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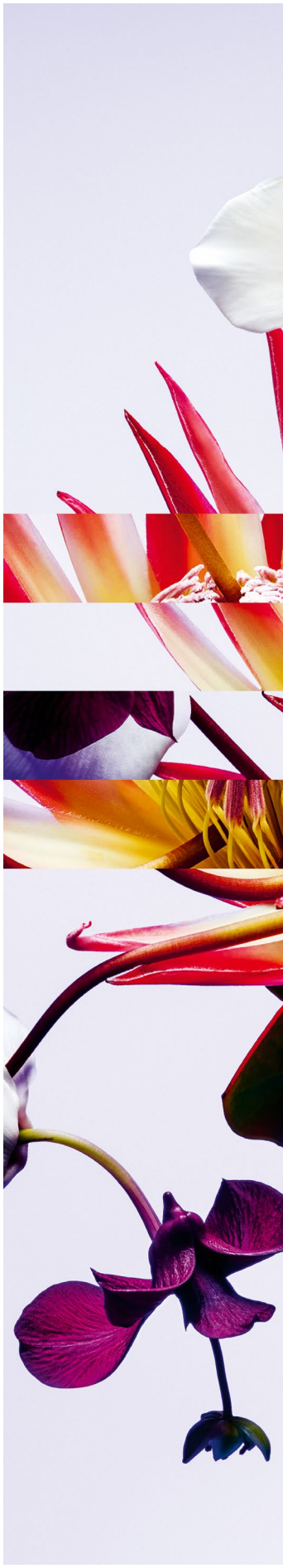


How APIs Make Digital Business with Customers Bloom

TEXT
DIETER GOERDTEN

I tend to be a traditionalist in certain matters. For example, I give my wife a bouquet of flowers at regular intervals. Unfortunately, the garden center in our town recently stopped operating. But I'm lucky: my wife has a flair for decorating. When I bring her a bunch of flowers from the local Migros, she quickly transforms it into a wonderful bouquet. Migros supplies the different elements for flower bouquets in bunches. I pick out the ones I find suitable, transport them home, and my wife conjures veritable marvels out of them in no time at all. The wonderful thing is that this way of giving flowers seems to please my wife at least as much as receiving florist-arranged bouquets once did. Perhaps it's because the end result is more personalized.

A similar evolution is underway in information technology. Digital services emerge from applications that have to be acquired as a complete "bouquet". In the future, however, applications will increasingly be broken up into subsets or modules. Consumers then will be able acquire the digital services they need practically piece by piece. In addition, they will even be able to combine modules from different applications to their own personal taste. These modules are also called packaged business capabilities (PBCs). A PBC consists of processes and data that work together to perform a certain service. In the realm of payment transactions, displaying account information or executing payments are examples of such modules.

Let's suppose, therefore, that a corporate client wants to obtain account information from its bank but doesn't want to have to log into its e-banking portal over and over again. The e-banking "bouquet" contains a slew of functions that are irrelevant at the moment to our example customer. The corporate client only wants electronic account information and wants the data right where it works with it – in its accounting software. It doesn't want a mixed bouquet from which it has to pick out the roses itself. The client simply wants roses only, and to decide when

and how frequently it gets them. And it goes without saying that the roses should be delivered straight to the client's vase.

Customized Query, Customized Response

The fulfillment of such wishes is inevitably tied to an array of prerequisites. First of all, banks must be capable of isolating the "client account management" capability, which means that they need to have it in stock as a PBC. A channel is then needed that is capable of transmitting customized queries and equally customized responses, in this case concerning the client's account. Application programming interfaces (APIs) have precisely this capability: they can react on demand or on an event-driven basis, they deliver information in the necessary subsets, and they are combinable. Gartner writes that APIs enable communication that resembles a conversation. It's a pretty picture: a customized digital query here and a customized digital response there. The result is that data are transmitted only when and in the way they are needed.

Recipients, however, have to meet certain prerequisites, too. They need a connection to the digital channels (APIs) and the ability to submit precisely fitting queries there. Of course, they also need to have receptacles – accounting software, for example – in order to be able to process responses and display them appropriately. Users thus have a choice: they can continue to acquire complete bouquets and use perhaps only a few individual flowers from them, or they can acquire precisely and solely those flowers that they need for their own customized bouquets and in their vases.

Donning API Glasses to Focus on Customers

Our floral analogy unfortunately ends there, because the financial services business is more complicated than our analogy suggests. First of all, parties that want to exchange data over APIs need a contractual agreement. Anyone who has ever entered into service agreements with banks knows that this can be quite a complicated undertaking. Banks have high security demands on behalf of their clients. They want to know, for instance, with which company they are entering into agreements, how its ownership structure changes over time, and whether the data are adequately protected there. They also want to know whether the end-customer's consent authorizing the bank to disclose data is stored in an ultra-secure manner. In the words of the CEO of one of Switzerland's cantonal banks, "We definitely don't want the data to turn up afterwards somewhere in China."

The agreements should also enable usage of APIs in combination. One example of this is filling out a tax declaration in an – unfortunately still fictional – digital application from the tax authorities. Let's suppose that alongside the account management API – which, incidentally, is the same API that otherwise serves my accounting software – there are other APIs for managing securities custody accounts and mortgages and calculating my interest income. This means that by

«APIs enable communication that resembles a conversation.»

combining those APIs, the tax authorities, with my authorization, could obtain this information directly from my bank. Suddenly the tedious task of collecting and printing out receipts and statements and manually transcribing information into (electronic) forms would no longer be necessary. If, then, there were also APIs for insurance information and my salary data, my digital tax declaration would practically fill itself out without my having to lift a finger. In the near term that's just a dream, admittedly a very nice one, but in the medium term I'm almost certain that this possibility will exist.

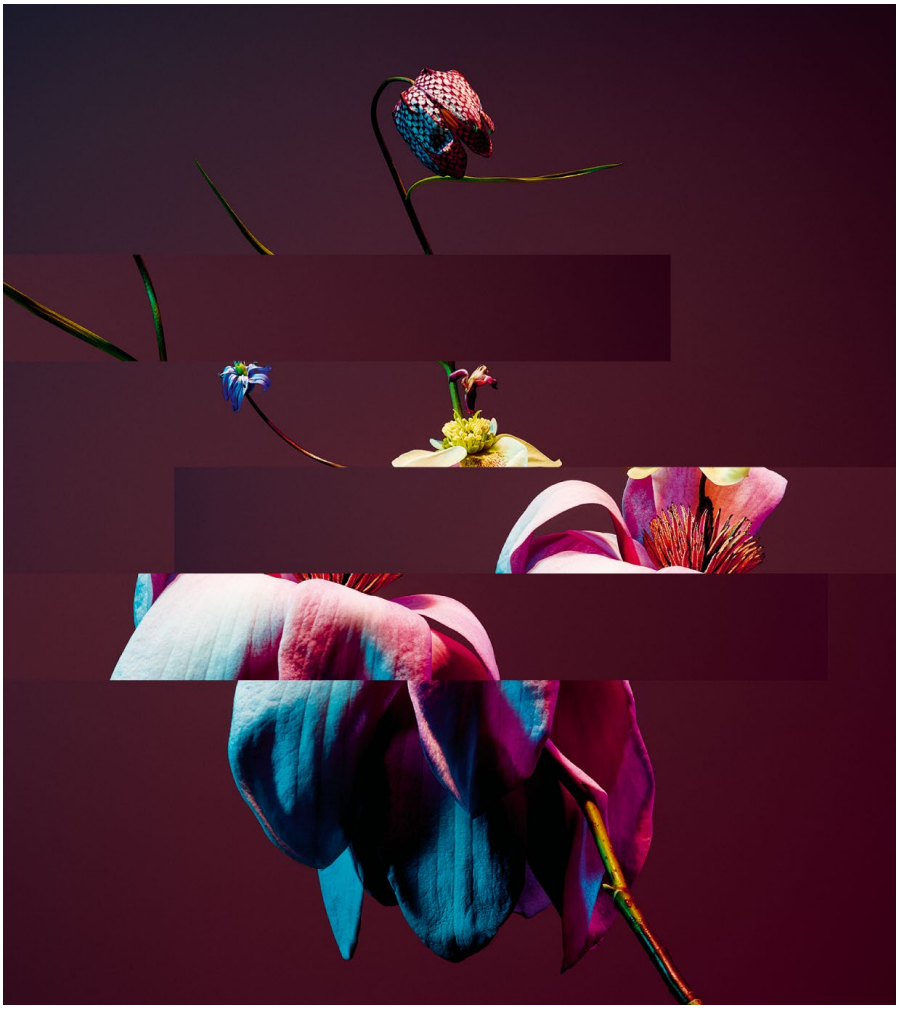
An Opportunity for Banks

On closer examination, banks actually possess information that can be employed far beyond the realm of banking. Presumably only your doctor knows more about your personal details. Via a "manage client data" module, banks could see to it that my son is able to show proof of his age at the cinema ticket counter – thanks to KYC. But this also applies to information concerning my shopping habits, my creditworthiness, potential savings contributions, and a whole lot more. It will become possible, for example, for me to activate a display that tells me very accurately how much CO_2 emissions I produce with my purchases. The payment information comes from my bank, a service provider, then breaks it down into categories such as mobility, food, etc., and then a different service supplies CO_2 emissions data for those categories. The setup already exists today for employees of Swiss Re through an application called Deedster.

We recognize that it will be advantageous for banks to break up their digital capabilities into modules and to

make them available via APIs. Moreover, banks shouldn't just have an eye on their own capabilities. On the contrary, they can engage in innovative partnerships to create completely novel offerings. That, however, also engenders complexity and necessitates new capabilities. That's why it's advisable to use a platform like bLink from SIX. In addition to providing standardized APIs, bLink gives a bank access to modular, field-tested draft agreements (see article on page 13). Furthermore, the platform also resolves questions regarding the management and the security of contractual partners. This enables banks to relax and concentrate on the important questions: What capabilities set them apart them in the market, which modules do they want to offer on the market in the future, and which partners do they want join forces with to maximize added value for their clients?

In the words of former Goldman Sachs CFO and CIO Marty Chavez, "Everything [in finance] is becoming a software service … to survive in this new economy, (…) you have to be a world-class producer of a small number of APIs and you have to be a really astute consumer of lots of other APIs. And if you don't offer your service in a computer accessible way via an API … I don't think you have a business." This happens to apply to banking services from SIX: We, too, will break these up into modules and offer them via APIs in the future wherever we are not already doing so. We, too, are on the lookout for partners to team up with to create innovative and unique services by combining APIs. A project for this purpose has already been launched.



«Digital transformation is a question of survival.»

FELIX BUSCHOR,
FORMER BANK DEPARTMENT HEAD AND
CURRENT UNIVERSITY INSTRUCTOR

How worthwhile have traditional financial institutions' investments in digitalization proven thus far? Many aspects of digital transformation necessitate a buildup of skills and capabilities. Take, for example, cloud computing or API management. Those are hard to justify with business cases, so corresponding investments in them are strategic decisions. Such investments are about maintaining future competitiveness. To put it another way, they're about ensuring survival. In this sense, digital transformation is viewed as a cost of doing business.

Which digital services are already producing their desired effect? Digital technologies make it possible to address very specific customer needs such as those of young people, families, homeowners, retirees, and so on. Granular services of this kind certainly resonate with such customer groups. A bank achieves a positive effect, namely profitability, by scaling up the number of users. That's the challenge. Roboadvisors for third-pillar securities savings plans for retirement are one example of a service that has been highly successful thus far, in my view.

What must banks do to maximize the customer benefits of open finance? First, they need to build up corresponding skills and capabilities, generally by means of a combination of recruiting talent and collaborating with specialized open finance companies. Second, they increasingly need to look outward. By that I mean they need to focus on customers' needs and to incorporate them into the development of digital services.

What prerequisites must be in place in order for an open architecture to gain traction in the financial industry? Standards and infrastructure have to be in place and must be affordably accessible to all interested parties. Right from the outset, one has to make every effort to ensure that opening the architecture doesn't harm trust in the financial industry. Since the focus outside Switzerland is mainly on payment transactions, this gives us an opportunity to set the international standard in the area of open wealth services.

For banks, opening the architecture leads to a tough strategic decision in which not only investment costs play a role, but which also requires a bank to clarify its positioning at the customer interface.

What role does artificial intelligence (AI) play? It plays a dual role. Open finance will intensify competition over the customer interface. Use of AI enables personalization of user interfaces. Second, open finance presents a possibility to merge data from different sources into a single data pool and to apply data analytics to make it useful. This is also important because more than a few bank customers hold accounts with multiple banks and their number is likely to further increase. It goes without saying that customer privacy and data protection laws must be adhered to when using artificial intelligence and data analytics.

TEXT
GABRIEL JURI

How many ATMs does Switzerland need? A study provides arguments in favor of “ATM pooling”.

A needs-based arrangement of the future cash supply could look as follows:

Communes in which the number of ATMs would be increased.

Communes where the number of ATMs would be reduced.

Communes where the number of ATMs would remain the same.

Communes in which all ATMs would be removed.

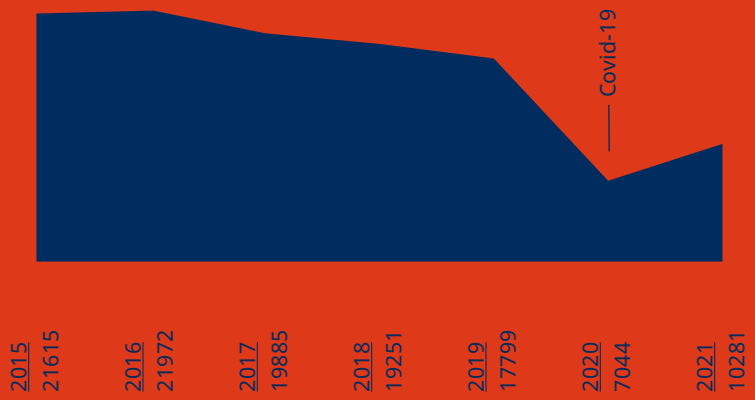
Read the whole study:

Concentrated ATM network: data-based scenario shows redistribution of locations, while service performance remains the same

Theoretical, model-based scenario taking into account transaction potential and accessibility for the population

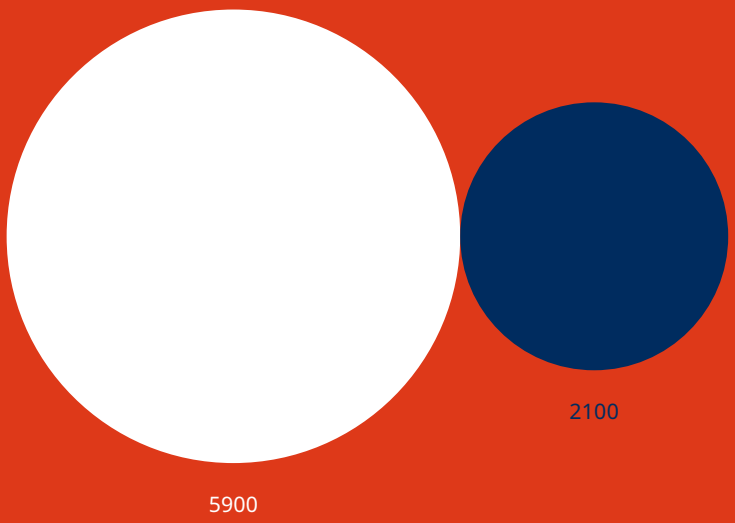
● communes

Source SNB



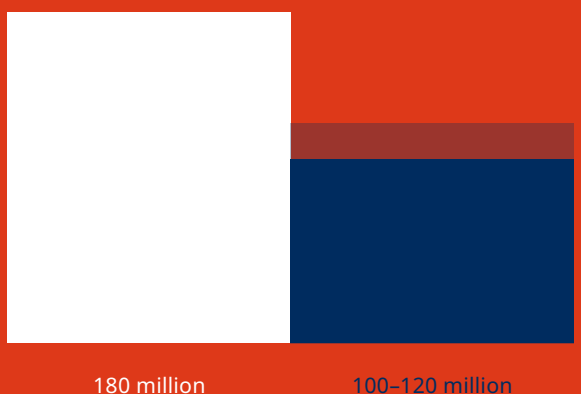
Cash withdrawals Switzerland, April 2015–2021

- number of withdrawals



In an ideal distribution, around two-thirds fewer ATMs than today would be sufficient to meet the population's need for cash without a noticeable reduction in service.

- today
- scenario



Today's costs and expected costs after savings with ATM pooling: A considerable part of today's costs is dependent on the number of ATMs.

- today
- scenario

Fresh, Fresher, Farmy – Switzerland's Unlikeliest Startup

TEXT
SIMON BRUNNER

Going by the book, Farmy shouldn't actually exist, given how unpromising its business model seems. Yet the online farm store is already number three in Switzerland.

If the story of Farmy were ever made into a motion picture, the audience's first reaction would probably be: "That could never happen in a million years." The screenplay pitch alone already sounds completely unrealistic. "Neither my business partner nor I knew anything about retail," Tobias Schubert says, laughing, "and we didn't know a thing about Switzerland." Tobias Schubert and Roman Hartmann, the co-founders and co-CEOs of Farmy, met and got to know each other in Moscow, where they tinkered with devising a sustainable online retailing concept. Their segmentation of the market revealed that Switzerland is the perfect location for Farmy because "Swiss consumers value good quality," Schubert explains, "and the online retailing space here isn't saturated yet."

But the move to Switzerland was the least of the issues that the two e-commerce specialists had to face. Does the business model have high fixed costs? Yes. Does it require high investment costs? Yes. Does it need a lot of personnel? Yes. Does it require complex information technology? Yes. Does it face tough competition? Yes. Is it hard to convince Swiss farmers to entrust the sale and distribution of their products to a small startup company? Yes. Is the business scalable? Not really.

Farmy nevertheless commenced operations in 2014, and today the company already generates annual revenue of 32 million Swiss francs with yearly double- to triple-digit growth rates. Farmy is already the number-three Swiss online food re-

tailer, “but far behind the number one and two,” Schubert says humbly. The company isn’t profitable yet. “We need to generate around 100 million Swiss francs of sales revenue per year to turn a profit, which will take another two to three years,” the former employee of the legendary Berlin-based startup incubator Rocket Internet says. Farmy has already opened a branch in Lausanne, a software studio in Barcelona, and an additional office in Berlin for support functions. A good 70 permanent employees and around 150 hourly employees work for Farmy today.

A visit to Farmy’s headquarters reveals just how challenging the company’s business model is. Here in Zurich-Altstetten, in a former industrial district that is becoming more and more hip, Schubert, a German national, and Hartmann, of German-Russian origin, have taken over a large industrial warehouse. It’s late afternoon and orders are currently being dispatched. The warehouse’s 2,000 square meters of floor space are pulsating with activity like a beehive during pollen season. Hartmann, sporting shoulder-length hair and wearing a cardigan and jeans, guides us through the seething swarm. The tour begins in a cold storage cell the size of a classroom. Pickers and packers rush around pushing carts that they use to assemble orders.

“When we came to Switzerland, we knew that the people here are very well-off. But we didn’t think that it would be so hard here to find reliable personnel to do manual labor,” Schubert says. “Occasionally we find strong, loyal workers, including among groups like former convicts, addicts, or refugees who want to reintegrate after having gone through a tough life situation.”

The pickers and packers wear a small finger barcode scanner that they use to register goods. A display on the shopping cart shows which products are missing from the order and where they are located. “We developed the entire software ourselves,” Hartmann says proudly. “It’s so good that we’ve even sold it to other retailers.” Indeed, the two former business consultants recently founded Farmy Solutions, a new business unit that develops software specially designed for retailing. Its first major customer is from Germany.

Hartmann scurries forward. More walk-in refrigerators filled with fresh produce follow as hip-hop blares from loudspeakers. “We conducted a study,” the trained e-commerce expert recounts, “and discovered that our key products like lettuce, vegetables, and fruit are three days fresher than they are at the big supermarket chains.” How is that possible? Unlike Migros or Coop, Farmy does not hold such products in storage – they are delivered in the morning from farms and are dispatched to customers in the evening.

The next department is astonishingly … empty. “We’re starting up our floral business here,” Hartmann explains, and a proprietary bakery is already in operation. A few steps further on we come across a couple of empty bottles standing on an upended barrel. “We held a tasting of non-alcoholic wine today at noon,” Hartmann says. “To our surprise, it already accounts for 14% of our total wine sales revenue.”

He then skips down the steps to the basement, which looks like a dodgem car attraction, though no one is sitting in the tiny speedsters whirring around the floor. “Those are our robots,” he explains.

Tobias Schubert (left) and Roman Hartmann, the founders of Farmy AG.

“They transport entire shelf racks and bring them to the pickers and packers, saving time and space.” Hartmann climbs up a ramp that leads outdoors to show us one of Farmy’s own electric vehicles that it uses to deliver orders, but all of them are gone. “At the moment we’re having to use our own cars to make deliveries,” says Hartmann, who often used to help his grandparents on their farm in Siberia and is a passionate cook.

Over 8,000 products can be ordered from Farmy in the German-speaking region of Switzerland. The grocery deliverer started out with fresh regional produce and organic products (which together account for 70% of its product range), but has long since added imported products such as avocados and bananas as well as non-food items such as cosmetics and baby products to its assortment, “but definitely no strawberries in January,” Hartmann stresses. The most popular ways for customers to pay are via credit card (30%), TWINT (30%), and payment slips, including QR-bills (21%). “We don’t really mind how customers pay,” Hartmann says, though the Swiss payment solution TWINT has boomed in recent years, he adds. “Customers who pay with TWINT are particularly interesting to us,” Hartmann explains, “because they are mobile-savvy and thus very willing to do their shopping digitally.” Farmy, in turn, pays its farmer suppliers once to twice per month via invoice.

The tour is over, and Hartmann hurries back to Farmy’s large open-plan office. There’s a lot to do at the moment. Farmy has already raised around 35 million Swiss francs’ worth of capital from private investors, and shortly after our visit, Hartmann and Schubert disclose that Farmy will soon be moving to Spreitenbach, to premises that offer more than triple the transshipment space. Switzerland’s improbable startup movie – “The Farmy Story” – continues.

Modularization of Products and Contracts

Required knowledge
— Prior knowledge of APIs and PBCs
— Contract administration basics

Modularization has been an issue for various industries for decades. Take the automotive industry, for example. The modularization of vehicle production enables manufacturers to offer a wide variety of products with simultaneously low variation of the individual modules and thus to fulfill the individual wishes of buyers.

Leading companies have recognized that they can modularize their products and accelerate the development of new services with modern technologies such as cloud services, containerization, APIs, or packaged business capabilities (PBCs), i.e., the packaging of function blocks. This allows them to react more flexibly to changes in the market, to respond more quickly to individual customer requirements and to open up new market opportunities with innovative products.

The concept of modularization has also gained a foothold in the financial sector in recent years. Here, too, people have a growing need for tailored products. They want to purchase only those services and applications they really need, and they also want to be able to combine them easily with other products purchased from third parties. A good example is open finance, where financial institutions and third-party providers share modular and interoperable account and transaction data. This means that banks can easily source services from third parties via APIs and link them to their own services, or provide services to third parties themselves and offer them to their end customers, such as in payment transactions, wealth management or accounting.

But this requires more than just technical capabilities. Without suitable contracts that map security, compliance, and regulation and manage the participants in such ecosystems, modular service concepts do not make much of a difference.

Conventional Contracting is Cumbersome

If a customer wants to purchase several products, this leads to multiple contracts, which are usually associated with high verification and administrative costs. For example, governance bodies have to check data protection and non-disclosure agreements again, which are formulated with different clauses in the individual contracts. The different contract structures and hierarchies also make it difficult to compare the contracts with each other. In addition, current contracts usually require the purchase of a product as a whole, and individual functions cannot be purchased and combined at will.

Conventional contracts also often prevent the use of new technologies because they are designed locally (premises, governance, etc.) and do not reflect dynamic, virtual conditions. They often describe in too much detail how and with which technology something is to be implemented in specific terms, instead of addressing the general requirements. As a result, contracts quickly become outdated and have to be repeatedly adapted to new circumstances. This means more time and costs.

The Modular, Easily Scalable Framework Agreement

SIX's open finance platform bLink is an example of how a modular, easily scalable framework agreement can simplify the lives of all contracting parties. With its harmonized contract clauses, it allows products to be combined and expanded in a simple manner and shortens the time from development to market launch of new products. In addition, banks and third-party providers benefit from shorter contract negotiations and considerably less testing effort.

This is because contracts ("applications") between providers and customers are automatically created via the common platform as soon as they start using the products. Thus, a bLink participant can obtain the desired number of applications and combine them for its customers.

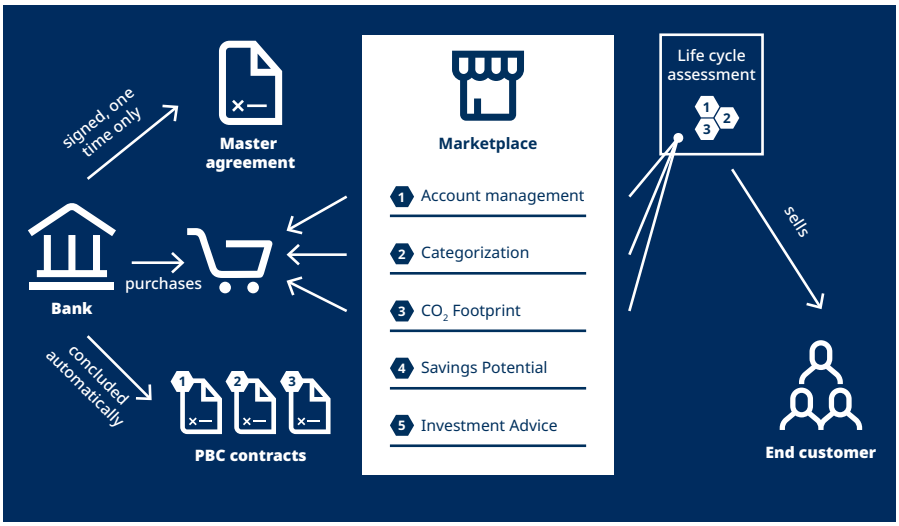
It stands to reason that SIX wants to promote the modularization of contracts via the bLink ecosystem.

How Agility is Converted into Contracts

Here's how it works: SIX will break down its products into smaller, clearly understandable PBCs in order to offer them together with other offerings – including those from other providers – on a digital marketplace. In this way, a bank can choose from a range of diverse PBCs according to its needs and easily put together a customized product portfolio.

To participate, a bank simply needs to sign the framework agreement that entitles it to use the marketplace and the PBCs it offers. Then, for example, the bank can obtain a PBC called "Account Management" (Figure 1a) and combine it with other PBCs such as "Categorization"

Figure 1a: Initial purchase of PBCs on the marketplace



and “Carbon Footprint” to ultimately offer its own “Life Cycle Assessment” product to its end customers. To do this, the bank selects the necessary PBCs and links them in the desired order. By using the PBCs, the corresponding contracts for them are automatically concluded without further contract negotiations and signatures. All relevant provisions follow from the master agreement and the PBC contracts on the digital marketplace. If the bank wants to put together a new product at a later date, such as “Savings/Investment Advice” (Figure 1b), it can reuse the existing PBCs (“Account Management,” “Categorization”) and, while complying with the framework agreement, only has to select the additionally required PBCs “Savings Potential” and “Investment Advice” on the marketplace. The related contracts are automatically concluded by using the marketplace.

Figure 1b: Purchase of additional PBCs on the marketplace.

The framework contract regulates the generally applicable conditions and the logic of combinability as well as the necessary automated contract conclusions for all participants of the marketplace for both the product providers and their end customers. SIX ensures easy extensibility and combinability through a clear hierarchical structure. Generally applicable requirements on topics such as data protection, confidentiality agreements, platform security, release and incident management are clarified in dedicated annexes that apply to all PBCs. The individual PBC contracts regulate application-specific topics such as scope of services or more extensive duties and rights, as well as specific security requirements. With this hierarchical and modular structure, SIX ensures expandability with additional PBCs while maintaining a stable and consistent set of contracts.

SIX has started work on the modularization of contracts across all ecosystems and will involve its customers in due course.

NADJA GRABER
HEAD OF ENTERPRISE SECURITY ARCHITECTURE, BANKING SERVICES, SIX

Standardized Secure API Authorization

Required knowledge
— Sound knowledge of authorization and authentication procedures

As websites, applications, e-commerce applications and mobile apps become ever more numerous, content is used ever more frequently across platforms via application programming interfaces (APIs) simply and easily in our professional and private lives. As such, it is becoming ever more important to protect data and privacy.

“OAuth” (Open Authorization) is an internationally standardized communication protocol that allows secure API authorization for desktop, web, and mobile applications. In Switzerland, version 2.0 of the open protocol is used in the eBill infrastructure and the open finance platform bLink, for example. Thanks to OAuth 2.0, a bank customer can, for example, grant a service provider access to their bank account on the bLink platform without having to disclose secret log-on credentials. For example, the service provider can obtain protected account information from the bank on behalf of the customer and send payments to it automatically. The customer then approves a payment instruction directly in e-banking.

Weaknesses in the Conventional Model

With conventional simple authentication using a username and password, the client (such as an application for an accounting solution) requests an access-protected resource (protected data, such as account information) on the server by using the resource owner’s log-on details (bank customer) as verification that it is authorized to do so. The resource owner must pass on their username and password to the third-party provider (service provider) in plain text for this purpose, which leads to several problems.

— Firstly, the client obtains wide-ranging access to the resource owner’s pro-

tected resource without any limit in terms of duration or the data it can access.
- The client usually saves the access data, such as the resource owner's username and password, in plain text.
- If a third-party application is compromised, this leads to the resource owner's password and all data protected through this password being compromised.
- The server must support password authentication although passwords are at risk of security gaps.
- The resource owner cannot revoke access to an individual third party with out revoking access to all third parties and must change the third party's password to do so.

How OAuth 2.0 Works

OAuth 2.0 addresses these problems by introducing an authorization level and separating the role of the client from that of the resource owner. With OAuth, the client requests access to the resource, which is controlled by the resource owner and hosted by the resource server, and receives a different set of log-on credentials from that of the resource owner.

Instead of using the resource owner's log-on credentials to access the protected resource, the client receives an access token – a string that specifies a certain area, a certain lifetime and other access attributes. Access tokens are issued to third-party clients by an authorization server with the approval of the resource owner. The client uses the access token to access the protected resources hosted by the resource server.

The four roles of OAuth 2.0

1. Resource owner (also: user, end user): an entity that is able to grant access to a protected resource. If the resource owner is a person, they are referred to as the end user.

2. Resource server (also: service): the server that hosts the protected resource (data) and is able to accept requests for a protected resource and respond to them using access tokens.

3. Client (also: third party, third-party provider, third-party application): a desktop, web or mobile application that makes requests for protected resources in the name of the resource owner and with their approval.

4. Authorization server: the server that authenticates the resource owner and issues a time-limited access token to the client for a scope defined by it.

In practice, authorization and resource servers are often operated together and referred to as OAuth servers.

Authorization Grant vs. Access Token

An authorization grant is proof that the holder has been authorized to access the protected resource, which the third-party provider application must use to obtain an access token.

Access tokens are used to access protected resources. An access token is a string that represents an authorization issued to the client. The string is generally not legible for the client. Tokens stand for specific access areas and periods, which are granted by the resource owner and enforced by the resource and authorization servers.

Abstract OAuth 2.0 Protocol Sequence

The abstract OAuth 2.0 sequence shown in Figure 2 describes the interaction between the four roles and comprises the following steps:

a) The client requests authorization from the resource owner. The request for authorization may be addressed directly to the resource owner (as shown) or preferably indirectly via the authorization server as an intermediary.

b) The client obtains an authorization grant from the resource owner.

c) The client requests an access token by providing verification that it is authorized to do so to the authorization server and presenting the authorization grant.

d) The authorization server authenticates the client and validates the authorization grant that has been issued. If the grant is valid, it issues an access token.

e) The client requests the protected resource from the resource server and provides verification of its authorization by presenting the access token.

f) The resource server validates the access token and handles the request if it is valid.

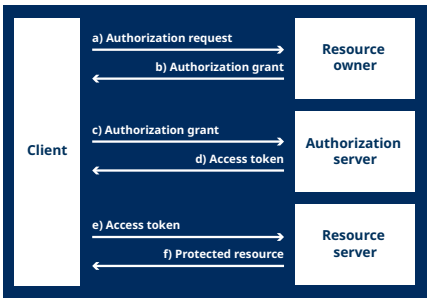


Figure 2: Abstract OAuth 2.0 protocol sequence

Complexity of OAuth 2.0

The high level of complexity is a problem when implementing OAuth 2.0. There are numerous options for implementing the OAuth process ("flows"). To avoid security vulnerabilities in authentication processes, it is essential that robust validation of the input parameters is implemented for both the OAuth provider and the client application and only the most up-to-date flows are used.

Although OAuth 2.0 plays an ever more important role, it is foreseeable that even more secure and less complex authorization models will be used. The Internet Engineering Task Force (IETF), which defines the OAuth framework, published the draft for the new OAuth 2.1 authorization protocol last October. This eliminates some of the major weaknesses in the previous version and will hopefully soon replace OAuth 2.0.

PETER RUOSS
PRODUCT OWNER PAYMENT SOFTWARE PARTNERSHIPS, UBS SWITZERLAND AG

Further information:

IEFT RFC 6749: The OAuth 2.0 Authorization Framework

Draft of the OAuth 2.1 Authorization Framework

Integrating Wholesale Central Bank Digital Currency into Existing Financial Market Infrastructure

Required knowledge
— Knowledge of the SIC system and the SDX platform
— Familiarity with ISO 20022

In the second phase of Project Helvetia, the Swiss National Bank (SNB), The Swiss Center of the BIS Innovation Hub, and SIX investigated how wholesale central bank digital currency (wCBDC) issued in Swiss francs on the platform of SIX Digital Exchange (SDX) can be integrated into the core banking systems of the SNB and the commercial banks (see p. 20). In an experiment carried out in collaboration with five commercial banks, they successfully tested a suitable solution design over the course of several days in the fourth quarter of 2021.

Solution Design

The solution design tested, as shown in the diagram, consists of the following three components:

— A dedicated test environment of the SDX platform; this is a financial market infrastructure based on distributed ledger technology. Each of the commercial banks and the SNB have a "node" that can hold both wCBDC and tokenized assets.
— A dedicated test environment of the SIC system ("X3"), in which each of the commercial banks and the SNB have a settlement account.
— Core banking test systems of the commercial banks and the SNB.

The participants establish interoperability between the components via existing standards such as ISO 20022. The commercial banks and the SNB also defined new book entry rules and reconciliation processes for wCBDC.

The participants tested the solution design on the basis of multiple use cases, including the issuance and redemption of wCBDC, the transfer of a tokenized security in exchange for a simultaneous payment in wCBDC in accordance with the principle of delivery versus payment (DvP), and wCBDC payments.

Adjustments to SDX and SIC

To implement the solution design, SIC and SDX made the following amendments compared to the production system versions. In SDX, a newly created SNB node acted as an issuer of wCBDC. The cash-leg of all transactions in Swiss Francs was settled in wCBDC rather than in commercial bank money used on the SDX live platform. SIC introduced two new payment types for the issuance (ISSCBC) and the redemption (REDCBC) of wCBDC. Additionally, a settlement account owned by the SNB (SNB Technical Account), acting as the counterparty in SIC to every issuance and redemption, was established. Last but not least, a new interface based on ISO 20022 ensured that the two systems were able to communicate with each other.

Issuance of wCBDC

The issuance of wCBDC was based on protocols defined by SIC, SDX, and the SNB. A participant initiated an issuance process by sending a pacs.009 message with the payment type "ISSCBC" to the SIC system. Since the credit was to go to the SNB's technical account in the SIC system, the corresponding SIC IID had to be entered in the <InstdAgt> field. Furthermore, SDX expected a unique identifier for the participant in the <FinInstnId> field in the creditor section to be able to automatically credit the right node in SDX. In the experiment the participant's BIC served as the unique identifier. This was the prerequisite for wCBDC automatically being credited to the correct node on SDX. The participant could follow the issuance process via the web-based graphical user interfaces of SIC (SIC Web Portal) and SDX (SDX Portal). Once wCBDC had been credited to the participant's node on SDX, it received a credit notification in the form of a camt.054 message.

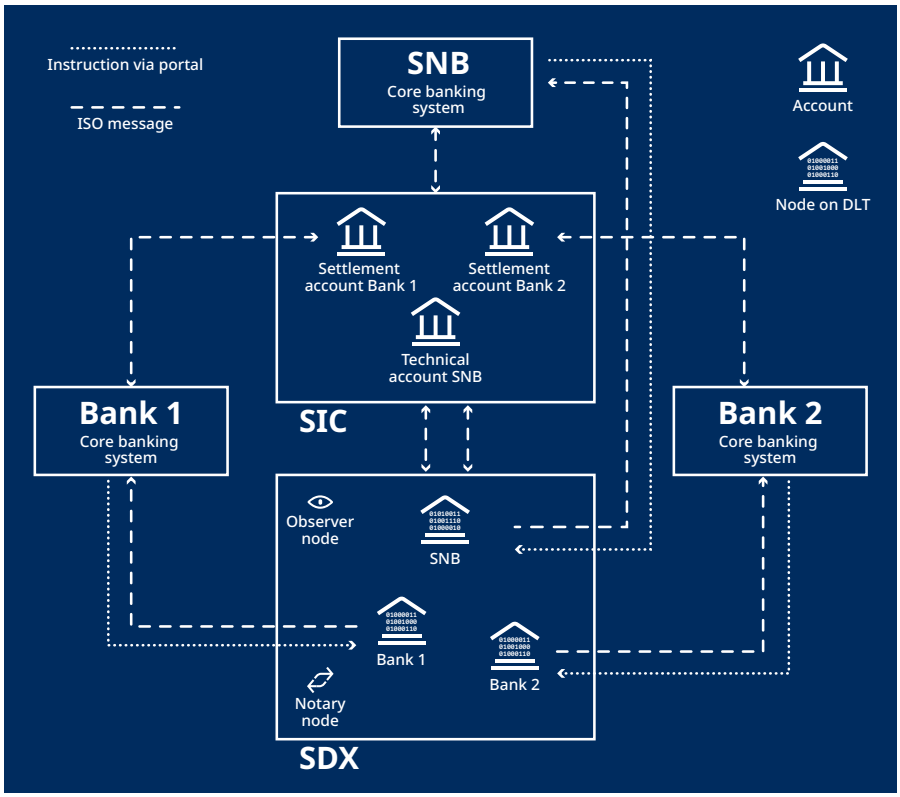


Figure 3: The wCBDC solution design

Redemption of wCBDC

The redemption process for wCBDC was very similar to that for the issuance but in the opposite direction. The participant entered the instruction in the SDX portal, alternatively a pacs.009 message could have been sent to SDX. For a redemption, the participant's unique identifier in the SIC system (SIC IID or BIC) had to be provided in the creditor section of the instruction to SDX. Upon receipt, SDX blocked the amount of w-CBDC and automatically triggered an instruction to the SIC system in the form of a pacs.009 message with payment type "REDCBC". The resulting debit of SNB's technical account and credit of the participant's SIC account was acknowledged by the SIC system both to the participant (via a pacs.009 message) and to SDX (via a pacs.002 message), whereupon SDX destroyed the blocked wCBDC.

SDX Transactions

wCBDC was used for numerous use cases on the SDX platform. The participants in the experiment investigated the DvP processing of the purchase and sale of a tokenized security, wCBDC payments, and the processing of a corporate action. All use cases with tokenized assets were initiated and monitored via the SDX portal or by means of messages based on ISO 15022.

Day-End Processing

Toward the end of the value date, SIC and SIX coordinated closely on preparations for day-end processing. The productive process in the SIC system, with its sequence of various clearing stops, remained unchanged from the current setup. The SDX processes were aligned with those of the SIC system. During day-end processing, the participants received camt.052 messages from SDX and SIC that served as a basis for their internal reconciliation. The message from SIC was identical to that used in the current production system, with the two new payment types for issuance and redemption added. The camt.052 message from SDX itemized all transactions, e.g. the wCBDC settlement of DvP transactions.

Conclusion

The testing proved that the proposed solution design works. However, it cannot be interpreted as an indication that SNB plans to issue wCBDC. Integrating it into the existing systems and the current infrastructure would be possible and straightforward. This can be attributed primarily to the fact that the solution design for system-wide communication is based on the ISO message standard. ISO-based integration of that type is currently feasible. In the future, however, alternative options for exchanging information, such as application programming interfaces (APIs), could be considered as well.

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TIMO PFAHL,
HEAD OF IT MANAGEMENT, SIX INTERBANK CLEARING

CYRILL BLÖCHLINGER,
SENIOR PRODUCT MANAGER, SIX DIGITAL EXCHANGE

1.8

Cowrie shell currency spread from the Maldive Islands to the entire Asian region and on to Africa and the South Sea Islands. It peaked in importance in ancient China, where it was the recognized as the reserve currency from 1500 BC to 200 AD. The Tolai Exchange Bank in Papua New Guinea exchanges a 1.8-meter-long chain made up of 300 to 400 shells for hard national currency at a conversion rate that works out at around one Swiss franc.

Wholesale CBDC Successfully Tested in End-to-End Settlement

Project Helvetia Phase II was successfully completed in January 2022. The project investigated the settlement of transactions using tokenized assets in wholesale central bank digital currency (wCBDC). The Swiss National Bank (SNB), the Swiss Center of the BIS Innovation Hub, SIX, and five banks – Citi, Credit Suisse, Goldman Sachs, Hypothekarbank Lenzburg, and UBS – were involved in the experiment.

The experiment focused on the integration of wCBDC into core banking systems, as a result of which post-trading processes for interbank, monetary policy, and cross-border transactions could be tested end-to-end on the SIX Digital Exchange (SDX) platform. This extended all the way from inputting the settlement instruction and executing it on SDX to booking and reconciliation in core banking systems.

The experiment was carried out under realistic conditions in the test environments of the SDX platform, the SIC system and of core banking systems operated by SNB and participating banks. SDX is the world's first regulated financial market infrastructure based on distributed ledger technology (DLT).

Project Helvetia is looking towards a future in which assets will be increasingly tokenized and DLT-based systems will coexist with current infrastructure. Interoperability between new DLT-based and current systems is therefore essential for a functioning financial ecosystem. Project Helvetia Phase II presents an approach for integrating wCBDC seamlessly in existing processes and systems (see page 16).

The final report on Helvetia Phase II and a video can be viewed on the SNB website. The final reports and videos on Project Helvetia Phase I and Jura can also be found there. Project Jura, which was completed in December 2021, investigated the use of wCBDC in cross-border currency and securities transactions. The projects mentioned are exploratory in nature and cannot be interpreted as an indication that SNB plans to issue wCBDC.

FURTHER INFORMATION
FINAL REPORT AND A VIDEO ON HELVETIA PHASE II

TEXT

BENJAMIN MÜLLER,
SENIOR ANALYST, SWISS NATIONAL BANK

OLIVER SIGRIST,
ADVISOR, BIS INNOVATION HUB

Embedded Finance *en Vogue*

There was a time when most of us made regular trips to the bank. For some time now, however, the bank has come to us in the form of online and mobile banking. Now another paradigm shift is taking place in the form of embedded finance – financial products offered by companies other than banks. These non-banks "embed" financial services in their sales processes. The process still needs banks, but they play a largely invisible role.

Solarisbank in Germany is a pioneer of such services. It has a German banking license and offers financial products for non-banks. Samsung is one of its best-known customers. Anyone who buys a smartphone from Samsung can activate Samsung Pay and open an account. What end customers generally do not know is that it is Solarisbank that is providing their accounts with Samsung Pay and operating all processes involved in opening and managing their accounts. There are now more than a million people using the service. The bank also cooperates with Engel & Völkers. Under the E&V Smart Money brand, the company enables all real-estate-related banking transactions in one account to be conducted via an app. The service comes with account management and a debit card included free of charge.

This January, Metro AG also launched an embedded finance service. The German wholesaler, which sells food and non-food products to 2.5 million hotels, restaurants, and caterers in Germany, is also offering a debit card in collaboration with Mastercard. Features of its service include 0.5% cashback on all purchases, flexible payment of outstanding balances with 60 days (buy now, pay later), and conversion of payments into installment purchase arrangements. What is actually new is that B2B customers do not need to open a new account to use the card. Instead, they can link the card to an existing business account. Metro then assigns the transactions directly to the bank. PSD2 makes this possible in the EU.

Embedded finance is making life easier for end customers worldwide and creating opportunities for a new type of bank. By contrast, conventional banks are running the risk of losing their direct contact with customers and the associated information and, ultimately, missing out on business opportunities.

TEXT

DIETER GOERDTEN,
HEAD OF PRODUCTS & SOLUTIONS,
BANKING SERVICES, SIX

Global ISO 20022 Migration in Full Swing

It is estimated that more than 70 payment transfer markets all over the world are currently developing migration strategies and plans for the transition to the ISO 20022 message standard. In its capacity as a financial hub, Switzerland has taken on a leading role in this respect and switched its payment transactions over entirely to ISO 20022 a few years ago.

The global rollout of ISO 20022 is leading to considerable improvements in the end-user and customer experience, with faster processing, higher straight-through processing rates throughout the entire life cycle of a transaction, interoperability across various markets and financial market infrastructures, and consequently lower costs. It is particularly worth mentioning the more efficient and effective processes in relation to payments processing, sanctions-checking, and reconciliation throughout the payment chain, both by banks and by end customers, including their service providers.

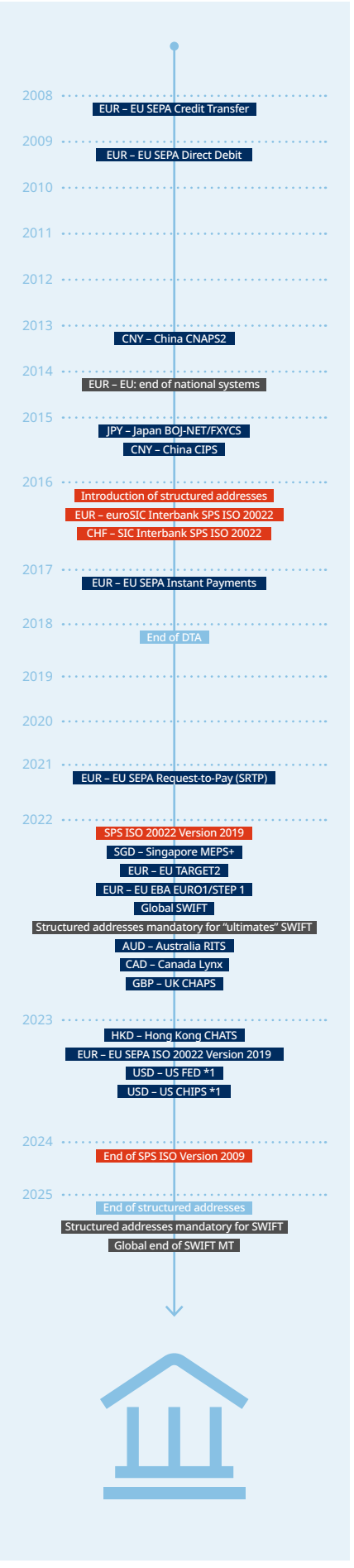
The period for switchover via the significant global SWIFT network runs from November 2022 to November 2025. Over these three years, the markets that have not yet adopted the current ISO 20022 message formats will be particularly likely to encounter challenges relating to interoperability.

Close collaboration between all players within the payment ecosystem (banks, their customers, and service providers, SWIFT, market infrastructures, industry groups, and regulatory authorities) is essential during this global switchover.

FURTHER INFORMATION
SWIFT PAYMENTS MARKET PRACTICE GROUP

TEXT

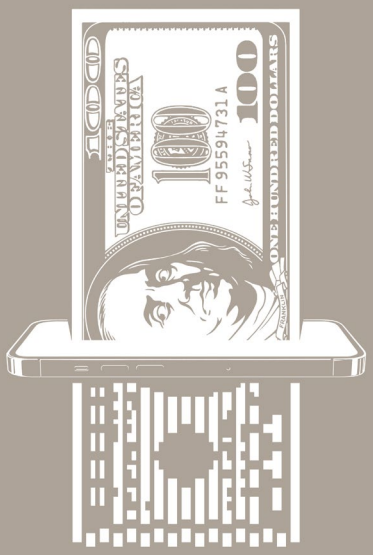
PETER RUOSS,
PRODUCT OWNER, PAYMENT SOFTWARE PARTNERSHIPS, UBS SWITZERLAND AG



Countries at odds over Bitcoin & Co.

In India, draft legislation is pending that would prohibit the use of cryptocurrencies for payments. Matters are quite different in El Salvador: last autumn, the Central American country became the world's first to officially declare Bitcoin legal tender.

Further details
prsindia.org
transparencia.gob.sv



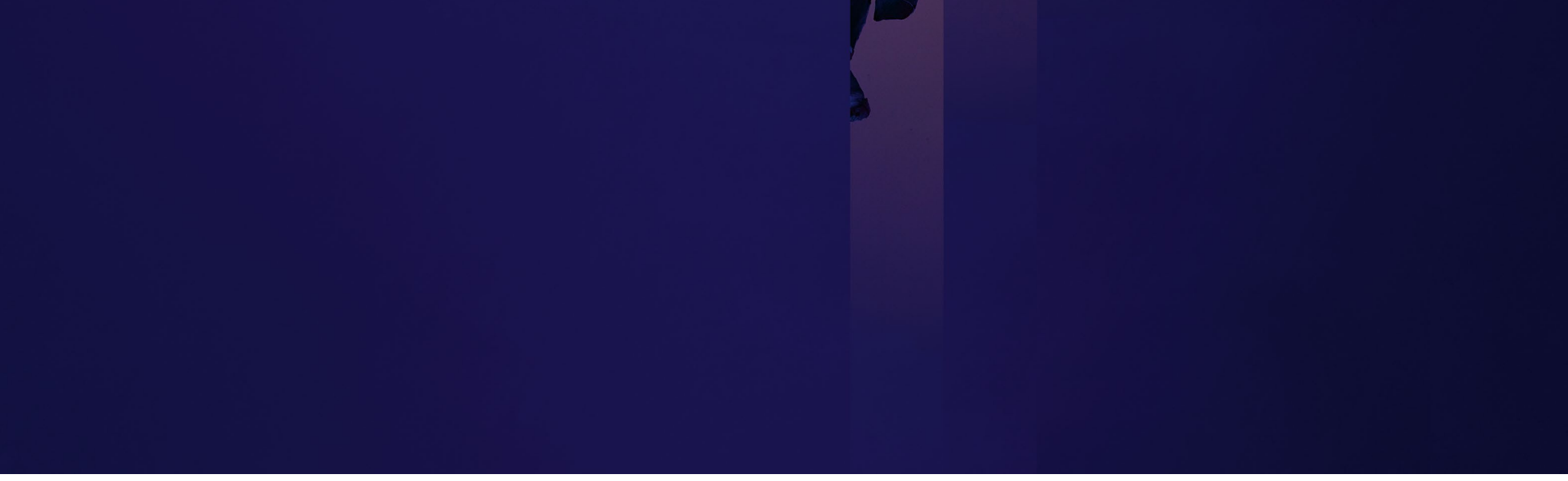
US Federal Reserve Shelves Digital Dollar

The US Federal Reserve released its long-awaited study on a digital dollar a few weeks ago. The 40-page paper doesn't issue any recommendations about introducing a central bank digital currency (CBDC). The Fed instead extensively cites the pros and cons of a CBDC: more and faster payment possibilities on the benefits side, and risks to financial system stability, privacy protection issues, and fraud risk in terms of drawbacks.

Further details
federalreserve.gov

From commodity money to metallic money, from coin to paper, and from banknote to electronic coin: The Bern Historical Museum invites you on an evocative and exhilarating journey with its exhibition "Money unleashed – The story of an invention". The discursive exhibition ventures to ask the cardinal question: "Can we trust our monetary system?"

Further details
www.bhm.ch/money



There are people who pay well, who pay poorly, people who pay promptly, who never pay, people who pay slowly, who pay in cash, pay off, pay extra, pay back – but people who like to pay do not exist.

Georg Christoph Lichtenberg (1742–1799)