey respondents said that by then they would use their smartphones at least once a week to shop online, but also to make contactless payments. They also expect their mobile spending to increase. Interest in contactless payments via smartphone is already pronounced today.

The Statistic

Daily Usage of Mobile Payments*

<table>
<thead>
<tr>
<th>Year</th>
<th>Usage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>9%</td>
</tr>
<tr>
<td>2020</td>
<td>20%</td>
</tr>
</tbody>
</table>

Weekly Usage of Mobile Payments*

<table>
<thead>
<tr>
<th>Activity</th>
<th>2020 Usage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In stores</td>
<td>53%</td>
</tr>
</tbody>
</table>

Weekly Spending via Mobile Payments*

<table>
<thead>
<tr>
<th>Activity</th>
<th>2015 Spending</th>
<th>2020 Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>In stores</td>
<td>€22</td>
<td>€35</td>
</tr>
<tr>
<td>In restaurants or bars</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For travel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Interest in Contactless Payments via Smartphone

<table>
<thead>
<tr>
<th>Activity</th>
<th>Interest (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>In stores</td>
<td>43%</td>
</tr>
<tr>
<td>In restaurants or bars</td>
<td>41%</td>
</tr>
<tr>
<td>For travel</td>
<td>35%</td>
</tr>
</tbody>
</table>

* The study defines “mobile payments” as meaning contactless payments via smartphone, as well as online shopping via smartphone for items such as app purchases, music downloads, etc. The data stems from a survey of 12,000 consumers in Germany, Finland, France, the UK, Poland and Spain.
The Glossary

Greenshoe

A “greenshoe” is an overallotment option. It can be exercised when the demand for shares in an initial public offering (IPO) exceeds the number of shares on offer. By exercising the greenshoe, the stock issuer increases the free float, i.e., the percentage of shares whose ownership is not firmly locked in by an investor such as the company founder, for example. Eight of the last ten IPOs on the SIX Swiss Exchange included a greenshoe option; five of the greenshoes were fully exercised, and three were partially exercised. The term takes its name from the Green Shoe Manufacturing Company, which back in the 1960s was the first to include this type of option in an IPO. Today the shoe wholesaler is called Stride Rite Corporation and markets an array of brands that includes the Robeez line of children’s footwear.

The Find

A Stock Market for Opinions

Donald Trump will occupy the Oval Office – you can earn money with that opinion. Predictit, a US stock market for predictions, went live in 2014. The online platform, developed by the Victoria University of Wellington, creates a prediction market for questions like: “Who will be the next US president?” The election odds determine a share’s price. For example, a 30% probability of Trump winning the election equals a share purchase price of USD 0.30. If Trump gets elected, his “stock” is redeemed at USD 1.00; if he loses the election, his stock becomes worthless. But if it is sold at the right moment, a “Trump share” can still pay off even if Hillary Clinton ends up triumphing. To guard against illegal gambling, each question is limited to 5,000 traders and prediction contracts are capped at USD 850.

Prediction markets, by the way, have proven to be more accurate than surveys for forecasting election outcomes because the question “Who will win?” gets answered more rationally than the question “Who will you vote for?”

→ Visit predictit.org for more information. (Trading on the website is not yet possible in some countries including Switzerland.)
Oliver Bendel has cut a profile as an expert on machine ethics.

Frank M. Rinderknecht gets things rolling in the auto industry with his vision.
“How Much Humanity Should Go into the Machine?”

Future Talk: Autonomous Driving
Oliver Bendel, machine ethicist, and Frank M. Rinderknecht, automotive visionary, on the future of automobiles, the challenges on the road to that future, fun gadgetry and harebrained inventions.

Interview Iris Kuhn-Spogat

Mr. Rinderknecht invents automobiles that are capable of driving on and underwater. Together with SIX, he recently presented a car that can pay the bill in a drive-in restaurant by itself and can even feed parking meters on its own. What do you make of that sort of thing, Mr. Bendel?

Oliver Bendel I think it’s great to play with the idea. Too many car companies take everything far too seriously and thus miss the heart of the matter. They are stubborn and thus do not conceive of anything genuinely new. Gadgetry is exactly what’s called for, regardless of how crazy it is.

Frank M. Rinderknecht And I actually like to go crazy – I think it’s wonderful. The German word for “crazy” comes from the verb root “verrücken,” which means nothing more than “to move.” And that’s exactly my aim. By the way, that car that pays my parking fees isn’t a gimmick – I’m serious about it. How often have I wished that my car would deal with inconveniences like paying a parking lot ticket by itself? The Etos, the concept car that I built along with the help of SIX, proves that this would already be eminently doable today.

Where do you get all of the ideas that enable you to bring out world-debut concept cars year after year?

R Most of it is teamwork. Brain-storming in teams of three or four often yields better ideas than when I wrack my brain on my own. And in the end it’s never about who came up with the idea; what matters is that it was we who hatched it.

How do you envision the future of automobiles?

R Future generations will view everything differently. Fifty years from now they will say, “Hey, they were completely insane back then, they killed each other in traffic, polluted the air and destroyed everything.” The automobile in its present form will no longer exist. I envision small pods like the Google car. The future means one-stop-journey shopping; while I’m on the road, everything will be arranged for me with a click via booking.com, Airbnb, the online transport schedule and the restaurant. And in the future you’ll no longer need to own a car; they mostly stand idle anyway.

And all of the pods will cruise around town the same way? Or will there be more aggressive pods and more courteous ones?

B There is actually a debate underway about car personalities; it would be weird if a Porsche didn’t behave differently than a Fiat Panda.

R I think that’s totally ridiculous. What do I need an aggressively driving car for if I want to work during the trip? Accelerating, braking, accelerating, braking – that would surely make me nauseous.

B So you’re saying that the automobile will evolve into a sheer vehicle with added utilities? It will become a shopping mall and will take me to hotels and restaurants that it picked out and booked as being right for me?

R The car will take you there, and that’s it. In the future, money won’t be made by car manufacturers, but by service providers. The increasing convergence of software and hardware is posing an extreme challenge for the auto industry.

B Carmakers definitely need to come up with something.

R It’s questionable whether they’ll succeed in doing so. Take Germany’s auto industry. It is high-caliber, well-advanced and digitally oriented. All of its advancements are driven by engineers who concern themselves with things like 80 different seat position settings. Sorry, but who needs that? Elon Musk’s success with Tesla is essentially founded on the fact that
Frank M. Rinderknecht
The CEO of Rinspeed founded the company in 1979 and has been inspiring the auto industry ever since with visionary mobility concepts and innovative power trains. The 60-year-old makes headlines every year with a world-debut vehicle. His 2016 concept car was the Etos, equipped with features including a personal autopilot, a drone on board, and an integrated onboard payment function based on a collaboration with SIX.

Prof. Oliver Bendel
The philosopher and information scientist teaches business information technology at the University of Applied Sciences and Arts Northwestern Switzerland. The 48-year-old German national is particularly interested in philosophical issues and is an internationally sought-after expert and speaker on machine and robot ethics.

Getting back to autonomous cars, in May 2016 there was a fatal accident involving a Tesla Model S. What were your thoughts when you heard about it, Mr. Rinderknecht?

R I was stunned, not because the accident happened, but because just the day before I had mentioned to one of my major partners that there will be fatal crashes with self-driving cars. The Tesla accident was the first one, but it won’t be the last.

B The accident didn’t surprise me, and it probably didn’t surprise Tesla either.

Pardon me?

B Car manufacturers are implementing automation too quickly. There isn’t enough experiential data available yet to make automated driving systems safe in traffic. The Tesla accident made two things clear to me. First, that we are still a very long way away from fully automated, autonomous driving, and second, that people are serving as human guinea pigs here.

R And how much of a guinea pig is it permissible to make of a customer in circumstances that could have lethal consequences? If we someday reach a point where all cars are driving autonomously, then sure, that will benefit everyone; there will be fewer fatal accidents or accidents of any kind because machines are generally more vigilant than humans, have faster reflexes and don’t get fatigued …

B … but also make mistakes.

Could such an accident have happened to you?

B Me watching a movie in my car instead of keeping my eyes on the road? No. I’m familiar with the Tesla Model S. I test-drove one on a highway near Bern and tried out the autopilot function there. I felt safe and it was fun, but I wouldn’t have wanted to give up control of the steering wheel for more than that one passing maneuver. I think it would be fantastic to let myself be chauffeured from Milan to Genoa while I attend to something else that I believed to be more important at that moment, but everything has to become much safer first before I let that happen. Besides, today I frequently drive to work in my car precisely because doing so forces me to drop everything else.

R I would love to delegate the 90% of my driving mileage that is pure drudgery to an autopilot. Nevertheless, today I’m still very far from willing to completely entrust myself to a car. Trust is something between people. The relationship between man and machine will be a tough nut for the auto industry to crack. It has to find answers to questions like: How much humanity should go into the machine? That’s your field, isn’t it?

B Yes, that is indeed one of the issues I deal with. As a machine ethicist, I concern myself with matters that include decision-making by autonomous and semiautonomous systems. Returning to the Tesla accident once more, the system failed there. The driver most assuredly would have spotted the danger if he had been watching the road.

So who’s to blame for the accident?

R It’s 100% the driver’s fault.

B I wouldn’t be so sure about that. Tesla bears a relatively large part of the blame because the system clearly failed: It misinterpreted a white-sided truck trailer as being a road sign and killed the driver. Tesla no doubt will face litigation because the car’s numerous sensors and systems evidently aren’t interconnected. I believe that three or four systems are needed to safely monitor driving conditions. That might be an argument. 

“Today I’m still very far from willing to completely entrust myself to a car.”

Frank M. Rinderknecht
I doubt it. It will center on the question of whether it’s legitimate to publicly release a system that isn’t yet fully perfected and whose deficiencies – unlike in the case of a smartphone, for instance – can have lethal consequences. You can point to user warnings or can install tricks such as a mechanism that obliges drivers to touch the steering wheel every couple of seconds as much as you want. I can easily circumvent that, for instance by hanging a weight on the steering wheel.

Autonomous driving is still in its infancy, which raises the question of how or from whom cars should learn how to drive.

Autonomous learning or rigid programming – that’s being debated. I know firsthand from Daimler that the company intends to rely on rigid programming. But this means that in order to create a fully autonomous car, millions of potential driving situations have to be foreseen. But even then, it’s still highly probable that reality will end up deviating from the programmed scenario. How do you view it?

I see two possibilities. The first one is the Daimler approach, which is highly problematic. Let’s imagine a situation with no way out: A narrow street, a person standing in the middle of it and a tree on the right – the car cannot dodge them both. What should it do in such a situation? Kill the pedestrian, or kill me? In order to make a decision, the car would need some kind of values matrix. An example: You are younger than me, Mr. Bendel, and statistically have longer to live than I do. As a professor, you earn more than I do ...

... oh, I doubt that.

On the other hand, you might not have any children, unlike me.

That’s true.

We’re getting to know each other! But what I’m getting at is this: Autonomous cars would need a values matrix, but nobody has the right to formulate one and to value one human life above another.

For decision-making by autonomous cars, one could develop a precise set of unambiguous rules combined with an impact assessment performed by the vehicle itself. But I emphatically advise against putting machines in such complicated situations. A car shouldn’t decide whether two people are worth less than four or whether younger people are worth more than older people. In such situations, humans must take charge, even if it ends in catastrophe in individual cases. People are starting to come to grips with such moral dilemmas. German Transportation Minister Alexander Dobrindt is setting up an ethics commission right now to deal with such questions.

It’s a pure waste of time.

I also fear that it won’t do any good. The commission won’t bring forth any usable findings. But Mr. Dobrindt at least has recognized that cars mustn’t be allowed to rank people.

Moreover, we all learn how to drive, but not how to react in such a situation. We do it intuitively, and the intuitive decision is usually accepted, even if it turned out to be a bad one. That would be the second possibility: to develop machines that decide intuitively.

That’s an interesting idea. In my opinion, public acceptance of self-driving cars will largely depend on whether ethical questions get answered to the citizenry’s satisfaction. However, I cannot subscribe in any way to teaching cars to make moral reflections about people, and I think it would be disastrous to delegate complex moral decisions to machines.

My research work focuses on animals. A Tesla, for example, brakes for deer, and one car in one of my studies also brakes for hedgehogs and frogs. One animal or another could be saved using the appropriate approach.

I think that car manufacturers won’t be knocking down your door anytime soon. Issues like machine ethics can only be evaluated analogically, and that alone keeps them from showing up on carmakers’ radar screens. The same goes for the issues that we have just been talking about. In my opinion, the biggest obstacle won’t be the technology, but rather people. Autonomous driving cars are still just a dream.

“I cannot subscribe in any way to teaching cars to make moral reflections about people.”

Oliver Bendel

Learn more about the collaboration between Rinspeed and SIX in the video: six.swiss/rinspeed
SIX solutions – the factor of success for your cashless payment transactions

Whether at the point of sale, in e- or m-commerce, the innovative and customized cashless payment solutions of SIX Payment Services open up new sales potential. With our flexible payment systems, we make sure that your online business is secured on the highest standard and offer the appropriate payment methods and card acceptance for your online shop.

Focus on your core business and trust a reliable partner.

www.paymentforyou.com
Relax. You’ve got a strong partner by your side.

At the Swiss Exchange, you benefit from unique strengths: the highest market share of Swiss equities and the widest range of asset classes. All traded with the fastest and most secure technology. So you can stay relaxed in any market situation. And because we are constantly evolving, this partnership also helps you advance. You can count on it: www.six-swiss-exchange.com