



Future of Brick-and-Mortar Commerce

The Shopping Experience of Tomorrow

A SIX White Paper





White Paper Series:

- > Future of Brick-and-Mortar Commerce (2020)
 - > Future of Billing (2020)
- > Data, the Future of Financial Information (2020)
 - > Future of Money (2019)
- > Future of the Securities Value Chain (2019)

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Foreword

As the backbone of the Swiss financial industry, we at **SIX must understand the potential effects and relevance of the many developments we are currently witnessing** – from new technologies, to political shifts, social changes, and business model innovations. More specifically, **to understand how these various developments may affect infrastructure providers like ourselves, we must put on our clients' shoes as well as *their* clients' shoes.**

We publish some of our findings – including possible opportunities – for two reasons. First, **we want to be challenged.** Our views are the result of serious research, but we may have missed or misinterpreted some things. Second, **we want to motivate entrepreneurs to innovate in those spaces.** While some opportunities should be kept close to the chest, others are better shared widely as some opportunities are best pursued alongside, or in partnership with, external innovators.

We hope that our papers will encourage builders to approach us with their business ideas. This will help us better understand how to build the infrastructure they will need in the future. And it will help them better understand how SIX can already enable their businesses and ideas today.

Despite their look and feel, we view our white papers as works in progress, rather than an end-product. They capture our current views, and we are ready to update them as new information comes along. The current white paper is the result of a joint effort between SIX and the wider Swiss economy. We thank the authors and the many contributors, internal and external, for their hard work and inspiring insights.

We hope you will enjoy the reading, and look forward to constructive discussions and innovative partnerships.

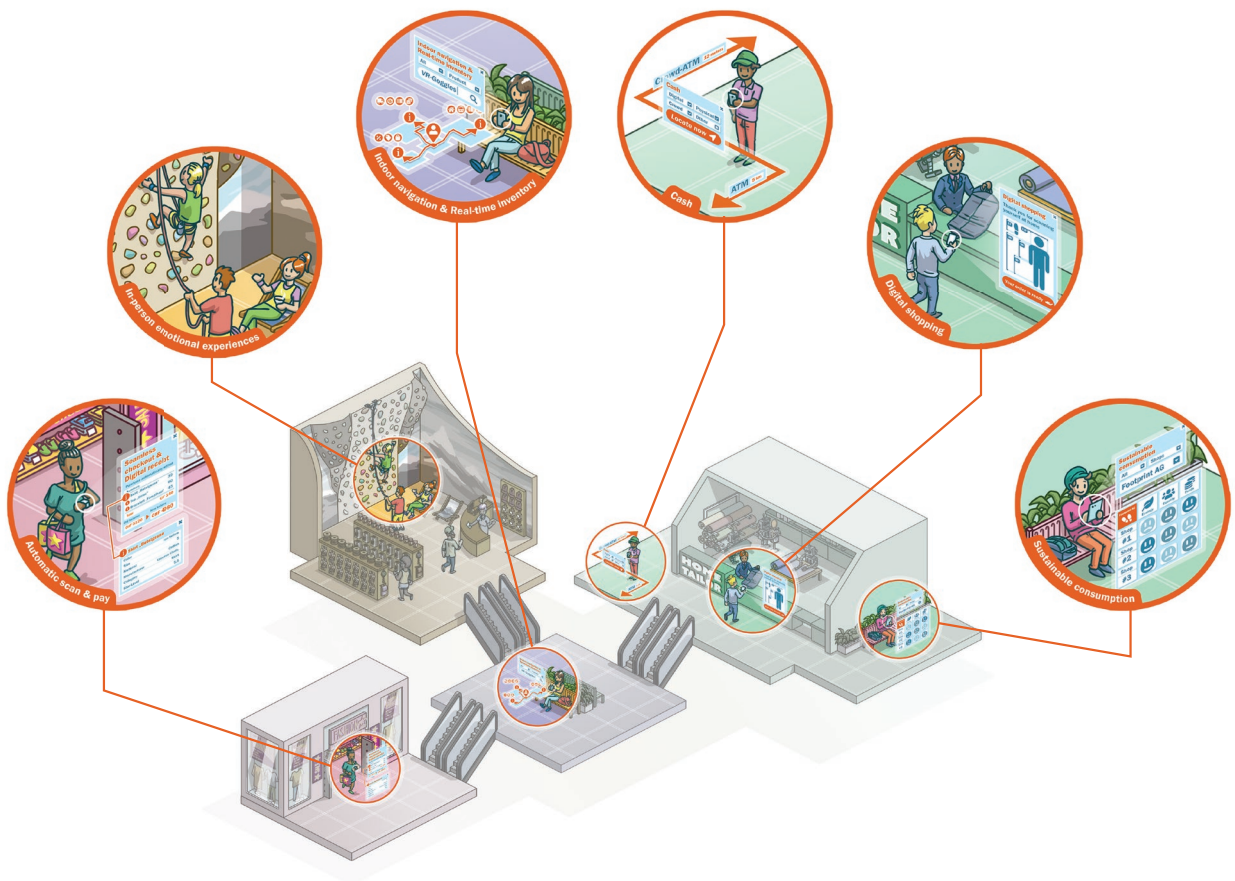
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1 In Brief

This paper aims to identify longer-term future business opportunities that may arise for retail banks in the context of brick-and-mortar commerce. It approaches the task by identifying the key characteristics that will define customer journeys around brick-and-mortar places in the future. It explores the entire spending journey from what happens before entering a brick-and-mortar place, what happens while visiting it, to what happens after leaving it.

We focus our attention on **two future scenarios** that we think will be of interest to strategic decision-makers in the retail-banking space – the most-likely scenario, and one alternative low-likelihood scenario that we refer to as *The Sustainable Consumer*. We decided to focus on this alternative scenario because sustainability has become an increasingly important topic for the financial sector, but the discussions about roles and business opportunities for banks have hitherto mostly been limited to the investment space.



Definition: Brick-and-Mortar Commerce. We adopt a broad definition of brick-and mortar-commerce (or ‘brick-and mortar-commercial places’). It captures any dedicated physical space that (1) private individuals visit and (2) is linked to spending by private individuals. It captures any physical location that plays a client-facing role in retail commerce. Behind the scenes infrastructure, such as warehouses, do not qualify.

Examples include mom-and-pop corner stores, supermarkets, fresh-food markets, fairs, street markets, Christmas markets, bakeries, pharmacies, restaurants, theaters, post offices, train stations, ski lifts, gas stations, fitness centers, hotels, wellness and spas, amusement parks, exhibitions, museums, sports events, etc.

Most Likely Scenario:

Everything Is Better *With* 0s and 1s, but Not Everything Is Better *in* 0s and 1s

Likelihood of occurrence: Most Likely

Key drivers: Five key factors drive this scenario.

- People are always online and always interacting with the digital world
- People will continue to highly value convenience and instantaneity
- Everything is connected, interactive, and smart
- Progress in artificial intelligence, but no artificial general intelligence (yet)
- Explosion in data accessibility and mobility

Scenario Summary

Digital solutions will continue their expansion throughout people's spending journeys. When did you last browse through the aisles of a store in a shopping mall? When did you last make a bigger purchase on the sole recommendation of an employee? And when did you last pay with cash? The digitalization of product search, assessment thereof, and payment will continue unabated. As will the digitalization of consumption, as many products and services are increasingly distributed digitally (e.g., streaming of movies, doctor visits) and others have themselves become digital (e.g., games, art). But brick-and-mortar places will survive because, sometimes, nothing beats the real thing. **Brick-and-mortar places will most notably survive where their interior or surroundings offer emotional experiences that can only be fully enjoyed in-person.**

Whether the number of brick-and-mortar places will decline is, in our view, a coin toss. What is certain, however, is that almost every (brick-and-mortar) merchant will need a digital storefront, omnichannel capability, digital sales channels, and to deploy digital technologies inside their places. Digital does not stop at the doors of brick-and-mortar places. And **the future will bring to the "brick-and-mortar location near you" a level of digitalization, convenience, instantaneity, and personalization that is far beyond what is offered by today's digital services.** It will go far beyond real-time monitoring of every item in stock and on shelves.

Today, we have the world's information at our fingertips. But even if we only need our fingertips, we still have to collect and combine that information from search engines, archived emails, chat histories, stored pictures, streaming services, and other digital service providers.

In the future, algorithms will source the data from these various private and public digital services, combine it, and send it wherever we want. **All the information that matters to a customer will instantly be displayed next to products and services.**

Today, we can jump from one website to another, from one app to another. But we oftentimes need to enter the same data over and over again. In the future, algorithms will help us carry our data with us, automatically entering it in the next app. Algorithms will also help us aggregate the information displayed in multiple apps and websites. It will feel as if the entire digital sphere were one single website. **Consumers will be able to design their digital journeys as they please** – whatever next step they decide to take, whether it is to consult the reviews on a specialized discussion board, check out at multiple retailers (simultaneously with one click), check out only with local distributors, have it delivered, or find which local brick-and-mortar stores carry them and go buy (some of) the products in person. **Prospective customers will seamlessly be able to defect in one click** from any website, application, and brick-and-mortar place to any other digital service. They will seamlessly and repeatedly oscillate between various online/digital services and brick-and-mortar places.

Checkouts everywhere will be frictionless. Customers' own gadgets or in-store cameras will scan how many pineapples are put into their shopping bag, which sushi is consumed, and automatically trigger payment from the customer's digital wallet. Depending on the customer's settings, a confirmation by pin, fingerprint, or voice may be requested in some stores. **Checkout everywhere will offer a wide choice of mediums of payment**, from paying with your data, to paying with virtual currencies from online games, cryptocurrencies, or mobile-phone credits.

Digital payments will continue to displace cash as a 'medium of exchange' to make the checkout as seamless and fast as possible. But cash will not disappear – although it will digitalize. **The cash infrastructure will leverage the crowd, from merchants to people, by building upon the penetration of digital devices and ubiquitous connectivity.**

Sales, and thus payments, will continue to move online – even when there is a brick-and-mortar touchpoint. People increasingly search where to buy online and make

the purchase online. And even when people stroll through brick-and-mortar places, an online purchase will always be just one click away (seamless defection). Overall, **we expect online sales to reach 40% of worldwide retail revenues by 2030, up from 16% in 2019.**

Meanwhile, **sustainable consumption will grow from a small niche to a niche market.** The rest of consumers will primarily consider the price and their immediate personal experience. But even they will consider sustainability when deciding between good-enough choices or when excluding certain products – similar to how many of us selectively consider certain green/eco/bio labels today.

Possible business opportunities: We only provide an excerpt in the following.

Experiential. Temporary offerings help brick-and-mortar places provide customers with the unexpected, novel, exclusive, Instagramable in-person experiences that they crave. There may be an opportunity for a neutral, trusted player to **operate a pop-up marketplace** that connects owners of brick-and-mortar places with pop-up-experience providers. The marketplace could then be extended (ecosystem orchestration) to solve further adjacent problems of brick-and-mortar owners.

Such a **marketplace could also help owners unlock the value of their underutilized brick-and-mortar places** – think of a bookstore that gives way to a yoga studio after the sun sets.

Seamless personalized journeys. Fast movers may have an opportunity to help brick-and-mortar places and digital-service providers offer biometric authentication to any person, even if that person is a first-time visitor. You could walk empty-handed naked into a shop you have never been to, find a product, pay with your face, and walk away. Specifically, there may be an opportunity for trusted players to **provide a secure biometric-data vault accessible via a secure network.**

People will want to seamlessly check out at brick-and-mortar places. But not every brick-and-mortar place may have (or want to have) biometric authentication for people to pay. Customers are unlikely to be willing to install an application for every other brick-and-mortar place. There may be an opportunity for a neutral, trusted player to help brick-and-mortar places by **pro-**

viding a cross-brick-and-mortar self-scanning and self-checkout application. This app could then be built upon **(platform)** to solve further adjacent problems of brick-and-mortar consumers.

Control. There may be an opportunity in **digitizing receipts.** Digital receipts generate product-level consumption data, which can be built upon **(platform)** to deploy many new solutions. Digitizing receipts could be realized by digitizing billing at the point of sale since a bill mentions the specific products. Product-level consumption data could then be used to **provide personalized information to buyers**, such as whether we already own a particular movie or book. Product-level consumption data would thus **provide buyers with an automatically-generated overview of all the things they own**; this overview of all the things one owns would also **allow the analysis of the sustainability impact of buyers and sellers.** Product-level consumption data would readily give brick-and-mortar places a live overview of their inventory by automatically comparing receipts of their purchases with receipts of their sales. Product-level consumption data may also help financial institutions **better assess sellers' credit score and/or offer better conditions** because it may provide a better and cheaper picture of business activity.

There may also be an opportunity for a trusted player to act as a **best-execution partner** that helps customers get the best possible price, both online and offline. Finally, there may be an opportunity as **Strong-authentication-as-a-Service** by operating a second-factor authenticator app that clients can use as their second factor in any brick-and-mortar place and any digital service (incl. payment apps).

Cash. Cash usage will decline, but cash will not disappear, neither as a medium of exchange, nor as a store of value. Only 23% of people say they would go completely cashless. But cash withdrawal and deposit services account for 10% of banks' operating expenses. The clearest opportunity to reduce costs is in **centrally operating the Swiss ATM infrastructure**, which could reduce the number of ATMs by 30-40% while continuing to provide the same level of coverage. A further opportunity to reduce costs may arise by bringing the crowd into the ATM infrastructure (**crowd-augmented cash infrastructure**), which would allow a further reduction in the number of ATMs while keeping the loss in coverage marginal.

Low-Likelihood Scenario:

The Sustainable Consumer

Likelihood of occurrence: Low

Key drivers: Three key factors drive this scenario.

- Intensifying anger and impatience with society falling short on sustainability.
- Soaring uptake of smartphones facilitating and sustaining activist consumption.
- Growing awareness that activist consumption is necessary to lift society onto a sustainable path.

Scenario Summary

Scenario summary. In so many respects it has never been a better time to be alive than in the twenty-first century. Life expectancy has taken off. Poverty plunged. New TV shows and movies are released every other day directly into our living rooms. But society has also fallen short in just as many ways. Progress on gender equality has been sluggish. Economic security and prospects for the young are lacking. Political rights for many are being denied. And the environment is deteriorating. Ever more people have grown increasingly disillusioned with this state of affairs. Seeing no other option, many will engage in activist consumption. And with a helping hand from the spread of smartphones, these trailblazers will carry sustainable consumption into the mainstream. **In developed countries, a vast majority of consumers will consider their sustainability impact before purchasing any goods or services and will not readily choose the cheapest product or service.**

Closeness to financial institutions. Supporting people in their endeavor to consume sustainably is closer to the DNA of incumbent financial institutions than it may seem at first sight. First, financial institutions have been supporting people in their consumption decisions for centuries by providing personal loans, insurances, and payment solutions. Second, they have also helped investors make better investment decisions by offering data, intelligence, and advisory services. This expertise could be leveraged in the consumption space. Third, they have been generating sustainability data for investors since the 1990s. This data trove could be leveraged in the consumption space.

Possible business opportunities: *Sustainability.*

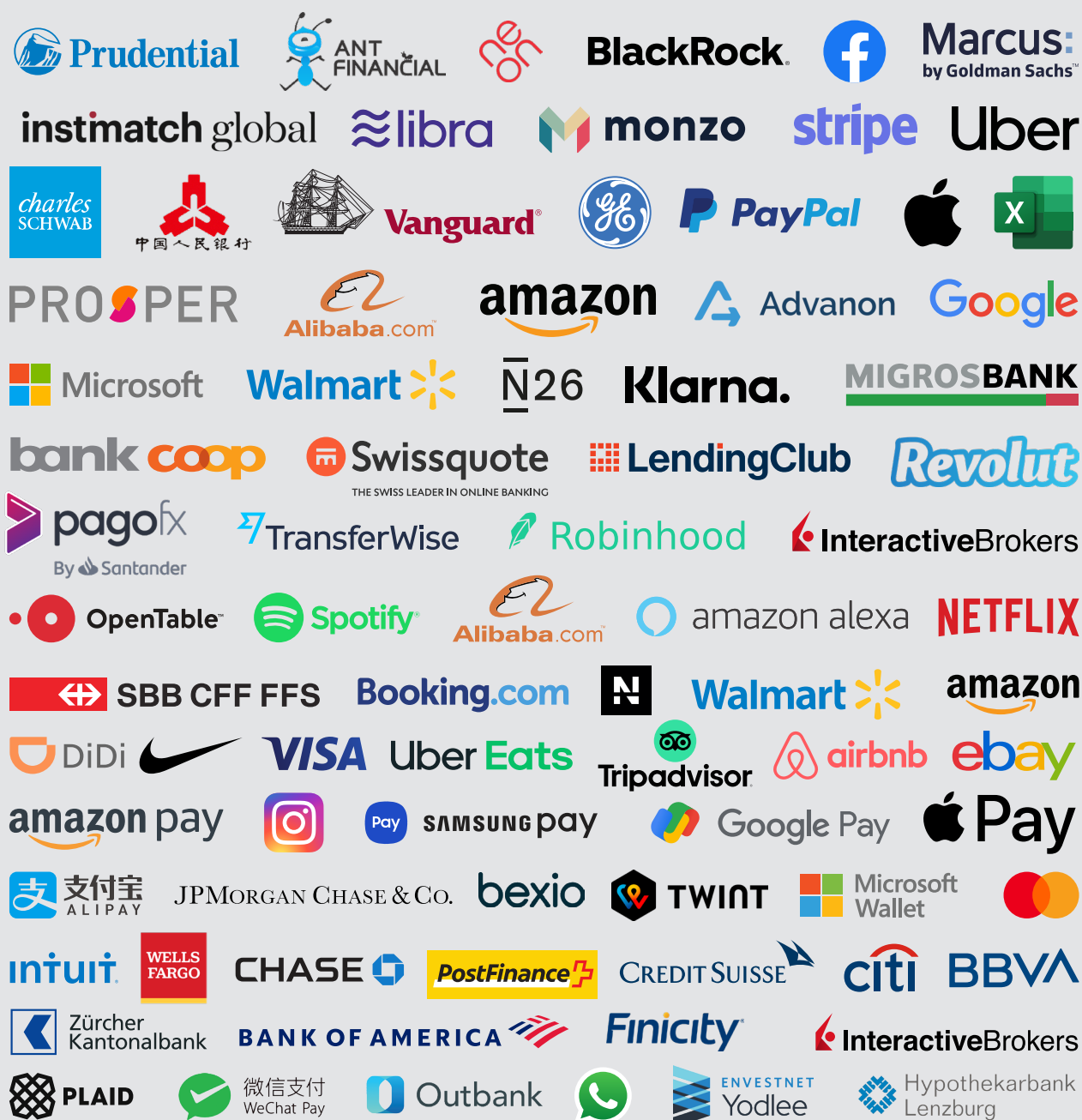
We only provide an excerpt in the following.

Every sustainable consumer values frictionless access to personalized sustainability information. But virtually every sustainable consumer (large market) faces instances where accessing all the relevant sustainability information is a serious pain (underserved need) in the status quo. There may be an opportunity to operate a **sustainability-information connectivity platform**, providing a standardized sustainability API for third parties to access a wide range of sustainability data relating to products, services, merchants, and companies.

Some of people's views and preferences may be inferred from their digital activity and traces. But probably not all. There may thus be an opportunity for a trusted, neutral player to operate a **sustainability cockpit** that stores people's sustainability views in the form of a set of rules and preferences. The cockpit would also be queried via the standardized sustainability API. When the query includes a unique user ID, the cockpit would return sustainability information about the product that is tailored to the user's views and preferences. The sustainability cockpit would also allow people to consult their sustainability-impact score across consumption and investment, dig deeper, get advice on how to improve their impact, and access sustainability-related news and webinars.

Furthermore, operators of a sustainability cockpit may **carry unique data and insights on consumers**. Operators have access to product-level consumption data, and to sustainability-behavior data. Sustainable consumers' behaviors in the context of sustainability may indeed contain unique insights into their preferences, beliefs, and views.

The Evolving Competitive Landscape Surrounding Retail Banks



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Exhibit 1

The Evolving Competitive Landscape Surrounding Retail Banks

New players increase competition in all traditional retail-banking products/services, from bank accounts, to payment solutions, currency-exchange services, external financing, and wealth-management solutions. These new players further increase competition. Not only because more service providers vie for the same customer, but also because they oftentimes raise the innovation bar in terms of user experience and fees (e.g., no-fee offerings via better cost structures or novel revenue streams).

Incumbent financial institutions are discovering the retail space. The asset managers BlackRock and Vanguard offer inexpensive, diversified investment solutions (index funds, ETFs). The institutional brokers Interactive Brokers and Charles Schwab offer low-cost online trading services. The insurance Prudential does the same. The investment bank Goldman Sachs' Marcus offers bank accounts and plans to extend into retail WM. The People's Bank of China plans on offering bank accounts to everyone (aka 'CBDC'), and other national banks are explore the idea.

Global tech companies with deep pockets are entering retail banking. Alibaba's MYbank offers bank accounts and its Ant Financial offers investment solutions; WeChat offers investment opportunities. Several Western global tech companies are planning to offer bank accounts, mobile wallets, and payment cards by partnering with banking-licence-holding financial institutions: Apple with Goldman Sachs; Google with Citigroup; Amazon and Lyft with JP Morgan; Uber with GreenDot. Facebook de facto plans to offer bank accounts with its Libra project. Amazon offers loans to businesses on its e-commerce marketplace. MS Excel now connects to bank accounts. While Apple (via its acquisition of Mobeewave) is about to turn its iPhone into a physical payment terminal.

Non-tech companies have entered the retail-banking space too. Brick-and-mortar retailers offer bank accounts: Migros Bank; Bank Coop (later sold to BKB and rebranded 'Bank Cler'); Walmart's GoBank (in partnership with GreenDot). General Electric offers commercial loans and other financial services to businesses in the aviation and energy sectors; in the early 2000s, General Electric even operated a retail bank ('GE Retail Bank') offering bank accounts, payment cards, personal loans and mortgages.

Fintech start-ups Fintech start-ups are offering retail-banking services: Klarna, Monzo, Neon, N26, and Revolut offer zero-fee bank accounts with payment solutions. Transferwise offer low-fee currency-ex-

change services. P2P platforms such as LendingClub and Advanion offer invoice financing (factoring). Loanbox, Prosper, and Instimatch offer alternative lending channels (P2P lending). Robinhood and Swissquote offer low-fee trading services. Payment infrastructure players such as Stripe have moved into offering credit cards (VISA scheme) and lending services. Some fin-techs are backed by incumbent retail banks, such as Santander's PagoFX. Start-ups entering this space is not new; PayPal has been around for 20 years.

Getting Crowded in Here

Providers of retail-banking services face increased competition. Competition is increasing at the product and service level. New digital technologies (Internet, cloud, smartphones, automation, machine learning, AI) and the explosion in collected data create many opportunities to rethink and improve traditional retail-banking products and services. It may thus disrupt incumbent retail-banking providers.

Offering retail-banking services may give an advantage for selling further (higher-margin) products.¹

Retail-banking services generate enormous amounts of data that contain deep insights on clients. These insights may help in offering better (e.g., better tailored) financial or non-financial services elsewhere.

Financial products and services are in full competition. Digitalization reduces switching costs at the product/service level. No longer is it more convenient to get all your financial services from the same provider. Digitalization empowers you to unbundle financial services, increasing competition for each product/service. More service providers vie for the same customer, which puts downward pressure on prices, puts upward pressure on quality, and reduces the likelihood of acquiring/keeping a customer.

À la Carte

Providers of retail-banking services face increased client-driven unbundling. Customers can consume financial services from different providers with little loss in convenience or speed. They can pick the best bespoke application for every situation.

Instant onboarding and digital channels erode lock-ins. Digitalization and automation of onboarding allow you to instantly start using the services of another service provider. You can open an account at Revolut in a few min-

utes. You can open a trading account, transfer funds, and start trading within minutes. And you can place their apps right next to each other on your smartphone screen.

Digital platforms make products/services easily comparable. High transparency. You can easily access information on other service providers. You can compare mortgage offers from different issuers on Moneypark, UBS Atrium, or PostFinance's Valuu. You can compare personal loans and insurances on Comparis. You can compare offers for tailored structured products on Contineo, Vontobel's Deritrade, or Leonteq's Constructor.

Jumping The Line

Providers of retail-banking services risk losing their customer interface(s). Competition is increasing at the CI level. The war for the CIs intensifies throughout retail banking.

Owning a CI for retail-banking services may give a leg up in selling other (higher-margin) products.¹ You may be more aware of the brand if you are frequently exposed to it.² You may feel connected to the brand if it supported you in emotionally-charged situations (e.g., key life events). Owning the CI may be necessary to get (unique) data on client activity. But it is CI owners that see this data. CI owners may limit what they share with the providers of retail-banking services.

Digital payments are embedded in websites and apps to offer seamless experiences in ever more aspects of our lives. Payment becomes invisible, and banks risk losing the high-frequency payment CI. Do you remember which payment method you stored on Amazon's voice-assistant Alexa, on eBay's website, or in Uber? What about in Nike's brick-and-mortar mobile-checkout app? In Walmart's in-store item finder with mobile-checkout app? In your restaurant-reservation and mobile-checkout app?

Mobile-payment apps are replacing plastic payment cards. Convenience and seamless UX tend to be the primary considerations when people choose a mobile-payment app today. Operators of mobile-payment apps own the CI, and banks risk losing the payment CI. You use Apple Pay because it launches automatically when you approach a payment terminal. You use Alipay or WeChat to scan a QR code because you already have it open.

Competitive pressure and regulatory obligation for interoperability. You can use Excel or WhatsApp to

check your bank account and trigger payments. If you prefer voice, you can ask Alexa to do it. As a corporate, you can aggregate all your bank accounts and pay your bills directly from your accounting software. Third parties become the customer interface, and banks risk losing customer interfaces, including the payment CI.

Financial institutions are voluntarily opening up interfaces to their bank accounts. These interfaces allow you to access your account balance and trigger payment directly from inside third-party apps. This increased convenience and more seamless UX pressures others into following along. Intuit's tax and accounting software already connects to accounts at Bank of America and JP Morgan Chase, among others. Bexio's SME accounting software connects to accounts at banks including CS, PostFinance, and ZKB. And Google Pay will soon directly connect to checking accounts at, among others, Citi and BBVA in the form of a co-branded user interface.

New players are forcing interoperability through screen scraping. The result is the same as when financial institutions voluntarily open up interfaces: Third-party apps can access bank-account data and directly trigger payments. The most notable example here is the API platform Plaid (acquired by Visa), which provides a standardized API interface to accounts at over 10,000 banks, including JP Morgan Chase, Citigroup, and Wells Fargo. Other standardized API platforms include Yodlee, Finicity (acquired by Mastercard), and xignite. Besides API platforms, fintech start-ups like Outbank and Numbrs also provide a single, unified customer interface to thousands of banks.

The EU, UK, HK, and AU have enacted open-banking regulations that require banks to provide such open interfaces. Banks must allow customers to access their checking account and trigger account-to-account payments from third-party apps – access to savings account, securities account, and triggering trading orders may be included in future regulations.

We define today's retail banks based on the products/ services they offer: physical vaults, cash services, digital accounts for money and securities, digital payment, loans (e.g., mortgages), access to the investment universe, proprietary research & insights, and simple advisory services. Retail banks may look completely different in the future.

2 Introduction

*SIX is a B2B business. To innovate, to co-create, and to be perceived as a partner, **SIX must thoroughly understand the future challenges and opportunities of the B2B.** This necessitates a good understanding of the B2B's own competition and clients. In short, **SIX must put on its clients' shoes as well as their clients' shoes.***

This paper focuses on the retail banking space. **Retail banks are a key client segment for SIX.** It operates various infrastructures underlying the retail banking space, from operating the platform to transfer digital money between banks (interbank clearing), to solutions in the cash-infrastructure space (e.g., ATM services), services around the issuance of payment cards (e.g., customer centers, fraud detection), and operating the platform digitizing electronic bills (eBill). Further, SIX is currently building a connectivity platform, enabling banks to easily engage in open banking (b.Link).

Incumbent retail banks are facing an increasingly animated and challenging environment due to digitalization (see page 8). New players are offering retail banking services. Digitalization increases competition between retail banking services and allows customers to unbundle across service providers easily. Digitalization also allows new players to grab the digital customer interface from providers of retail banking services. As a result, margins on traditional retail banking services have been falling. And the pressure to reduce operating costs has been mounting. **But we believe that digitalization is also likely to bring many new business opportunities for incumbent retail banks.**

Business opportunities always arise out of an unmet customer need. And these needs do not arise in a vacuum, but in specific contexts. Therefore, **we should explore business opportunities in specific contexts.**

This paper focuses on **brick-and-mortar commerce** (see next page for the rationale). As such, **this paper aims to identify longer-term future business opportunities that may arise for retail banks in the context of brick-and-mortar commerce.** To do so, we put on the shoes of the people who actually walk, or click, through the journeys involving brick-and-mortar commerce. We then explore their potential future customer

Definition

Brick-and-Mortar Commerce

We adopt a broad definition of brick-and-mortar commerce (or "brick-and-mortar commercial places"). It captures **any dedicated physical space that (1) private individuals visit and (2) is linked to spending by private individuals.** It captures any physical location that plays a client-facing role in retail commerce. Behind the scenes infrastructure, such as warehouses, do not qualify.

Examples include mom-and-pop corner stores, supermarkets, fresh-food markets, fairs, street markets, Christmas markets, bakeries, pharmacies, restaurants, theaters, post offices, train stations, ski lifts, gas stations, fitness centers, hotels, wellness and spas, amusement parks, exhibitions, museums, sports events, etc.

journeys and needs. We finally examine business opportunities arising from unmet needs, while keeping in mind retail banks' existing capabilities and their changing competitive landscape.

Our time horizon is **7-10 years**. The changes we identify may, however, happen much faster – some are already happening today. **Our findings are synthesized in the form of future scenarios** because scenarios allow us to experience futures. For more details on our method, see Chapter 4.

When thinking about the future of "something," it is dangerous to think in terms of today's structures, concepts, and vocabulary because we risk inadvertently biasing our thinking to "what is". Instead, **we should start by defining this something at an abstract level.** More specifically, we believe that we should try to describe this something **in terms of the values it creates for the user (or the "jobs it is hired to do") at an abstract level.**¹

We have relied on **two abstract conceptual frameworks** to think about the future of brick-and-mortar

¹ This approach has been referred to as 'first principles design thinking'; see e.g., Brett King, 2018, Bank 4.0: Banking Everywhere, Never at a Bank (Marshall Cavendish: Tarrytown, NY), pages 23-32, noting that this kind of thinking is characteristic of the likes of Carl Benz, Steve Jobs, and Elon Musk.

This paper focuses on the specific context of BRICK-AND-MORTAR COMMERCE. We have chosen to explore this scope for the following reasons.

- Where, how, and when we find ourselves inside brick-and-mortar locations is set to change dramatically. But some aspects of brick-and-mortar commerce will almost certainly survive.
- The digitalization of the brick-and-mortar experience will continue. But radical changes are not only challenging, they also tend to bring new opportunities. Take payments in brick-and-mortar commerce: Although they already range from cash and card to loyalty and mobile (Bluetooth, QR, NFC), new digital ways to pay are currently being prototyped (e.g., biometrics) – and many more are likely to see the light of day.
- Cash payments will continue to decline, but will not go to zero. Brick-and-mortar commerce is where we will continue to see cash being used. Financial institutions may be able to leverage their cash infrastructure to offer services beyond cash.
- The act of paying is something we do every day. Providing payment(-related) services offers the prospect of owning a high-frequency customer interface.

commerce: **(1) A customer experience chain;** and **(2) How people choose where, how, and when to shop.** Both frameworks are described in the coming pages.

We have then explored where and how various future developments would play out at this abstract level. For an overview of the most-important possible future developments that we explored, please see page 17.

The purpose of this paper is to identify possible business opportunities. This requires deep examination of possible futures. There are of course many future scenarios that could yield business opportunities. **But to allow us to dig deep enough, we have focused our attention on two future scenarios** that we believe yield some interesting new business opportunities for retail banks.

Our first scenario is the future we view as most likely, entitled *Everything is better with 0s and 1s, but not everything is better in 0s and 1s.*

The second scenario is a low-likelihood future we refer to as *The Sustainable Consumer*. We focus on this alternative scenario because sustainability has become an increasingly important topic for the financial sector, yet the discussions about roles and business opportunities for banks have mostly been limited to the investment space.

Additionally, we focus on this scenario because we expect sustainable consumption to also expand in the most likely scenario – in order to facilitate our understanding of what sustainable consumption entails, it is worthwhile exploring it in a separate scenario.

Needs do not arise in a vacuum.

Needs are embedded in specific contexts. And the experiences people expect for a seemingly identical need differ between contexts. An SME that needs external financing to grow may want smart money in its early stages, but it may not care where the money comes from once it is mature. When paying, you may want convenience and speed in most instances, but you may favor security and even accept friction when doing so in a third-world country.

Service providers should therefore explore business opportunities where needs arise – in specific contexts.

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In short, **SIX must put on its clients' shoes as well as their clients' shoes.**

What Business Opportunities Might Arise for Retail Banks in Brick-and-Mortar Commerce?

How Might They Solve Relevant Problems?

B2B and/or B2C. Existing problems. Possible future problems.
Not limited to traditional retail-banking products and services. Business model innovation. Open innovation. Etc.

How Might They Reduce Costs?

Economies of scale/scope. Standardization. Outsourcing.
Microservices-based IT stack. Automation. Business model innovation.
Open innovation. Etc.

How Might They Build Leverageable Capabilities?

Generate unique data.ⁱ Strengthen and/or expand customer interfaces.ⁱⁱ
Create network effects. Build platforms. Develop interconnectivity and interoperability. Heighten brand equity and awareness.ⁱⁱⁱ Digital/tech skills. Etc.

→ Try to Leverage Existing Capabilities

- Local anchoring and history
- Physical presence (branches, cash infra.)
- Swiss neutrality, stability, jurisdiction
- Reputation of reliability
- Reputation of security & privacy
- Reputation of discretion
- Mobile customer interface (e.g., app)
- Personal human connection/relationships
- Understanding of clients' preferences
- Network of smart money
- Highly-vetted employees
- Reputation of attracting top talent^{iv}
- Aspirational brand (e.g., exclusivity)

→ Be Alert to the Changes in the Competitive Landscape

- Providers of retail-banking services face increased competition.
- Providers of retail-banking services risk losing their customer interface(s).
- Providers of retail-banking services face increased unbundling.

→ Be Aware of Key Possible Future Developments (see scenarios)

ⁱ Data may enable differentiation through better tailoring of digital services, better personalization of advisory services, or better investment strategies. Data may be sold to third parties (anonymized).

ⁱⁱ Customer interfaces may improve brand equity/awareness. Customer interfaces may be expanded into a platform.

ⁱⁱⁱ The brand is not only relevant for selling products and services, but also for attracting employees. War for talent.

^{iv} It used to be the case. But banking is changing. How banking is delivered and consumed, which skills are relevant, what is value to people, are all changing. The necessary talent is being wooed by every industry around the planet.

Overarching Conceptual Framework I

Customer Experience Chain of Retail Commerce

We have all heard of the guy who walks by a restaurant, spontaneously decides to go in, order the lunch special, and walks out at the end. We have all walked by a movie theater, decided to go in, asked the ticket seller which movie they would recommend, and followed their advice. But more often than not, these brick-and-mortar experiences do not occur in such bubbles. The journey oftentimes does not start just outside the brick-and-mortar place. The journey tends to take a detour elsewhere before or after entering the place. And the journey usually does not simply end when leaving the place. To understand the future of brick-and-mortar commerce, we must, therefore, explore the overall customer-experience chain.

There are **probably as many customer journeys for retail commerce as products and services to buy**. Catch your favorite athlete wearing a new pair of shoes on Instagram, go on Amazon to read the reviews, test them in a shop around the corner, purchase them online. See the protagonist wearing a fabulous hat in a movie, search the hat on Google, buy it in a Shopify shop, and have it delivered to your doorstep. Arrive at the restaurant, browse through the menu on your smartphone while waiting to be seated, order on your smartphone, eat at the table, pay on your smartphone, and leave a tip in cash. To name just a few.

But we believe that **at an abstract level, they all involve the same steps**. The ten steps shown below.



Note to the reader:

We make no claim for completeness. We hope that this page will help the reader better understand our reasoning process in what follows.

Exhibit 3

Overarching Conceptual Framework II

Choosing Where, How, and When to Do Commerce

We buy things because we want to get something done. We choose the things we buy based on rational considerations as well as on the emotional experiences they are expected to produce. We choose where, how, and when to buy things in the same way.

Irrespective of the reason, we consider multiple factors (see surrounding logos) when deciding where, how, and when to go. What is very important in one context may be irrelevant in another. What is very important for one person may be irrelevant to another. The weights of the factors vary between contexts and people.

Note to the reader: We make no claim for completeness. We hope that this page will help the reader better understand our reasoning process in what follows.



Speed

- Physical proximity
- Traffic, waiting times
- Number of other shoppers
- Waiting time to get the products/services
- Findability (matchmaking engine)

Convenience

- Seamlessness of login, onboarding, check-out, etc.
- Accessibility (where, how, when), opening hours, access routes, parking
- Omnichannel (seamless switching)
- One-stop shop
- Service points
- Product/service comparison
- Payment and financing options
- Authentication options
- Delivery options
- After-sales services (e.g., return, replacement, cancellation policy, complaint process, staff, warranties)
- Child-friendliness
- Proximity to other shops

Brand

- As signal/indicator for quality (asymmetric information)
- Trustworthiness
- Values
- Environmental impact
- Sustainability impact
- Reputation
- Past personal experiences (e.g., supportive, in-person human contacts)
- Awareness (e.g., past exposure, frequency)

Security & Privacy

- Anonymity
- Data security, sharing/storage of data
- Payment and authentication options
- Physical and psychological safety (e.g., life, health)
- Reimbursement (e.g., fraud, no service)
- Legal recourse (e.g., jurisdiction)
- Physical activity (10,000 steps)
- Fresh air

Future Availability

- Resilience (e.g., diversified supply chains, cash reserves, local supply)

More for Less

- Best price
- Discounts
- Loyalty programs

Likelihood of Finding the Best Product/Service

- Size of inventory (products/services, brands), delivery options, etc.
- Quality of inventory selection
- Quality of staff (e.g., advisory)

Assessment of Products/Services

- Visualization of size and aesthetics
- Quality (e.g., maturity of fruits)
- Shape, fit, comfort (e.g., clothes, chair)
- Expert/peer reviews
- Sustainability impact



Experiential Diversity

- Of products/services, brands
- Of restaurants, theaters, games, etc.
- Proximity to other shops

Ambiance

- Taste, sense of beauty
- Types of visitors, shoppers, customers
- Exclusivity
- Surprises
- Vintage, avant-garde, non-digital, slowness
- Immersive Experiences
- Catering to all senses
- Touching, seeing, smelling, etc.

Personal Connection

- Personal experiences (e.g., nostalgia)
- Personal relationship (e.g., with restaurant owner)
- Building new connection (e.g., trust building)

Social Experiences

- Human non-digital contact
- Random encounters
- Sharing moments with friends and family
- Social-media shareable (e.g., Instagramability)
- Peer validation/pressure

Serendipity

- Surprise discoveries
- Unplanned journey
- Meet someone new or an old friend
- Thrill of the impulse buy
- Inspiration

Exhibit 4

An E-Commerce Sale Does Not Imply No Brick-and-Mortar Touchpoint

We want to emphasise this point because there tends to be confusion: There is no one-to-one relationship between the two. Buying something from e-commerce shop does not prelude prior touchpoints in brick-and-mortar stores.

And similarly, buying something in a brick-and-mortar store does not prelude prior interactions on e-commerce shops.

Shopping	Payment	Reception of Product	Physical Product Return ²	
End-to-end physical in-store shopping experience ³	Brick-and-mortar Sale	Takeout; Pick-up or Home delivery; or Digital delivery ⁴	In-store return; Pick-up return; Drop-off return	Brick-and-Mortar In-Store Touchpoint(s)
Physical in-store shopping , in-store online escape, in-store checkout		<i>Ditto</i>	<i>Ditto</i>	
Online shopping, physical in-store shopping, in-store checkout		<i>Ditto</i>	<i>Ditto</i>	
Online shopping, physical in-store shopping, online checkout ⁵		In-store pick-up; Pick-up or Home delivery; or Digital delivery	<i>Ditto</i>	
Physical in-store shopping , online escape, online checkout		<i>Ditto</i>	<i>Ditto</i>	
End-to-end online shopping experience	Online Sale	In-store pick-up	<i>Ditto</i>	
End-to-end online shopping experience		Pick-up or Home delivery; Digital delivery	In-store return	
End-to-end online shopping experience		Pick-up or Home delivery	Pick-up return; Drop-off return	
End-to-end online shopping experience		Digital delivery ³		No In-Store Touchpoint

² Services and digital products are returned by cancelling the contract.

³ Only shopping journey with absolutely no digital interface. Increasingly rare

⁴ For digital products/services such as software applications or movies.

⁵ At the store's own online shop or at some third-party's online shop.

Exhibit 5

Possible Future Developments

We considered many possible **future developments from all the STEEP dimensions** in order to explore the future of brick-and-mortar commerce. The table below depicts the ones we view as the most important possible developments.

Social / Cultural	Technological	Economic	Environmental	Political ⁶
Anger at world's development path	AI: object recognition	Accessibility and volume of data continues to explode	Environmental degradation	Increased activity of anti-trust authorities
Connected, always online	AI: natural language processing	Abuses of power/ position by platform operators	Global warming	Data sovereignty shifts to data subject (EU-GDPR like)
Convenience, seamless, all-in-one	Biometric authentication	BigTech companies continue to cross industry borders		Data-mobility requirements (EU-PSD2 like)
Data security & privacy awareness	Connected devices (e.g., IoT)	Cyber-attacks grow in volume and sophistication		Interoperability requirements (EU-PSD2 like)
Data sharing & monetization	Edge computing	Data controlled by subject (loss of data uniqueness)		Protectionism
Digital	Privacy-preserving algorithms	Data-enabled tailoring of services		Nationalization
Environmental concerns	Smart & interactive things: gadgets or spaces	Digitalization of services and products		US-China decoupling
Data sharing & monetization	Edge computing	Data controlled by subject (loss of data uniqueness)		Protectionism
Digital	Privacy-preserving algorithms	Data-enabled tailoring of services		Nationalization
Environmental concerns	Smart & interactive things: gadgets or spaces	Digitalization of services and products		US-China decoupling
Instantaneity	Voice interfaces	Gig economy		
Omnichannel		Interconnected digital services and products		
Populism & protectionism		Repatriation of global supply chains		
Sustainability/ESG penchant				

⁶ Includes legal and regulatory factors and international relations.

3 Deep-Dive Future Scenarios

Most-Likely Scenario	
Everything Is Better With 0s and 1s, but Not Everything Is Better in 0s and 1s	24
Low-Likelihood Scenario	
The Sustainable Consumer	73

Most Likely Scenario:

Everything Is Better *With* 0s and 1s, but Not Everything Is Better *in* 0s and 1s

Likelihood of occurrence: Most Likely

Abstract. Digital solutions will continue their expansion, from search, to assessment of products and services, payment, and increasingly consumption. Brick-and-mortar will most notably survive where it offers emotional experiences that can only be fully enjoyed in person.

The future will bring to the brick-and-mortar places near you the same level of digitalization as we have become used to in digital services. All the information that matters to a customer will instantly be displayed next to products and services. Consumers will be able to design their digital customer journeys as they please. Prospective customers will seamlessly be able to defect from any website, application, and brick-and-mortar place to any digital service. Checkouts everywhere will be frictionless and will exhibit a wide choice of mediums of payment.

Sales, and thus payments, will continue to move online – even when there is a brick-and-mortar touchpoint. Digital payments will continue to displace cash as a ‘medium of exchange’, but cash will survive. The cash infrastructure will leverage the crowd, from merchants to people, by building upon the ubiquity of digital gadgets.

Sustainable consumption will grow from a small niche to a niche market. To avoid repetition, we will not treat the topic in this scenario. Please refer to our alternative scenario ‘The Sustainable Consumer’ for a detailed exploration.



Key drivers of the Scenario



People are always online and always interacting with the digital world



People will continue to highly value convenience and instantaneity



Everything is connected, interactive, and smart



Progress in artificial intelligence, but no artificial general intelligence (yet)



Explosion in data accessibility and mobility

Description

When were you last in a brick-and-mortar place? Have you been looking forward during the coronavirus pandemic of 2019-20 to the moment when you can go back to your favorite restaurant surrounded by friends? Have you been looking forward to going to the street market, wandering from one producer to the next, not knowing what awaits after at the next turn, guessing what fruits hide behind the different smells, talking to the farmer and learning about them and their products?

We have been hearing about the death of brick-and-mortar since at least the turn of the century. Yet the late digital pioneer Steve Jobs has been opening physical stores for the past 20 years. And the e-commerce leader Jeff Bezos has been doing the same for the past ten. So, what will the future of brick-and-mortar commerce most likely hold?

Early-detection signals. Persistent digitalization of all aspects of life, digitalization of consumption of products and services, convenience and instantaneity continue to be key decision criteria; explosion in connected devices, advances in privacy-preserving data processing algorithms, advances in secure multi-party computation (e.g., homomorphic encryption), advances in edge computing, continued miniaturization, substantial advances in augmented reality, immersive digital experiences cannot (yet) mimic most real-world experience; new players such as global tech companies (Google, Apple, Facebook, Amazon, Microsoft, etc.) continue their expansion into financial services and occupy digital-payment interfaces; strengthening government activity to enforce private property rights and competition in the digital sphere (e.g., data subjects get sovereignty over their data; data mobility, interoperability, and API standards are required; and exclusive usage/access of data is restricted at times).

Five key developments have driven recent changes in retail commerce – and will continue to do so in the future. In the following, we first describe these key devel-

opments and then discuss the cornerstones of how retail commerce is likely to look in the not-so-distant future.



The first development is that **people are always online and always interacting with the digital world.** Most of us are increasingly becoming digital. We have been moving online for a while. Many of us since the 1990s. But the launch of the iPhone in 2007, which rang in the start of the mobile Internet era, led to an explosion in the extent to which we are online. We are no longer going online – we are simply online, 24/7, anywhere. We have *welcomed the digital realm into all aspects of our lives. And we naturally take out our smartphones to connect in virtually every situation.* We interact with our loved ones online. We find information online. We educate ourselves online. We access our bank accounts online. We invest online. We see what is happening out in the world online. We find a gift online. We seek help online. We do our work online. We consume movies online. We find a date online. We book a restaurant online. We find our way home online. We monitor our bodies online. We do our workouts online. We showcase our lives online. We play games together online. We do sports online. We manage our end-of-life legal documents online. And we increasingly forego cash to pay digitally. There is simply no sign of a slowdown. The world has already entered a post-digital era, where digital is so ubiquitous that we are only aware of it when it is missing.

“Over the past 10 years, our tech has grown from some devices and platforms we use to an entire environment in which we function. We don’t ‘go online’ by turning on a computer and dialing up through a modem; we live online 24/7.”

Douglas Rushkoff

2019, We’ve Spent The Decade Letting Our Tech Define Us. It’s Out Of Control, The Guardian (29 December 2019)



The second development is that **people will continue to highly value convenience and instantaneity.** People have always valued convenience and instantaneity. It has been argued that convenience and instantaneity were the key drivers behind most of our decisions to adopt the aforementioned digital services over the past two decades. As such, they led to the dominance of digital channels that let us consume information, access entertainment, and interact with each other (e.g., search engine, media and news, streaming, product or restaurant description, email, messaging, social media). More specifically, they led to services being directly embedded into customer journeys and, more recently, inside each other. They led to the rise of digital platforms that aggregate and connect us to diverse users and service providers (e.g., e-commerce, social media, messaging, video conferencing, streaming). And they led to the widespread acceptance of biometric authentication that unlocks our devices (e.g., fingerprint, face). *The majority of consumers even say they are willing to pay for more convenience.*⁷

“Convenience ... Has Emerged as Perhaps the Most Powerful Force Shaping Our Individual Lives.”

Tim Wu

2018, The Tyranny of Convenience, New York times (16 February 2018)

There is little doubt that *people will continue to highly value convenience and instantaneity* – arguably even more so. The vast majority of consumers indeed say that convenience is more important than it was five years ago.⁸ And there is little doubt that *people will become increasingly demanding.* Twenty years ago, we felt instant gratification after the two hours it took for the movie to be downloaded – today we already grow impatient if we have to wait two seconds for the movie to start.

⁷ A survey of 3,000 US adults finds that the majority (around 60%) is willing to pay more for convenience in groceries, clothing, electronics, personal care, and pet supplies (NRF, 2020, Consumer View Winter, 14 January 2020).

⁸ People have seen sensitive personal data being made public and used for blackmailing. See e.g., WSJ, 2014, Apple Investigating Reports of iCloud Vulnerabilities (2 September 2014), “Probe Comes After Celebrities’ Accounts Were Hacked, Nude Photos Published.” Even the world’s wealthiest person, Jeff Bezos, had digital private communication and intimate photos stolen, made public, and used to blackmail him (Wired, 2019, Jeff Bezos Goes Hard Against The National Enquirer, 7 February 2019).

Digital Technologies Enable, While the Demand for Instantaneity and Convenience Drives Embeddedness.

At first, we had to go someplace to go digital. Then, we could go anyplace and digital was there – digital became *embedded* into the physical world. Then, we could digitally interact and transact with places before even getting there. Digital became our primary gateway to the physical world. Places became *embedded* into the digital world.

At first, we had to go someplace in the digital world to get a specific digital service. Increasingly, we can go anyplace digital and the digital service is there – digital is becoming *embedded* into digital.

But despite their high importance to customers, it must not be misinterpreted to mean that no other factor is considered when people make decisions, or that convenience and instantaneity always win. *‘More for less’ regularly beats convenience and instantaneity.* Swiss-German customers have a history of driving to Germany on crowded Saturdays for the chance of a better deal on groceries. Bargain hunters spend time and effort to compare and change their insurance policy every year. And travelers continue to book the longer flight route with hour-long layovers in never-heard-of places.

Between January and May 2020, the video conferencing app Zoom grew from 10 to 300 million users on the back of social-distancing and WFH measures during the coronavirus pandemic.

Its tremendous growth was unimpeded by the discoveries of serious data security flaws, by false claims of end-to-end encryption, and by governments and firms banning the applications for its employees. Zoom grew by another 50%, from 200 to 300 million, in the weeks following these revelations.

Reuters, 2020, Zoom Participant Numbers Top 300 Million Despite Growing Ban List, Shares Hit Record (23 April 2020)

*Protection of value beats convenience and instantaneity in some instances. What amounts to ‘value’ varies between people. Some people prefer that their fortune is not easily accessible over some digital interface, instead preferring layers of authentication and in-person presence. Others even choose the inconvenience and slowness of an only-paper bank to protect their fortune and privacy – if nothing is digital, there are no risks of cyber-theft and lower risks of data breaches. And there is a growing group of people who prefer the slower train rides without air condition over a quick plane trip to reduce their environmental impact. In short, *convenience and instantaneity will remain highly valued, but they will not always win.**

“Lately doubts have been creeping in about whether today’s AI technology is really as world-changing as it seems ... There is no question that AI ... has made much progress.”

“The history of AI is of periodic bouts of overexcitement interspersed with ‘AI winters’, in which limits become apparent ... The current bout of enthusiasm has been the biggest yet.”

The Economist

2020, *Technology Quarterly: Artificial Intelligence and Its Limits* (13 June 2020)

Digital Technologies Enable, While the Demand for Instantaneity and Convenience Drives Digital Platformization.

From operating system to search engines, from supermarkets to ecommerce, from messaging to social media, *open digital platforms have become so dominant because they increase convenience and speed in at least four ways.* Open digital platforms amount to one-stop shops that (1) can be accessed from anywhere and anytime, (2) offer free choice among third-party service providers, (3) allow addressing multiple needs, while (4) AI-powered search and recommendation engines facilitate finding the best solutions

It remains likely that for most people, *convenience and instantaneity will continue to outweigh data-protection risks in most instances*. People have seen their data being used to (try to) manipulate their choices and actions, from purchase decisions to voting (Facebook).⁹ People have seen their sensitive personal data made public and used for blackmailing (celebrities, incl. the world's richest man).¹⁰ People have seen employees analyze their data, from emails to voice recordings (Amazon, Apple, Google, Uber).¹¹ And people have heard of states infiltrate their spies as employees at global tech giants in order to surveil and track regime opponents (Twitter).¹² But none of these data-protection risks seems to have made people rethink their usage of these services. A case in point is the video conferencing app Zoom on which people hold private conversations and provide a look into their apartments. Its growth continued unencumbered by revelations of data-protection shortcomings and misrepresentations.¹³

*Data risks seem to be perceived as too small – too little negative consequences, too unlikely, too far in the future, too abstract.*¹⁴ Not enough to bear the inconvenience and slowness that would result from turning one's back on these services. And this is unlikely to change with the next revelations of data loss, abuse, and breach. To be sure, if two services score similarly on convenience and instantaneity, data-protection risks may act as tiebreaker.



The third development is that **everything is connected, interactive, and smart**. The number of connected things¹⁵ has been growing exponentially and is forecasted to reach 1 billion by 2035.¹⁶ We will be able to interact with these things, through their own (touch or voice) user interface, or through a third-party device such as our smartphone or AR glasses. Ever more things are smart, enhanced with AIs that run locally (edge computing) or on some connected computer. Everything means everything, from gadgets (e.g., smartphones, hearables, wearables, implants)¹⁷ to spaces. The next generation of cellular network technology (5G) will allow these billions of devices to interact at zero latency and unlimited bandwidth.



The fourth development is **progress in artificial intelligence, but no artificial general intelligence (yet)**. Progress in AI since the mid-2000s has been nothing short of spectacular and miraculous – far beyond what most computer scientists had foreseen at the turn of the century. All of a sudden, statistical models with little structure (known as 'deep learning') started working.

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- 9 People have seen their data treated with little care, lying around unprotected on company servers for employees to snoop through. Google accidentally stored passwords from some corporate G-suite users in plain text since 2005; see e.g., Wired, 2019, Google Has Stored Some Passwords in Plaintext Since 2005 (21 May 2019). People have seen employees analyze their data, from emails to voice. See e.g., Guardian, 2019, Amazon Staff Listen to Customers' Alexa Recordings, Report Says (11 April 2019); Infosperber, 2020, Apple: Eingriff in die Privatsphäre von Millionen Menschen (31 May 2020); The Verge, 2018, Gmail app developers have been reading your emails (2 July 2018), "It's a common practice that's gone largely unnoticed."; Telegraph, 2018, Google Admits It Lets Hundreds of Other Companies Access Your Gmail Inbox (20 September 2018), "Google's vice president for public policy in the Americas admitted that it lets app developers access the inboxes of millions of users – even though Google itself stopped looking in 2017." People have seen their data being misused by companies themselves or their employees. Uber employees could easily track users' whereabouts using a so-called 'god mode'; see The Guardian, 2016, Uber employees 'spied on ex-partners, politicians and Beyoncé, 13 December 2016, noting that Uber employees could easily spy on the movements of politicians, celebrities, friends, and ex-boyfriends/girlfriends.
- 10 Several former employees of Twitter have been charged in the US with spying for Saudi Arabia, collecting user data and tracking government dissidents. See, for instance, Wired, 2019, Twitter Insiders Allegedly Spied for Saudi Arabia (6 November 2019).
- 11 Reuters, 2020, Zoom Participant Numbers Top 300 Million Despite Growing Ban List, Shares Hit Record (23 April 2020), "video conferencing app's number of daily meeting participants grew by another 50% to 300 million in the last three weeks, as the company fought to quell a backlash around security and safety that has seen a number of governments and firms ban its applications."
- 12 See e.g., Leslie K. John, 2019, Uninformed Consent, HBR: The Big Idea (September 2019).
- 13 Reuters, 2020, Zoom Participant Numbers Top 300 Million Despite Growing Ban List, Shares Hit Record (23 April 2020), "video conferencing app's number of daily meeting participants grew by another 50% to 300 million in the last three weeks, as the company fought to quell a backlash around security and safety that has seen a number of governments and firms ban its applications."
- 14 See e.g., Leslie K. John, 2019, Uninformed Consent, HBR: The Big Idea (September 2019).
- 15 Connectivity may, for instance, be over the Internet (Internet of Things) or Bluetooth.
- 16 Some forecasts put the number of internet-connected devices (IoT) by 2035 at one trillion – one hundred per human being. See, for instance, Economist, 2019, Connected Computers: Chips With Everything (14 September 2019).
- 17 Some futurists expect a development from off-body, to on-body and in-body gadgets.

These models had been around for over 50 years, but they were viewed as an unpromising path forward for AI, and thus largely disregarded. Then came the explosion in data sets and computing power. And machine learning, as statistical approaches are known in computer science, led to levels of progress that the field of AI had not seen in decades. The first half of the 2010s saw leaps in image and object detection (computer vision, CV); and the second half saw leaps in text and voice processing (natural language processing, NLP). We now have simple conversational chatbots, which can answer more or less complex questions and can execute commands.¹⁸ But *human-like AI or digital assistants of the sort displayed in movies, referred as ‘artificial general intelligence’ (AGI),¹⁹ is still far off* – and unlikely to be reached in the next two decades.²⁰ So we are unlikely to travel with a C-3PO or inside a self-driving car any time soon.²¹ But we must be careful not to throw the baby out with the bathwater.

“Researchers predict AI will outperform humans in many activities in the next ten years, such as translating languages (by 2024), writing high-school essays (by 2026), driving a truck (by 2027), working in retail (by 2031), writing a bestselling book (by 2049), and working as a surgeon (by 2053). Researchers believe there is a 50% chance of AI outperforming humans in all tasks in 45 years and of automating all human jobs in 120 years.”

Katja Grace et al

2018, When Will AI Exceed Human Performance? Evidence from AI Experts, Journal of Artificial Intelligence Research Vol. 62, 729-754

Today’s AI will spread to many new areas. And progress in artificial intelligence will not come to a halt, advances on two fronts will spread AI to many more areas.

There will be leaps in the proficiency of *edge AI*. Statistical models will continue to become smaller and less computationally intensive without adversely impacting accuracy. As a result, increasingly complex algorithms will be able to run on end-devices such as smartphones and cameras. Google Assistant and Apple’s Siri can already run their speech recognition locally, no longer needing to send the data to the cloud for processing.²² These tiny AIs will increase data security and privacy, improve reactivity, and improve reliability because everything happens on the end-device.

The shift in data sovereignty to data subjects will have substantial effects on data as a unique asset.

Data subjects will have increased control over their data. Governments and/or technology will empower data subjects to share their data with anyone they wish.

In addition, there will be leaps in the *proficiency of privacy-preserving data processing*. Data sets may contain highly sensitive private information from family pictures, religious views, medical records, or confidential contracts and emails. Advances in privacy-preserving technologies guarantee a dataset owner that no private information would be revealed if they allow third-parties to query their data. Money and research will increasingly flow into this area. Apple has already positioned itself among the BigTech companies as the pro-

18 CB Insights, 2019, Lessons From The Failed Chatbot Revolution – And 5 Industries Where The Tech Is Making A Comeback (November 2019), “a chatbot is a text- or voice-based interface that lets users execute certain actions and retrieve information using language ... Building a real ‘virtual assistant’ capable of understanding context and responding to unclear queries proved to be much more challenging than building a simple chatbot. Many chatbots couldn’t understand enough human language or process enough data to complete the kinds of complex requests companies promised they could handle ... “In 2016, chatbots were all the rage ... Facebook scaled back work on its flagship ‘M’ virtual assistant after it revealed that M had failed in handling 70% of all user requests. Google similarly admitted that it used humans in call centers to make its assistant work.”

19 Artificial general intelligence (AGI) describes a machine that exhibits the same capacity to learn and understand intellectual tasks that the smartest human being can. Economist, 2020, Technology Quarterly: Artificial Intelligence and Its Limits (13 June 2020), “chatbots ... generate a shallow appearance of understanding, without the reality.”

20 Economist, 2018, AI, Radiology And The Future of Work: Images Aren’t Everything (9 June 2018), “General AI may still be at least 20 years off”; “it is important to remember that AI, for the foreseeable future, will remain ‘narrow’, not general. No human is as good at mental arithmetic as a \$10 pocket calculator, but that is all the calculator can do ... [ML-based AI] is broader ... but in the end it, too, is limited”. Katja Grace et al, 2018, When Will AI Exceed Human Performance? Evidence from AI Experts, Journal of Artificial Intelligence Research Vol. 62, 729-754, survey based on a sample of 352 leading AI scientists.

21 Economist, 2020, Technology Quarterly: Artificial Intelligence and Its Limits (13 June 2020), “Self-driving cars have become more capable, but remain perpetually on the cusp of being safe enough to deploy on everyday streets ... Without another breakthrough ... Self-driving cars, which must navigate an ever-changing world ... may never arrive at all.”

22 Karen Hao, 2020, Tiny AI: We Can Now Run Powerful AI Algorithms On Our Phones, MIT Technology Review (March/April Issue), “Google announced that it can now run Google Assistant on users’ phones without sending requests to a remote server. As of iOS 13, Apple runs Siri’s speech recognition capabilities and its QuickType Keyboard locally on the iPhone.”

tector of people's privacy.²³ In Western countries, privacy was the main bone of contention in the development of contact-tracing apps in the first half of 2020 to fight coronavirus pandemic.²⁴ Data-manipulation algorithms will become increasingly good at anonymizing ("de-identification") the data by removing identifiers and injecting noise to the data before sharing the data out – known as 'differential privacy.'²⁵ Edge AI will enable ever more data queries to be processed locally, with only the result of the query returned to the querier – the raw data never moves, only the trained model parameters do.²⁶ And improvements in computing power and cryptography will enable ever more complex queries to be efficiently processed while keeping the underlying raw data encrypted at all times – known as "secure multi-party computation."²⁷

*"The Commission's approach to regulation is to ... **prioritise interoperability requirements and standards within and across sectors, while taking into account the need for sectoral authorities to specify sectoral requirements ... work towards a more harmonised description and overview of datasets, data objects and identifiers to foster data interoperability (i.e. their usability at a technical level) ... [and] make it easier for individuals to allow the use of the data they generate"***

European Commission

2020, A European Strategy for Data (19 February 2020, pages 12f, footnotes omitted).



The fifth development is an **explosion in data accessibility and mobility**. Digital data is exploding exponentially in types and volume. But most of it sits behind companies' digital walls, locked away from prying eyes. *New laws and privacy-preserving technologies will make all this privately-held data accessible to third parties.*²⁸ This will substantially affect the uniqueness of companies' data sets.

Governments are already in the process of shifting data sovereignty and control to data subjects, empowering them to share their data with anyone. The European Union and California were pioneers by mandating data portability, requiring companies to ensure that data subjects can easily obtain a machine-readable copy of their personal data so that they can reuse this data (at other service providers) without hindrance.²⁹ Governments will make data sharing more convenient and instant by mandating *data mobility, requiring companies to set up a (standardized) API that enables anyone to automatically source data if the data subject consents to it*. In several countries around the world, data mobility is already a reality for banks: So-called open-banking law requires them to set up such interfaces to their clients' bank account data.³⁰ The financial sector is likely only a testing ground, and many more sectors will face data-mobility requirements in the form of standardized APIs. Retaining its pioneering

23 In 2019, Apple run billboards saying "What happens on your iPhone, stays on your iPhone." See also www.apple.com/privacy/

24 See e.g., FT, 2020, How Europe Splintered Over Contact Tracing Apps (10 May 2020).

25 Anonymization techniques alone are unlikely to be sufficient, however. See, most notably, Yves-Alexandre de Montjoye, Alex Pentland, 2016, Response to Comment on 'Unique in the shopping mall: On the reidentifiability of credit card metadata', Science 351 (6279), 1274-1274, "We have currently no reason to believe that an efficient enough, yet general, anonymization method will ever exist for high-dimensional data".

26 Federated statistical algorithms (aka: federated AI, federated machine learning) build upon local processing of the raw data. It describes a machine-learning approach not requiring the raw data to be aggregated and stored in one central location. It sends the models to all the locations where the data is held (e.g., on a mobile phone, in some on-premise database, or in some public cloud), trains separate models in each location, sends the trained models (i.e., the calibrated parameters) back to the central unit, and combines them into a master model. The raw data does not move and cannot be reverse-engineered from the trained models. See e.g., The Algorithm, 2019, A little-known AI method can train on your health data without threatening your privacy, MIT Technology Review (11 March 2019). Google invented federated AI in 2017, see Google, 2017, Federated Learning: Collaborative Machine Learning without Centralized Training Data, Google AI Blog (6 April 2017). Google is invested in a start-up applying this approach in the health-care space, where we may not want to send the data through the Internet because of its sensitivity.

27 Homomorphic encryption is a strict subset of secure multi-party computation. There is a long tradition in homomorphic-encryption research, but only recent advances in computing power have made this technique possible/viable.

28 See, more generally, SIX, 2020, Data, The Future Of Financial Information (February 2020).

29 The first mover was the European Union in 2018 with the entry into force of the EU General Data Protection Regulation (GDPR). The California Consumer Privacy Act of 2018 (CCPA) entered into force in January 2020.

30 The EU, UK, HK, and AU have already enacted open-banking regulations that require banks to provide such open interfaces. The first mover was again the European Union in 2018 with the entry into force of the EU Payments Service Directive 2 (PSD2). It requires banks to provide communication interfaces for third parties to access bank-account data; a third party has access only if the account owner (data subject) consents to it. The UK Open Banking Regulation (entry into force 2018) goes one step further by additionally requiring access to product data (e.g., fees, charges, lending rates to the customer). And the Australia Open Banking Regulation (entry into force 2019) goes even further by requiring access to any customer data they hold.

spirit, the European Commission has recently announced such a path in its strategic roadmap for regulating the data economy.³¹ A similar path forward is being advocated in the United States by a recently proposed bill that would impose such requirements on digital platforms with over 100m active monthly users.³²

Where companies do not (immediately) provide open interfaces allowing us to access our data, we will increasingly be able to send AI algorithms to screen scrape the websites and apps to retrieve our data. *Screen scraping* is already being deployed today: People are using it to access and aggregate their bank-account data (think Plaid), and people are using it to browse through a one-stop display of products across multiple online shops (think Google Shopping). And, we can already share websites and posts by a click or screenshot with a data vault (think Apple's Notes) – vaults could easily exhibit an open interface.

Privacy-preserving technologies guarantee a data owner that no private information would be revealed if they allow third parties to train their statistical models. *Advances in privacy-preserving technologies will increase people's willingness to provide third parties with access to their data.* Individuals will be able to provide access to their digital photos while preventing any query that would reveal anything private; facial-recognition queries would automatically be blocked, while queries about the places in the background or food on the table would be allowed.

Corporations will be able to provide access to their HR data while being certain that queries that could reveal information about any specific employee would automatically be blocked; salary queries would automatically be blocked, while queries on gender ratios or age distribution would be allowed.

"There has long been an underlying assumption that virtual is the future and physical stores are the past. We have become used to hand-wringing articles about the death of the high street and arty pictures of 'dead malls' online. But now the companies of the future seem interested in the past – and perhaps offline is the new online."

Julius Bär

2019, Online goes offline: The business of high touch (27 November 2019)

Platform start-ups such as IFTTT ("If This Then That") connect to existing open APIs and allow users to define actions that are triggered when the data from one of those APIs fulfills a certain condition. You may, for example, define that if you update your Facebook profile picture, then your Twitter profile picture will automatically be updated as well. The global player Microsoft recently announced its intention to also move into building the infrastructure for connecting anyone to easily share and access data held at private companies.³³ This further increases the likelihood that open interfaces will become ubiquitous, and allow accessing ever more data from, and trigger ever-more actions in, applications.

31 Most EU legislation must be proposed by the executive branch (European Commission) and approved by the legislative branch (Council of European Union; European Parliament) to become law. The EC's recently announced digital strategy is therefore a strong indicator of future EU law-making. "The Commission's approach to regulation is to ... prioritise interoperability requirements and standards within and across sectors, while taking into account the need for sectoral authorities to specify sectoral requirements ... work towards a more harmonised description and overview of datasets, data objects and identifiers to foster data interoperability (i.e. their usability at a technical level) ... [and] make it easier for individuals to allow the use of the data they generate" (EC, 2020, A European Strategy for Data, (19 February 2020, pages 12f, footnotes omitted).

32 The bill was proposed by a bipartisan group of US senators in October 2019 and is referred to as 'Augmenting Compatibility and Competition by Enabling Service Switching Act of 2019' (or 'ACCESS Act of 2019').

33 Microsoft plans to become an operator of data-mobility infrastructure (API aggregation platform; DRM) and to become an orchestrator of this space (Marketplace/Matchmaking platform). See e.g., Economist, 2020, Microsoft Embraces Big Data (23 April 2020), "Microsoft has reasons other than altruism to champion open data. It makes most of its money not by extracting value from hoarded data through targeted advertising, like Alphabet or Facebook, but by selling services and software to help others process digital information. The more data that are shared, the better for Microsoft."

*In the following, we describe the **six cornerstones of the future of retail commerce** generally, and brick-and-mortar commerce specifically.*

Digital Solutions Expand, but Brick-and-Mortar Survives

Retail commerce is not exempt from the wave of digitalization roaring through the economy. **Consumers will continue to adopt digital solutions because they are more convenient and faster.** You can access and consume services in the digital world with one click, anywhere and anytime. Digital platforms provide instant access to the entire world, and consumption is usually just one more click away. And digital services are highly personalized. This digitalization trend will continue as digital affinity continues to grow, and as digital solutions continue to improve.³⁴ The coronavirus crisis of 2019-20 will accelerate this process by increasing people's willingness to try (not-yet mature) digital solutions – what was going to take years is now happening in months.

Ever more of the steps before and after a purchase will become digital for ever more products and services. We already compare products and services online, consult what others think online, search where to buy online, purchase online, and pay with digital money. Augmented reality will allow us to assess a pair of shoes as if we were wearing them or gauge a couch as if it were already standing in our living room. And we already listen to and follow digital algorithms, think about how we find information or how we find the path to a destination. In the future, we may even start to entirely delegate purchase decisions to an algorithm that knows our preferences and automatically purchases the best and cheapest product for us (aka algorithmic consumption).³⁵ **Ever more products and services will be consumed online in digital form.** We are already consuming ever more products and services online, from streaming a movie, to joining a spinning or yoga class from home. Testing is already being done on services that would allow you to visit the doctor or a museum online. And **where products are not dematerialized, delivery services will deposit**

them to your doorstep, GPS position, preferred pick-up place – even directly in your fridge. Technological advances, automation, and ingenuity will improve the quality, prices, and geographic coverage of these services. Pre-cooked dishes that suffer too much from a ride are being delivered as ingredients so you can easily prepare them at home (half delivery, half DIY).³⁶ And work has been ongoing to combine AI and ovens in delivery vans in order to finish baking your pizza on the way, timing it perfectly to the estimated time of arrival.³⁷ As people will increasingly not see the added value of entering brick-and-mortar places, they will simply stay away. **Many shops, restaurants, sports facilities, or hotels will close forever.**

The pursuit and importance of emotional experiences might explain why Amazon has not been able to crack selling groceries online even after a decade of trying. It may also explain why the number of bookstores has increased 50 percent in the US in the 2010s.

But not everything will be better in a digital coat – at least not for everyone. Some people will still want to see, touch, and smell the pineapple and fish to assess the quality. Some people will still want to avoid digital traces to ensure privacy and discretion. Some people will still prefer grocery pickup at stores to reduce their environmental footprint. Some people will still want to taste dishes that only a Michelin-star chef can prepare. And many people will still seek emotional experiences that can only be enjoyed in person (see below).

There is something fundamentally different when we experience a movie alongside other human beings, even complete strangers.

Financial Times

2020, How Food-Delivery Apps Could Change the Way we Eat Out (29 January 2020)

34 Improvements of digital solutions will be driven by advances in miniaturization, automation, artificial intelligence, interconnectivity and interoperability of data and services, communication network technologies, and privacy-preserving technologies.

35 Johanna Gollnofer, 2019, Interview: Bauchgefühl ade?! Technologische Entwicklungen im Marketing, Marketing Review St. Gallen (4/2019), 52-46, page 55, "algorithmischer Konsum [wird] in den nächsten Jahren viele Branchen erfassen ... Besonders kurzlebige Produkte, wie Duschgel, Toilettenpapier oder Joghurt könnten zukünftig von Algorithmen gekauft werden ... Statt selbst nach Sonderangeboten Ausschau zu halten, kann der Algorithmus permanent die Preisentwicklung für Produkte des täglichen Bedarfs beobachten und den Kauf dann tätigen, wenn das Produkt besonders günstig ist."

36 See e.g., The Atlantic, 2020, The Pandemic Will Change American Retail Forever (27 April 2020).

37 Fortune, 2016, This Robot-Made Pizza Is Baked in the Van on the Way to Your Door (29 September 2016).

Hence, **brick-and-mortar commerce will not disappear.** And indeed, while brick-and-mortar shops are closing in record numbers,³⁸ digital giants such as Apple or Amazon have been acquiring physical stores (e.g., Whole Foods) and announced plans to build up to 3,000 more stores by 2021 in the US.³⁹ IKEA is experimenting with 25 different types of brick-and-mortar places around the world, despite online sales growing 40 percent in 2019.⁴⁰ Starbucks may be closing 400 cafés in the US, but it is opening almost as many pick-up locations.⁴¹ Meanwhile, bookstores are defying all odds: Physical bookstores with physical books have been thriving in the 2010s.⁴² But do not be mistaken, there are substantial changes ahead. Owners and usages of many brick-and-mortar places will change.

Some brick-and-mortar commercial places will thrive, some will barely survive, some will find new purposes (in ways we can't imagine today), and some will disappear.

The purpose carousel is already spinning. Grocery stores are becoming CrossFit places, Yoga studios, specialty cafés, hip architecture offices, showrooms, and pick-up locations. Parking lots are already (temporarily) hosting pick-up boxes, food corners (e.g., food trucks), drive-in theaters, drive-in churches, and even medical services.⁴³ At the same time, many forms of usage will decline, while others will cease to exist entirely, becoming the stuff of history books. Just look at how malls look today compared to 20 years ago – today, with their many shops, temporary exhibitions, choice of restaurants, and variety of attractions, they feel more like small towns than malls.⁴⁴

38 In the US, physical store closures reached all-time highs in 2017 and 2019. See The Atlantic, 2020, The Pandemic Will Change American Retail Forever (27 April 2020).

39 CB Insights, 2019, The Store Of The Future: What Retail Could Look Like In 2030 (June 2019), page 31. JLL, 2018, How E-Commerce Brands Get Physical (October 2018), notes that The top 100 online retailers plan to open 850 physical stores over the next five years.

40 Economist, 2020, IKEA: Part Of The Furniture (6 June 2020), "The firm is experimenting with 25 different 'touch points' in cities, ranging from the IKEA planning studio on Manhattan's posh Upper East Side to a mini-store that will open next spring in West London. In the next couple of years, it is planning to expand in large cities in America."

41 CNN, 2020, Starbucks Is Closing Up To 400 Stores And Expanding Takeout Options (11 June 2020).

42 Ryan L. Raffaelli, 2020, Reinventing Retail: The Novel Resurgence of Independent Bookstores, Harvard Business School Working Paper 20-068 (June 2020), pages 3 and 6, "1995 ... marked the launch of Amazon.com ... five years later the number of independent bookstores had dropped by 43% ... The American Booksellers Association (ABA) reported a 49% percent growth in the number of 'indie' booksellers, from 1,651 in 2009 to 2,470 in 2018."

43 New Yorker, 2020, Our Ghost-Kitchen Future (28 June 2020); The Verge, 2020, Walmart Is Converting Its Parking Lots Into Pop-Up Drive-In Theaters For The Summer (2 July 2020); Time, 2020, "Come As You Are in the Family Car." Drive-In Church Services Are Taking Off During the Coronavirus Pandemic (28 March 2020).

44 New Republic, 2015, The Mall is Dead: Americans Shop at 'Lifestyle Centers' Now (3 March 2015), "Its dense, high-end retailing, residences, restaurants and offices create a city-within-a-city. The architecture—with urban row houses finished with earth tones and pastel stucco—overtly evokes Old Europe, and developers brought in antique metalwork, pottery and stone fountains to further instill a sense of history (one store even imported the façade of a nineteenth-century building from France)."

Research-Enter-Click-Search-Compare-Try-Pick-Deliver-Etc.

Already Today, Physical Locations Are Deeply Intertwined With the Digital World. Everything Is Hybrid.



Catch your favorite athlete wearing a new pair of shoes on Instagram, go on Amazon to read the reviews, test them in a shop around the corner, purchase them online.



See the protagonist wearing a fabulous hat in a movie theater, search for the hat on Google, buy it in a Shopify shop, and have it delivered to your doorstep.



Walk into the retail store, open the digital shopping list, walk to the first item, see another product, quickly check reviews online, purchase it online, pick it up at the store tomorrow.



Buy the tickets online, walk right in as cameras at the amusement park recognize ticket holders, get on the most Instagramable ride, take a selfie at the top, and share it before leaving the ride.



Arrive at the restaurant, browse the menu on your smartphone while waiting to be seated, order on your smartphone, eat at the table, pay the bill on your smartphone, and leave a tip in cash.

There Is No Pure Offline Anymore.

We view the **odds at 50-50 that the number of physical commercial locations will fall**.⁴⁵ We have seen that digital giants, retail giants, coffee shops, and bookstores are all expanding their brick-and-mortar presence. We are furthermore also cautious to not underestimate human inventiveness when it comes to finding new utility for abandoned brick-and-mortar places. The most impressive example of successful repurposing arguably comes from the retail giant Walmart. Its sales were falling. Its market capitalization lost a third of its value in 2015. And its 11,000 stores were widely regarded to be rapidly approaching the end of their useful life, amounting to a liability that would eventually lead to Walmart's demise in an online shopping world.⁴⁶ But it brilliantly fought back by turning their liability into an asset. Walmart turned its physical stores into pick-up locations in order to rapidly deploy its digital click & collect solution throughout the US – 70% of the US population lives within five miles of a Walmart, and 96% within 20 miles.⁴⁷ Walmart's market capitalization doubled between 2015 and 2020. During the coronavirus pandemic of 2019-20 Walmart again rethought an underutilized asset: They transformed their parking lots into drive-in movie theaters.⁴⁸ **What is certain, however, is that almost every (brick-and-mortar) merchant will need a digital storefront, omnichannel capability, and a digital sales channel.**

Indoors, It's About Emotional Experiences

Most of the reasons that will continue to drive people inside brick-and-mortar commercial locations only apply to niches of consumers and/or situations. Only a few people are food experts and want to assess the products themselves; the rest will happily delegate the assessment of groceries in exchange for more convenience and speed. Only a small number of people may be concerned with leaving digital traces behind; and even they may only care about it in a few situations, when it relates to their wealth for example. Michelin-star dishes

are not everyone's thing, and most people will not even notice the subtle difference when prepared by future home robots.

But most people will continue to value and seek emotional experiences that are only enjoyable in-person in the real world. We are a social species and we will continue to value and demand activities in the presence of other human beings. We will also continue to enjoy and demand experiences that appeal to all our senses. Even if we trust others to better identify the perfect pineapple, for many of us grocery shopping is also about the smells and the haptic, about meeting the guy who travelled the world to discover the freshly roasted coffee.⁴⁹

"As Jonathan arrives at his favorite grocery retailer, the store recognizes him, its systems alerted to his presence either as his smartphone connects to the in-store Wi-Fi, or perhaps by a facial-recognition technology that he has signed up to use. Once Jonathan agrees to log in, the store accesses the shopping list he's been building at home by scanning items with his phone as he uses them up. As he walks the aisles, smart shelf displays illuminate to show the location of those items, while also highlighting tailored offers, complementary items, and regular purchases that didn't make it onto the list ... His bag full, Jonathan leaves the store. There was no need to check out: RFID scanners and machine vision systems have already identified every item he packed, and his credit card, already on file in the retailer's systems, is debited as he passes through the doors."

McKinsey

2019, *A Transformation in Store* (May 2019)

When we eat at a restaurant, it tends to be about more than the dish itself: The waiting list, the tortuous road, the decor, the waiter, peeking how others are liking it, knowing that the chef touched your plate, they all con-

45 See also Julius Bär, 2019, Online goes offline: The business of high touch (27 November 2019), "There has long been an underlying assumption that virtual is the future and physical stores are the past. We have become used to hand-wringing articles about the death of the high street and arty pictures of 'dead malls' online. But now the companies of the future seem interested in the past – and perhaps offline is the new online."

46 Business analysts predicted a dark future for Walmart in the mid-2010s. Its stock price had just dropped 30%. See e.g., Forbes, 2016, The 10 Telltale Signs That The Future Looks Bad For Wal-Mart (24 February 2016).

47 The Verge, 2020, Walmart Is Converting Its Parking Lots Into Pop-Up Drive-In Theaters For The Summer (2 July 2020).

48 The Verge, 2020, Walmart Is Converting Its Parking Lots Into Pop-Up Drive-In Theaters For The Summer (2 July 2020).

49 Similarly, Christine Schäfer, GDI researcher, "Der ganz klassische Supermarkt, wie wir ihn heute kennen, wird wohl verschwinden. Ob alles online gehandelt wird, ist offen. Denn wir werden wohl nach wie vor Lebensmittel anfassend, ihren Ursprung kennen und uns mit den Produzenten austauschen wollen. Dieses Bedürfnis wird nicht verschwinden." (Migros Magazin, 2020, Auslaufmodell private Küche, 24 February 2020).

The Digital Store



Precise in-door directions

Connected customer gadgets (or apps thereon)

Edge-AI-enhanced cameras with privacy-preserving data processing

Digital displays (interactive displays, smart shelf labels, etc.)

Personalized digital information (visual, auditive)

Simple digital conversational chatbots

Augmented reality, virtual reality, and holograms

Augmented salesforce

Digital authentications (QR code, card, smartphone, wearable, implant, biometrics, etc.)

Means of digital payment (ditto)

Digital mediums of exchange (sovereign currencies, nonmonetary assets, Bitcoin, in-game virtual currencies, gold, Tweet, usage rights to our data, etc.)

Real-time inventory and on-shelves tracking (RFID sensors, weight sensors, camera tracking, etc.)

Highly automated (robotics, AI, cleaning robots, etc.)

tribute to the overall experience. When we go to a museum, it tends to be about more than seeing the paintings and sculptures: It's also about wandering between art works, encountering the unexpected, and marveling together with others at the ingenuity and craftsmanship. And when we go outdoors, it is all about emotions. Seeing the sun rise above the sparkling sea, a gentle breeze caressing our cheeks, warm sand covering our feet, and ocean waves thundering in the background. Riding down a mountain, hip deep in fresh powder, and the crisp winter air nipping our noses.

We do not view it as likely that virtual worlds will perfectly replicate the real thing in the near future.⁵⁰ And even if they could, our experience may not be the same: Our subconscious mechanisms for information processing and sensing have developed over thousands of years, in and for the real, physical world. It is unclear whether they can perfectly translate into man-made fully-immersive digital worlds.

The prevailing reason for people getting through the door and inside brick-and-mortar places will therefore be the promise of a non-digitizable emotional experience – inside the place or in its vicinity.⁵¹ Emotional experiences seem indeed to have been a key reason behind the resurgence of bookstores. For many people, going to a bookstore is about more than purchasing a product. It is about supporting businesses with a strong local history, about the personal recommendations from, and relationships with, the passionate bookseller, and about physical meeting and interacting with a community of like-minded enthusiasts.⁵² In a similar vein, IKEA is hosting sleepover parties with movies and food in its stores.⁵³

Owners of brick-and-mortar commercial places must thoroughly understand what non-digitizable emotional experiences people seek, which ones they (or their surroundings) can offer, and which ones to focus on.

Digital Outside, Digital Inside

People will widely adopt digital solutions to find, compare, purchase, return, and even consume the products and services that address their needs. But digital does not stop at the doorstep of a brick-and-mortar location. Inside too, people will demand and adopt digital solutions for greater convenience and speed. The coronavirus pandemic of 2019-20 will likely accelerate the adoption of digital solutions that help customers minimize the time they have to spend in overcrowded areas (e.g., indoor directions optimized to avoid close proximity, self-checkout services to avoid queues, appointments like at the doctor to limit the number of people indoors).

50 Of different opinion: GDI, 2019, The End of Consumption as We Know It (February 2019), page 54, "virtual worlds will not only be heard and seen in [the] future, but experienced holistically ... Thanks to immersion it will be possible to experience the entire intensity of the real experience, even if you are sitting comfortably on the sofa at home."

51 Forbes, 2019, Mindful Consumption, Peak Amazon And The Participation Decade - 8 Retail Predictions For 2020 (13 December 2019) "Over the past decade, we've witnessed physical retailers transition from transactional to experiential ... Retailers will take this to the next level in 2020".

52 Ryan L. Raffaelli, 2020, Reinventing Retail: The Novel Resurgence of Independent Bookstores, Harvard Business School Working Paper 20-068 (June 2020), page 3.

53 Huffington Post, 2019, Ikea Will Host Cross-Country Sleepovers, Because Why Not (7 February 2019).

Digital will drastically intensify inside brick-and-mortar places – but only insofar as it does not conflict with the reason for people entering them. People may forego the convenience and speed of digital solutions if it conflicts with the primary reason that brought them to the brick-and-mortar place. Where a fear of leaving digital traces brings people indoors, digital tools will be very limited. Where in-person social experiences bring people indoors, digital tools will only be present if they do not jeopardize this experience. Where pre-digital nostalgia brings people indoors, digital tools will be absent or invisible.

Digital will thus manifest itself in various forms and shapes across brick-and-mortar commercial places. People will increasingly use their *own digital gadgets* in physical locations to access the digital world. Already today, almost two-thirds of US shoppers say they use their smartphone in stores to compare prices, search for deals and coupons, and look for reviews.⁵⁴ People are also increasingly consulting their digital shopping lists when walking through the aisles.

Additionally, *physical spaces themselves* will also become digital, connected, interactive, and smart.⁵⁵

- Advances in location technologies will provide us with *precise indoor directions*,⁵⁶ displayed on our own gadgets (smartphone, AR glasses), shopping carts, or floors and walls.
- We will be able to *authenticate ourselves using a digital gadget (e.g., smartphone), wearable, implant, or their various biometrics*.⁵⁷
- Advances in privacy-preserving AI will enable *cameras to track a person and register the products* he/she puts in their shopping cart, all without ever storing any personally-identifiable data and without the data ever leaving the store's location.⁵⁸
- We will experience physical locations, products, and services in completely new ways with *augmented reality, virtual reality, and holograms*.⁵⁹
- Advances in AI and connected devices will give us simple conversational chatbots and augmented-human salesforce.
- Sensors, trackers, and AI-augmented cameras will provide us with *real-time tracking of inventory and shelves*.⁶⁰

Owners of brick-and-mortar commercial places must thoroughly understand their target consumers in order to assess what digitalization investments are necessary, which to prioritize, and which ones to stay away from.

54 eMarketer, 2019, Two-Thirds of Shoppers Check Phones In-Store for Product Information, Skipping Store Associates (8 May 2019).

55 McKinsey, 2019, The Future of Personalization–And How To Get Ready For It (18 June 2019), “Physical spaces will be ‘digitized’.”

56 Bluetooth 5.1 will enable connected devices to track each other down to the centimeter (it used to be precise to the meter). See e.g., Chris Smith, 2019, Bluetooth 5.1 will do a much better job of tracking down your lost tech, Trusted Reviews (28 January 2019).

57 Biometrics include fingerprint scan, retina scan, facial recognition, and various behavioral biometrics such as gait and smartphone typing (BioTyping), voice recognition, and lip motion. Biotyping monitors how the user enters their PIN code in terms of pressure (heavy or light), of the surface they touch (large or small), and of touch motion (how the user moves their fingers). See e.g., Worldline, 2020, Future Payments (January 2020), page 15.

58 AI will replace faces with anonymized computer-generated faces on input data. The modified images reflect the facial expressions and emotions of the underlying real face; see e.g., Artificial Intelligence, Deepfakes could anonymize people in videos while keeping their personality, MIT Technology Review (17 September 2019), “The algorithm extracts information about the person’s facial expression by finding the position of the eyes, ears, shoulders, and nose. It then uses a GAN, trained on a database of 1.5 million face images, to create an entirely new face with the same expression and blends it into the original photo, retaining the same background.”

59 Chevrolet enhances the experience in its showrooms using mixed reality (<https://youtu.be/k5mfQqWRzV0>). At Hublot, customers can preview how a watch would look on their wrist using hologram technology.

60 McKinsey Global Institute, 2020, Connected World: An Evolution In Connectivity Beyond The 5G Revolution, Discussion Paper (20 February 2020), page 4.

“So Much More Than Light.”

There are over 42 billion light sources worldwide. Light sources are the most widespread power-supplied devices in the world. And the advent of LED turned all these light sources into a digital network: Today light sources can wirelessly transmit data and positions between them using light (known as “Light Fidelity,” Li-Fi).

Li-Fi is significantly cheaper to set up than Wi-Fi and promises to reach speeds up to 100 times faster than Wi-Fi. Light sources will therefore increasingly become a key element of the future IoT system, and connect with other sensors and beacons. Light sources will not only act as wireless communication devices, but also process data at the edge.

Soon, smartphones and other customer devices will become Li-Fi compatible. Light sources can be used to enable real-time augmented reality in brick-and-mortar places, displaying real-time, personalized information to customers. A network of light sources can also be used to enable precise indoor location, offering indoor turn-by-turn navigation to customers.

Dominic Wäger

Manager KAM, Zumtobel Group

“The Upcoming Automation Age in Brick-and-Mortar Commerce”

It is true that the e-commerce space promises rapid growth and large opportunities. But at Swisscom, we believe that there are vast untapped opportunities in the brick-and-mortar space. We believe that the greatest of these opportunities lies in delivering meaningful omnichannel experiences through automation by leveraging shops’ geographic proximity to their customers.

A good example for an automation-powered client experience is Hema, an omnichannel retail concept of Alibaba. At Hema everything can be done on the smartphone, from obtaining product information to self-checkout and receiving personal recommendations based on your shopping behavior. At the same time, every Hema location acts as a local distribution center. If there is no time to go shopping, everything will be delivered to your doorstep within the next 30 minutes.⁶¹ In the near future more and more brick-and-mortar stores will follow the path of Hema, or are already working on similar projects.

There are many more benefits of automation for brick-and-mortar owners. Less inventory is needed on-site, if something is out of stock it is only a tap away, cashiers are redundant – as customers scan their goods themselves, and cleaning will be done with floor scrubbing robots such as Whiz from Softbank Robotics or Neo from Avidbots.

Finally, physical proximity to customers may especially be an advantage once robots and drones will carry out last-mile delivery. Amazon’s fulfillment centers are, for example, too far away for drone technology to carry out the delivery.⁶² But 50% of the customers of major retailers live in a drone-accessible zone from some brick-and-mortar shop. This opens new possibilities of cooperation with global e-commerce giants.

At the same time, reliable connectivity networks and secure machines rise in importance to support this paradigm shift.

Reto Wälchli

Senior Business Developer, Swisscom Digital Business

61 E-tailment, 2019, Alibaba: Die Neu-Erfindung des Supermarktes (4 June 2019)

62 Supply Chain Dive, 2017, Brick and mortar: Retailers’ last-mile advantage over Amazon? (17 April 2017)

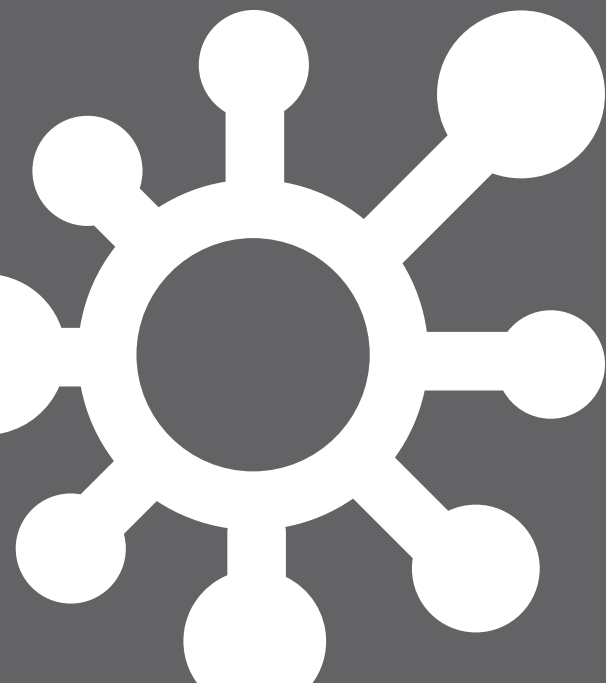
“COVID-19 Has Dramatically Increased the Speed of Brick-and-Mortar Digitalization”

Digitalization has been gathering even more pace over the past months. Digitalization continues to gather pace in the retail sector, particularly since the outbreak of COVID-19. New use cases have been emerging for months, and the pandemic has only served to accelerate their implementation. Examples include self-checkout solutions on smartphones, unstaffed supermarkets and virtual showrooms, to name just a few. And then there are the use cases that have arisen precisely due to the coronavirus crisis. One of these is CountMe, a system used for managing customer flows. CountMe allows retailers to measure the number of customers in a defined area, which enables digital access control. **COVID-19 led to the emergence of new customer needs, which drove the adoption of digital tools over the past months.** But how could these new use cases be implemented within such a short space of time? The answer is that customers' needs have changed significantly as a result of COVID-19. According to a study by the University of St. Gallen, 28.6% of consumers are worried about coronavirus, and this fear has inevitably changed their behavior. Customers now see real added value in new use cases like contactless shopping. So, let's go one step further and offer our customers even more digital services:

- **Best time to shop:** by combining the collected and predictable data (e.g. weekday, holidays, weather) with real-time information, retailers can inform customers of the quietest times in the store, and thus the best time to go shopping.
- **Best path to shop:** Let's return to the example of CountMe: the cameras that detect the number of visitors can also trace potential visitor flows and paths. This enables stores to create heatmaps that show the areas with the highest and lowest footfall. There are numerous potential benefits to this, e.g. cost savings through process automation, optimum product placements, and better use of the retail space.
- **24/7 convenience stores:** automated checkout processes allow even small shop owners to offer their customers extended opening hours without having to employ additional staff. Customers can use their smartphone app to open the front door of the shop, add their desired items to their shopping basket by scanning a QR code, and pay for them easily with their stored payment method when leaving the shop.
- **Automated supermarkets:** digitalization is not an option that's limited to small shops. Unstaffed supermarkets with largely contactless purchases will become increasingly common. For example, computer vision technology allows stores to track what goods the customer has put into their shopping cart. As soon as the customer leaves the shop, the selected items are automatically paid for using their stored payment method.

Daniel Rapp

Business Solution Manager, Zühlke Engineering AG



Instant, Yet Personalized Information

We always hear that everything is instant and personalized, but when it comes to information, we must choose. It is true that the Amazon or Netflix websites are instantly tailored, from the font, to the pictures above movies, and the order in which they are displayed. It is true that Facebook's and Google's algorithms instantly tailor advertising to what we say and do online (i.e., to our psychometric profiles). Yet when we look at a movie listing, we do not see the score from our preferred rating site Metacritic, we do not see the review from our favorite Twitter influencer, we do not see the review a friend of ours wrote in WhatsApp, we do not see whether we can afford it, and we do not see whether a friend of ours could lend it to us. Instead, **today we must visit multiple websites, go through multiple apps, and run multiple searches to gather all the information that is relevant to us.**

We also do not instantly get a truly personalized assessment of whether we will like a movie based on all our digital traces – whether from our behaviors, comments, purchases, writings, likes, to-watch lists, and irrespective of whether we made them in an Email, in a comment on Facebook, in a private chat, in a review on eBay, in a book annotation on Amazon's Kindle, in a personal note on Evernote, on any of the streaming services, or while playing an online video game. We do not instantly get information on whether we have the shirts that go with this fancy pair of pants that we have been marveling at.

We do not instantly get personalized health-impact information⁶³ or sustainability-impact information.

When we read an article online, we do not instantly see related articles from the various newspapers we subscribe to, or commentators we follow. And when we walk into a store, we don't readily get directions based on our (digital) shopping list. Instead, we may get an employee to point us in the right direction, to later only get lost again in front of the walls of (similar) products.

"[People] spend a huge amount of time and effort just to absorb and make sense of the sheer volume of information available."

Accenture

2019, Accenture Global Financial Services Consumer Study, page 22

But there is change ahead, substantial change. We have seen that people will be able to access and source all their data, wherever it is held, and send it to wherever they want. We have also seen that people will become increasingly willing to share their data because of advances in privacy-preserving data-processing techniques. And already today, three-quarters of people are willing to share their data for more personalized experiences.⁶⁴

63 CB Insights, 2020, Retail Tech Trends To Watch (March 2020), "Germany-based discount grocer Aldi launched a free mobile app in February 2020 to help shoppers make healthy food choices. The app, dubbed Healthy Pick, gives nutritional information for different products when the item's barcode is scanned via mobile phone."

64 A survey of 47,000 people across 28 markets in Asia-Pacific, Europe, Latin America, Middle East and Africa, and North America finds that "more than three-quarters of all respondents are willing to share the data required for benefits such as personalized offers, more efficient and intuitive services, and more competitive pricing." (Accenture, 2019, Accenture Global Financial Services Consumer Study, page 32).

Transparent AI-Augmented Filter

These filters are **like looking through augmented reality (AR) lenses**, overlaying the real world with additional information to further personalize our experience thereof. We may see this information (visual AR) or hear it (audio AR).

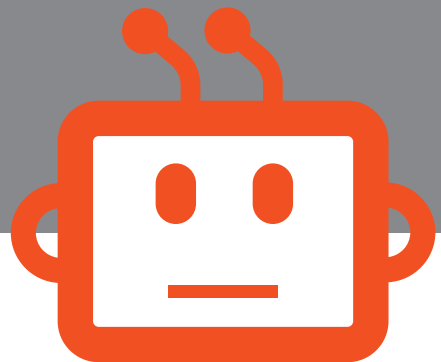
These filters overlay webpages, applications, and operating system. The AI algorithm screen scrapes whatever is being displayed on websites, in apps, in our glasses.

It understands what is being displayed, recognizes products and brands, sources relevant data, and seamlessly **adds additional content** where it makes sense. It tracks what we do, what data we enter, where we click, and where we look. And it recognizes entry fields, can interact with websites and apps like a human, and enters data itself where it makes sense.

On operating systems, websites and in apps, we will not be able to distinguish what has been added. **To us, it will be as if Amazon or eBay were displaying the content themselves.** Content includes personalized information, sourcing data from anywhere we want, and personalized buttons, leading us to anywhere we want. These filters will even be able to entirely reorganize what is being displayed in real-time. Finally, where the AI enters data itself, to websites and apps, it will be as if a human was interacting with them.

- *The filter can be installed as an **add-on to our web browser** to overlay websites and web apps – progressive web apps (PWAs) may well end up displacing native apps. The filter can be installed as an app on our smartphone to overlay the operating system, apps, websites, and camera.*
- **Web browsers are already deploying such filters today**, albeit in a different context: *The Brave web browser can detect advertisement and may then block it out. The privacy-focused web browser Brave can not only block/hide ads, it can also display different ads in their place. It either displays white spaces of blocked ads. Or, if the user consents, displays different ads and splits revenues with the user (70 percent). See e.g., Wired, 2019, The Brave Browser Will Pay You To Surf The Web (24 April 2019).*

- **Operating systems will likely allow such apps or provide the feature themselves.** *Apple and Google are already making it easier for apps to communicate with each other (1) to reduce the likelihood that users leave for a better-integrated OS, (2) to reduce the likelihood that one app becomes a superapp, and (3) to position their voice assistant as the main interface into the digital sphere. These features would empower Siri and Google Assistant to control everything on their OS, from apps to websites.*
- **The AI technology is already being deployed today.** *Screen scraping and automated data entry is in-use to access/-aggregate bank-account data respectively to trigger payments from third-party apps (think Plaid). Screen scraping is in-use to aggregate products across multiple online shops on a single webpage (think Google Shopping). Screen scraping is in use to collect data from third-party websites (think Amazon's Alexa when we ask her about the time of our train, what movies are currently running at the theater, or where to find the nearest Italian restaurant with octopus salad on the menu).*
- **All of this can occur without ever revealing which website or product we are looking at.** *The AI algorithm can run locally (edge AI). All the data it collects can be stored locally and immediately be deleted. And when it sends out a request to source data, it can add noise to the request by randomly generating additional data requests, thus hiding the real request among them.*



Governments will require companies to set up *open (standardized)* output interfaces for us to access and share our data. But these interfaces may not give access to all our data, and even if they do, they will not immediately be available.

Service providers will themselves provide *open input interfaces* for us to send our data and then have it displayed next to products and services. They will do so because it is in their own interest. A tailored experience is very important to consumers, who may switch to service providers offering better tailoring. But not all service providers may do so. And even if they do, the interfaces will not immediately be available and/or we may not feel comfortable sending our data to these service providers.

The Empowered Prospective Customer

Overhear a conversation about the new Star Wars, check a search engine where it runs near you, click to buy a ticket right there, get a message that your favorite seats are already taken, but that there is still one available that you will like, remember that the 'click here to buy' is not part of the search engine, but added by your transparent AI-augmented filter, which takes care of filling everything out on the movie theatre's website in the background, confirms the purchase, and receives the ticket by email.

Open the map, the destination has already been filled, and click on the button of your favorite ride service.

Walk into the theatre, pick up your favorite movie snack, which has already been waiting on the counter, enter the cinema itself and have your seat automatically illuminated.

Watch the movie, marvel at the pair of shoes that the main character is wearing, enter the pair of shoes in your search engine and have it automatically completed with the movie title and scene, quickly marvel at AI inferring this information from your movie ticket and time, and go back to the movie.

During the intermission, check out the reviews from different online shops aggregated on one page, tell it to buy a pair in your size from a shop that has it in stock and that is located on your way home.

Where interfaces are found wanting, *transparent AI-augmented filters* will take up the slack [see highlighted box]. These filters will display additional (personalized)

information that is perfectly embedded onto whatever we are looking at.

We will no longer have to choose between instantaneity and personalization. Whether through interfaces or filters, ***we will be able to instantly see personalized information on every website, in every app, on every augmented-reality display, every in-store display; and we will be able to hear it in every earphone and every in-store speaker.*** If we wish, we can display the aggregated ratings of Rotten Tomatoes and Metacritic next to a movie. We can display the assessment of our favorite influencer or most knowledgeable friend regarding a sweater, whether they gave it on Facebook, Twitter, LinkedIn, Reddit, Medium, Amazon, eBay, TripAdvisor, private Email or WhatsApp chat – or wore it in an Instagram picture. We can display a personalized likeness score based on our assessments, behavior, and discussions in apps, on websites, and in our personal notes. We can display who among our friends already owns it, who has a subscription that includes it, whether we have already seen it. And we can display an assessment of whether we can afford it.

Owners of brick-and-mortar commercial places must ensure people can easily access and consult information that is personalized to them – both outside and inside.

Seamless, Yet Personalized Digital Journeys

We always hear that everything is seamless and personalized, but when it comes to digital journeys, we must choose. It is true that Amazon and Netflix offer us an almost unlimited choice of series and movies, from themselves and from third parties, and that we can buy a movie with just one further click. Yet, it is much less seamless if we want to watch this movie on another service, where we would have to enter the same data again. It is true that we can order anything on Amazon, and have it delivered to our doorstep with one click. Yet, it is much less seamless if we want to order it from small local merchants who are not on Amazon because they ensured that we had access to groceries during the coronavirus pandemic of 2019-20. ***The seamlessness that digital service providers offer within their ecospheres has blinded us from seeing how little there is between them.*** It is true that we can ride in an Uber without any thought. Yet, it is much less seamless if we want to order the cheapest ride, requiring us to reenter the same data in Uber, Lyft, and other taxi apps. It is true that reviewing

and booking a restaurant on TripAdvisor takes little effort. Yet, it is much less seamless if we also want to order a ride, and check the movies that are running at a nearby cinema. We would again have to reenter much of the same data several times.

But there is change ahead, substantial change. We have seen in the previous section that we will be able to take our data out from any service provider and to send our data as input to any service provider. Where interfaces are found wanting, transparent AI-augmented filters will again take up the slack.

We will no longer have to choose between seamlessness and personalization. Whether through interfaces or filters, *our data will travel with us, wherever we go, and make any digital path we take (feel) seamless.* Everything we see, everything we do on a website or an app will be collected. We can then go to any website and any app, and all this information will be used to make it as though we had been on this website or app all along. We may start on Amazon because we prefer its product description and look-inside feature. We can add books to the Amazon shopping cart, switch to exlibris online shop, and have all the books automatically added to the shopping cart. Algorithms may learn over time what our likely next destinations are and already start to pre-fill in the background while we are still browsing on Amazon. *It will feel as if the entire digital sphere were one single website or app.*

Whether through interfaces or filters, *forward-aggregation platforms will enable us to take parallel paths yet experience them as one.* Already today, Google Shopping screen scrapes multiple online shops and then displays them in a unified way. When we click on a product, the online shop opens. Future aggregation platforms will go one step further: We will be able to add products to shopping carts and order them from the respective online shops without ever leaving the aggregation platform.

Wherever we go, we will be received as if we had been a regular customer for longer than we can remember. When we book a flight, our favorite seats will be preselected. When we go to a restaurant, the server will naturally guide us to the table that we would have chosen ourselves. When we walk into a store, we will know exactly where to go because we shared our shopping list with the store. When we walk up to any counter, we can simply say ‘my usual’.

*The digital sphere will appear completely malleable, controllable, **plug-and-play**. Everything will appear interconnected and interoperable.*

Prospective customers will seamlessly be able to defect from any website or application to any other. There are no switching costs, the data travels with the customer.

Prospective customers will seamlessly be able to defect from any brick-and-mortar commercial place to any digital service. There are virtually no switching costs; the indoor movement data, shopping-list data, AR-glasses data, and preceding digital-journey data all travel with the customer to the digital service. Voice commands and pictures complement the data if needed.

It is very unlikely that a single player will be able to cover all possible customer journeys leading up to a given purchase. Different consumers prefer different journeys; and each consumer prefers different journeys at different times. The journey may start with us seeing our favorite athlete wearing a new pair of shoes on Instagram; with us seeing James wearing the shoes in the new Bond movie, either at a movie theatre or on a streaming service; with us chatting with a friend; or with us discovering a hole in our own shoes. The next step in the journey may take just as many turns as there are starting points. We may want to see the product descriptions and reviews on Amazon, ask a friend, and/or see what our favorite influencer thinks. There is virtually an unlimited number of paths because the possible combinations increase exponentially with each additional step.

*The client-initiated unbundling of the customer-experience chain is likely to open **the field for smaller players to focus on individual steps/verticals in the overall journeys.***

More generally, we will be able to seamlessly switch from consuming one digital service to another because our activity data will always be able to travel with us. We will be able to seamlessly change music-streaming providers because we can carry our settings, preferences, and playlists with us – if there is no open interfaces to take out our data, an algorithm will screen scrape our music app and will then ‘manually’ recreate what it has ‘seen’ in the new app. Technical switching costs (lock-ins) will be virtually zero everywhere in the digital sphere.

For a more extensive discussion of disappearing (technical) switching costs, see SFTI, 2020, Future of Financial Institutions (February 2020), pages 38ff.

Owners of brick-and-mortar commercial places must ensure that their physical store, in-store experience, and digital storefront seamlessly integrates with any relevant digital path that people may take – both before and after.

Payment Goes Digital and Online

Brick-and-mortar places and online shops will widely adopt digital solutions to ameliorate the checkout experience. They will do so to provide the best possible experience for their customers, hoping it will translate into higher spending and lower likelihood of defection to competitors.

The in-store “experience ... is more closely akin to shoplifting”

New York Times, 2018

Inside Amazon Go: A Store Of the Future (21 January 2018)

Checkouts will exhibit a wide range of means of payment. We will be able to pay with cash, QR code, card, smartphone, wearable, implant, biometrics, etc.

Checkouts will exhibit a wide choice of mediums of payment.⁶⁵ We will be able to pay with ‘rights to our data,’ just as we have – knowingly or not – been doing online for services such as Gmail, Google Search, and Facebook. More generally, we will be able to pay with currencies issued by central banks, in-game virtual currencies issued by video-game makers (e.g., V-Buck issued in Fortnite),⁶⁶ cryptocurrencies (e.g., Bitcoin), and various other nonmonetary assets (e.g., our data, a Tweet, a FB like, mobile-phone credit,⁶⁷ ounces of gold).

“The POS is everywhere; it is each individual consumer.”

Gottlieb Duttweiler Institute, 2019

The End of Consumption as We Know It (February 2019), page 48

Checkouts everywhere will be frictionless, sometimes invisible. Consumers have repeatedly expressed that convenience and speed are very important at the checkout, and that both are deficient in the status quo.⁶⁸ The coronavirus pandemic of 2019-2020 will likely accelerate the adoption of self-checkout solutions because they help customers minimize the time they have to spend in over-crowded areas (e.g., avoid the lengthy proximity to others in queues). Brick-and-mortar places will combine people’s own digital gadgets, store-provided gadgets, and smart physical spaces to create a seamless experience – including checkout. Scanners, weight sensors, and cameras will register the pineapple we put in our bag, the amount of sushi we consume, or the type and amount of gas we put in our car. And if we already authenticated ourselves, the amount will automatically be withdrawn from our digital wallet as we walk out or drive away. Alternatively, we will increasingly be able to self-scan the banana with our own gadget (or app thereon),⁶⁹ and will then see the amount automatically withdrawn from the connected wallet as we walk out.⁷⁰ **We will be able to pay everywhere as seamlessly as after an Uber ride today: Simply walk away.** If we want to, we can require that (certain) purchases must be confirmed by Pin, fingerprint, or voice.⁷¹ The point of sale will be wherever the consumer is.

⁶⁵ See SIX, 2019, Future of Money (November 2019), page 29.

⁶⁶ FT, 2020, What do children spend their pocket money on? (14 January 2020), “six of the top 10 purchases that children made in 2019 were [digital-]gaming-related ... All have their own virtual currencies, which your child may be more familiar with than pounds and pence.”

⁶⁷ IDEO, 2020, Your Competitors Aren’t Who You Think They Are, IDEO Journal (4 March 2020), “In many African countries, citizens have so little faith in their nations’ financial stability and fiat currency that a new kind of money has emerged: prepaid mobile phone minutes. People pay for a broad range of goods and services—from procuring groceries to settling their electric bills—by transferring mobile phone minutes. Kenya’s most ubiquitous service, with more than 30 million users, is m-pesa, launched by the country’s top mobile phone companies, Vodafone and Safaricom. Who would have thought that mobile phone companies would emerge as the central disruptors in Africa’s financial services sector, disintermediating the banks?”

⁶⁸ A survey of 3,000 US adults finds that in online journeys, convenience is most important when researching a product; and that in offline journeys, convenience is most important at checkout (NRF, 2020, Consumer View Winter, 14 January 2020). CB Insights, 2019, Automatic Checkouts Will Affect More Than Store Operations (17 June 2019), “Checkout lines are the most annoying part of going to the store. Various technology investments have tried to fix them. Early efforts involved self-checkouts.”

⁶⁹ See e.g. the self-scanning app Koala.

⁷⁰ We are, after all, already authenticated on our own gadgets.

⁷¹ Finextra, 2020, Google Tests Voice Confirmation For Payments (27 May 2020).

Usage of cash as a means of payment will fall by 40-70%, but will not disappear.

In-store payment will continue its transition from cash to cards to smartphones. And may then move to wearables, implants, and/or physical spaces (biometrics).

SIX, 2020

Future of Money (November 2019)

Payments at brick-and-mortar places will increasingly be in digital form. Carrying cash around has never been particularly convenient. We have seen that consumers will adopt digital solutions and digital payments in order to make the checkout as seamless and fast as possible. **Digital payments will hence continue to displace cash as a 'medium of exchange'.**⁷² The usage of cash as a means of payment will fall by 40-70% but will not disappear. The coronavirus pandemic of 2019-20 will accelerate this fall as retailers ask and recommend their customers to use a digital means of payment. In the UK, cash payments have halved during the first months of the crisis. But cash payments will not disappear. Even in Sweden, which has the lowest usage of cash in the world, it still amounts to 15 percent of transactions.⁷³ Also, only 23% of people say they would go completely cashless.

Sales, and thus payments, will continue to move online – even when there is a brick-and-mortar touchpoint. They will increasingly compare products and services online, consult what others think online, **search where to buy online and make the purchase online.** We have also seen that two-thirds of US consumers already take out their smartphone to consult and compare inside brick-and-mortar places; and that this number will further increase as defecting/switching online becomes another one-click thing. **Even when people stroll through brick-and-mortar places, an online purchase will always be just one simple click away.**

Overall online sales will reach **40%** by **2030**, and **15%** in groceries.



Online sales/payment accounted for **16%** of worldwide retail revenues in 2019, and **2%** in groceries.

Reminder: Online sale/payment does not exclude brick-and-mortar touchpoints.



Online sales stood at 15% of worldwide retail revenues in 2019, with groceries standing at 2%.⁷⁴ Before the coronavirus pandemic first hit in 2019, online sales were usually forecasted to reach around 25% by 2025, with online groceries reaching 5%.⁷⁵ As we have seen, the pandemic will likely increase people's willingness to try digital solutions, and thus accelerate the already-ongoing shift toward adopting digital solutions. Hence, even though we are split on whether the number of brick-and-mortar commercial locations will decline, **we expect online sales to reach 40% of worldwide retail revenues by 2030.** This growth is driven by the increased adoption of, and switching to, digital solutions before the purchase; by improvements in price, quality, and coverage of delivery services; and by the continued digitalization of consumption (e.g., streaming music and films instead of carrying home physical disks).

⁷² For an extensive discussion, see our most-likely scenario in SIX, 2019, Future of Money (November 2019), pages 18ff.

⁷³ See e.g., Sveriges Riksbank, 2018, Payment Patterns in Sweden (May 2018).

⁷⁴ Forbes, 2019, The Bogus 'Retail Apocalypse' Looks More Like a Renaissance (21 June 2019); eMarketer, 2019, Five Charts: The State of Online Groceries (7 June 2019).

⁷⁵ McKinsey, 2019, A Transformation in Store (May 2019), "Even by 2023, e-commerce is forecast to account for only 21 percent of total retail sales and just 5 percent of grocery sales."



“IoT Will Completely Revolutionize Payment”

If there is one thing that has always fascinated me about the payment industry, it is that an **overwhelming majority of the people buying something have no interest whatsoever to engage in the payment process**. To take out their card, mobile wallet, or cash and to hand it over to the cashier at the point of sale is just a hurdle and hassle they want to manage with as little effort as possible!

The technology to render payments seamless, even invisible, exists today – and is already being deployed in digital apps. For example, a connected fridge can already today order food automatically when it detects that supplies are low. Connected cars can pay parking fees and road tolls by themselves based on machine-readable rules and by utilizing the car sensor systems, with no need for driver interaction. The frictionless experience for the user is like the first time you took a ride with an UBER. Everyone who has been in an UBER or similar service remembers the feeling of just stepping out of the car for the first time without the hassle of paying the driver even though the driver naturally received the money and tip from you. But it hasn't found its way into brick-and-mortar places. The inherent friction in the payment process linked to cash, cards, and online alternatives have been roughly the same for decades. Yes, sure we have made it a little bit easier and faster and even though touchless payments and similar methods have improved the user experience at the point of sale, incumbent payment services providers struggle with the decreasing opportunities to build brand recognition and marketing value with cards and branded mobile wallets or online check-out solutions because of the rise of low-touch payments. This is about to change. Customers have always demanded convenience and instantaneity, but their expectations of what represents a seamless, frictionless user experience are being informed by their experiences in the digital sphere. **Not so long from now, digital payments will become a lot more seamless and convenient in brick-and-mortar places.** Amazon Go will be the norm.

And not much later, once the Internet of Things (IoT) becomes ubiquitous, digital payments everywhere will be truly seamless and invisible. More and more things and infrastructures are becoming part of the connected world. 'Things' will soon have access to the consumer's bank account via any screen or infrastructure that can

authenticate and identify a person. **Payments will be done everywhere and nowhere**, they will be truly invisible – hidden deep in the user experience of services and user journeys. Dynamic electronic wallets that manage microtransactions will take care of automatically distributing funds to all the relevant participants in the supply chain. The idea is not too farfetched. There are projects running today with programmatic payments linked to strong digital identities in the supply chain that together with dynamic e-wallets and microtransactions provide the opportunity for a shipment from a supplier to pay its way from production to the buyer, via the most energy efficient, fastest, or the safest route.

Why would we then need an interface for point-of-sale or merchant dashboard if there is no payment touchpoint?

Tommy Andorff

Co-Founder and COO, Trust Anchor Group

This is an excerpt of a longer article entitled “POS - touch point or pain point? The merchant's dilemma – everyone wants to buy, but no one wants to pay!”

Disclaimer: All views and expressions in this text are those of the authors and do not represent the opinions of any entity whatsoever with which the author has been, is, or will be affiliated.



→ Human-Centric Description of This Future Scenario

0s and 1s Are Everywhere, but Not Everything

Zurich, Monday March 11, 2030, 7:40 a.m. Of course, the sleep analysis score is bad. But I already knew that. Going out during the week is deadly for the numbers. The body wants habitude. To get up at the same time every day, to eat the same thing for breakfast, and have a low-carb vitamin-rich dinner, but not too late. Now I haven't had enough deep sleep and too few full sleep cycles. I knew it, without even checking it out on my super-app on my smartphone. Still, waking up has been gentle since my body controller – this little strap around my left wrist full of sensors and transmitters – has been monitoring my sleep phases. At the ideal waking time, the cool magic gadget notifies the super-app, which sends the order to the roller blinds to “go up,” while telling the network speaker to “start my personal Wake Up playlist and slowly increase volume.” The bathroom is nicely warmed, and as I step into the shower, the water streams from the shower head at exactly my preferred temperature. I've changed the playlist. It's time for something a little more energizing, and every now and then I glance at the glass shower door upon which a muted video stream with current news footage is projected, accompanied by a steady stream of headlines covering my areas of interest. At the same time, the coffee machine in the kitchen turns on. Thanks to my body controller, it knows that I'm now awake. And when I come out of the shower, I'm met by the aroma of 200 milliliters of Kopi Luwak – coffee from cat poop – steaming and at the ready (**everything is connected, interactive, and smart**).

Dressed and on the way to the kitchen, I always enjoy how seamlessly the home electronics accompany you from one area of the apartment to another. It feels like hovering over a cloud. There's a blinking red light on the large touchscreen on the fridge door: The milk's gone bad again. The fridge had already reminded me a few days ago to use it up – it even suggested some recipe ideas so that the milk wouldn't go to waste. I was also able to approve a new milk order, some of which I now appreciatively pour into my coffee. By the way, I almost forgot to introduce myself – I'm Mario. I live in Zurich in an apartment overlooking the Lake of Zurich together with my wife, Marianne, and our two kids.

I drink my morning coffee and first venture a look at the smartphone, check out my Health app, which collates and evaluates all the data regarding my body and its functions. Well, the urine values aren't bad. It's amazing

how clearly the second beer last evening shows up in the figures. How quickly you get used to the fact that even the toilet gathers so much data for each registered user – as soon as my body controller reported my approach, it activated my profile. If I wish, I can have the app connect automatically with my doctor's digital calendar and suggest an appointment for a checkup (**data accessibility and mobility; interoperability**). Today, all apps can communicate with each other, and every app can integrate and start other apps, as well as transfer data (**seamless personalized digital journeys**). Gone are the days when you had to go through the hassle of signing on to 15-20 individual apps, when you had to pay attention to seemingly thousands of passwords, couldn't find the app you needed, and had to re-enter the data from one app into the next. But I've never tried out the doctor function. I'm happy that I can still define which apps can communicate with each other. I'd feel a little uneasy if data were sent to my doctor without my approval (**data sovereignty with data subjects**).

Then my digital wizard notifies me that it's our anniversary in two days. Thank goodness. Before, I usually forgot it, and disappointed my wife – again. The wizard offers me the opportunity to go on a virtual shopping experience, and in addition to the classic product photos, allows me to chat with a rep for advice, and to thoroughly experience the product – directly via my wizard. Via an AR function, I can visualize the object in my apartment or on somebody, without having to buy it sight-unseen (**digital shopping; augmented reality**). I decide on a pearl necklace, and take a look at a few. We honeymooned in Fiji and had the opportunity to visit a pearl manufacturer there. Three necklaces make the shortlist, which I'll take a closer look at later.

Meanwhile, both the kids have also woken up. It's a typical Monday morning, and everyone's a little slow getting going. Whew, am I happy that my wife has already left for work! And I, thanks to the flexible working arrangement, have my “Dad's Day”. Things are so much more family friendly than they were a decade ago. We would have had to engage a nanny, call upon the grandparents, or hope for some flexibility from our employers – of course COVID 19 is a major reason why working has changed so much. A half-hour later, the kids are already on their way to kindergarten, and I'll soon find myself in a spinning class at my local fitness center. It's important to get my fitness level up again,

Digital Shopping ←



→ Human-Centric Description of This Future Scenario

otherwise I could lose my health insurance protection bonus this month when they see my data. That's the crux of these new rates. If you do something for your health, you pay less. It's a system that gets this couch potato at least motivated to do something.

Before I leave the apartment, my wizard – a conversational chatbot – advises me to take an umbrella since after the fitness class there's an 85% chance of rain. It also displays what products I need to shop for in order to make pizza for lunch. It's quite impressive, particularly since an algorithm independently weighs out price from all providers against my preferences and convenience. This allows me to always delegate various purchasing decisions to my wizard (**digital shopping; algorithmic consumption**). Since it's supposed to rain today, I want to have everything sent to the pick-up station, a sort of cold storage house with a self-service counter. Jacket on, grab the cap, out and – damn! Forgot the umbrella. A pause until the digital lock recognizes that it's me standing at the door, and that I want to come in again. As the door slides open, the interior lighting automatically turns on as well as the ventilation and heating – and my “house wizard” offers up the friendly greeting “Hello Mario, it's nice you're home again.”

On the way to fitness, I notice that the wash machine has reported that it's out of fabric softener, so time to update the shopping list. I arrive at the fitness center on time, check in, and see via the wizard that I've been here the last five days in a row, and that my account has been charged CHF 25. I confirm (**voice authentication**) and tell my wizard to initiate today's fitness program now. At the same time, I receive the response that it had to change the order of the workout program since all the cross trainers are busy at the moment. My mistake, I should have notified the center with my program while I was on the way so that the device could have been reserved (**data accessibility and mobility**). Fine. I've got a cross trainer reserved in 15 minutes. In the meantime,

I'll begin with a few yoga exercises to warm up. Thanks to my “Smart Clothing,” I get an immediate notification that my perspiration concentration is ideal, and that I've also greatly improved my posture. It's cool that, thanks to this feature, I don't have any more back pain. Right on schedule, I finish up at 10:00, and note that I've received 50 sports points that will be credited by my health insurance provider.

I start heading home – it's awesome that my bus stop is right beside the pickup counter (**pickup location**). I could have opted to have my items delivered, but I find the pickup counter great for smaller shopping volumes – and it's more eco-friendly. I easily open my locker via an iris scan – I've wondered where exactly the database that has my biometric data is located (**biometrics-data vault**). In any case, I'm glad to also have had the option to open the locker without an iris scan, and by QR code instead. This freedom of choice instills in me a great deal of trust (**choice of means of authentication**). I also think it's great that, thanks to a cockpit app, I can also monitor who is allowed to access my data and accounts (**control cockpit**). Of course, I still have the option of doing everything myself. My wizard beeps to notify me that my goods and I have left the locker, and that my bank account has been debited CHF 14.75. By the way, I've mentioned my wizard several times already. It has a name, Q, because James Bond is my favorite movie character. The wizard reminds me of his tech-nerd-genius Q.

I'm back home. It's 12:10, and in seven minutes my little ones will be back from kindergarten, and the pizza will thankfully be hot out of the oven. Or maybe not? What's that smell in the kitchen? Oh no! The pizza's burnt, and I can't offer my little ones these charcoaled disks. OK, quickly over to plan B. It's really quite amazing how seemingly everything around me reacts to my actions – or incompetence. A coupon arrives on my smartphone from the Italian place around the corner: “Today: half-price off all pasta dishes.” You'd think my digital profile knows that I'm a washout in the kitchen (**data accessibility and mobility**). Right, quickly order three servings and have them delivered. My wizard chimes in again – it recommends that I don't eat pasta today, but an Insalata Mista instead so that I can adhere to my meal plan (**instant personalized information**). Fortunately, the delivery comes quick and my hungry kids get something to eat. After my kids return to kindergarten for the afternoon classes, I do some more yoga in order to re-gain my inner balance – with that done, I earn another 10 points from the health insurance provider. Compared to my peer group, I'm doing a little better than average – Yay!

It's time to order a new pair of jeans again. I go online, and arrange to have my perfectly fitting custom-tailored jeans delivered – a luxury that I allow myself. Taking my measurements is really easy with my digital wiz-

In-Person Emotional Experiences ←



→ Human-Centric Description of This Future Scenario

ard, which recognizes my size immediately and forwards it to the supplier (**digital shopping; artificial intelligence**). I can also attract the opinion of what are known as “Fitting Models,” which provide me with a bit more information – like narrower cuts, higher insteps for shoes, etc. I even recently read a story from these fitting models – really quite interesting, that garment wearing and testing is a job. And this is also done: my old jeans, that I wanted to get rid of, were picked up when the new pair was delivered and recycled – the topic of sustainability is omnipresent in our household, and the fact was recorded in my sustainability score (**sustainable consumption**). Of course, these clever algorithms are a huge advantage to suppliers – previously, I would have ordered several pairs of pants, and then returned over half of them. With the new system, I hardly ever need to return something – much to the delight of the supplier, and the environment.

In the afternoon, I decide to do some quick shopping. I have the afternoon off. The children will go straight from kindergarten to Nonna & Nonno to play, and my wife will pick them up. I treat myself to that once or twice a month, and not just for shopping. I also go to physical locations regularly – to do fitness, or go swimming, or get out to watch a baseball game, featuring the Zurich Challengers of course, or just to go out to a restaurant. That’s because with all the digital services available, I sometimes miss going to a physical store, actually touching products, smelling fruits, and interacting with people face to face (**in-person emotional experiences**). Since social distancing took effect during the COVID 19, people have become aware of how important having human contact is. You appreciate something only once it’s gone. These digital tools can’t generate this kind of feeling. But that’s not so easy anymore since many traditional shopping malls have disappeared. The whole online shopping thing has definitely left its mark. Many jobs like cashiers and stocking clerks have disappeared – now the employees have more time once again to attend to customers. Service has really become excellent.

I order an electro car to pick me up, and have it drive me to the shopping center. As soon as I get in, my favorite music begins to stream, and the display shows the latest news (**instant personalized information**). I’m reminded that I’m due again for an eye test. I do this during the ride and get the result right away – oh man, a little bit worse again, so I tell my wizard to set up an appointment with

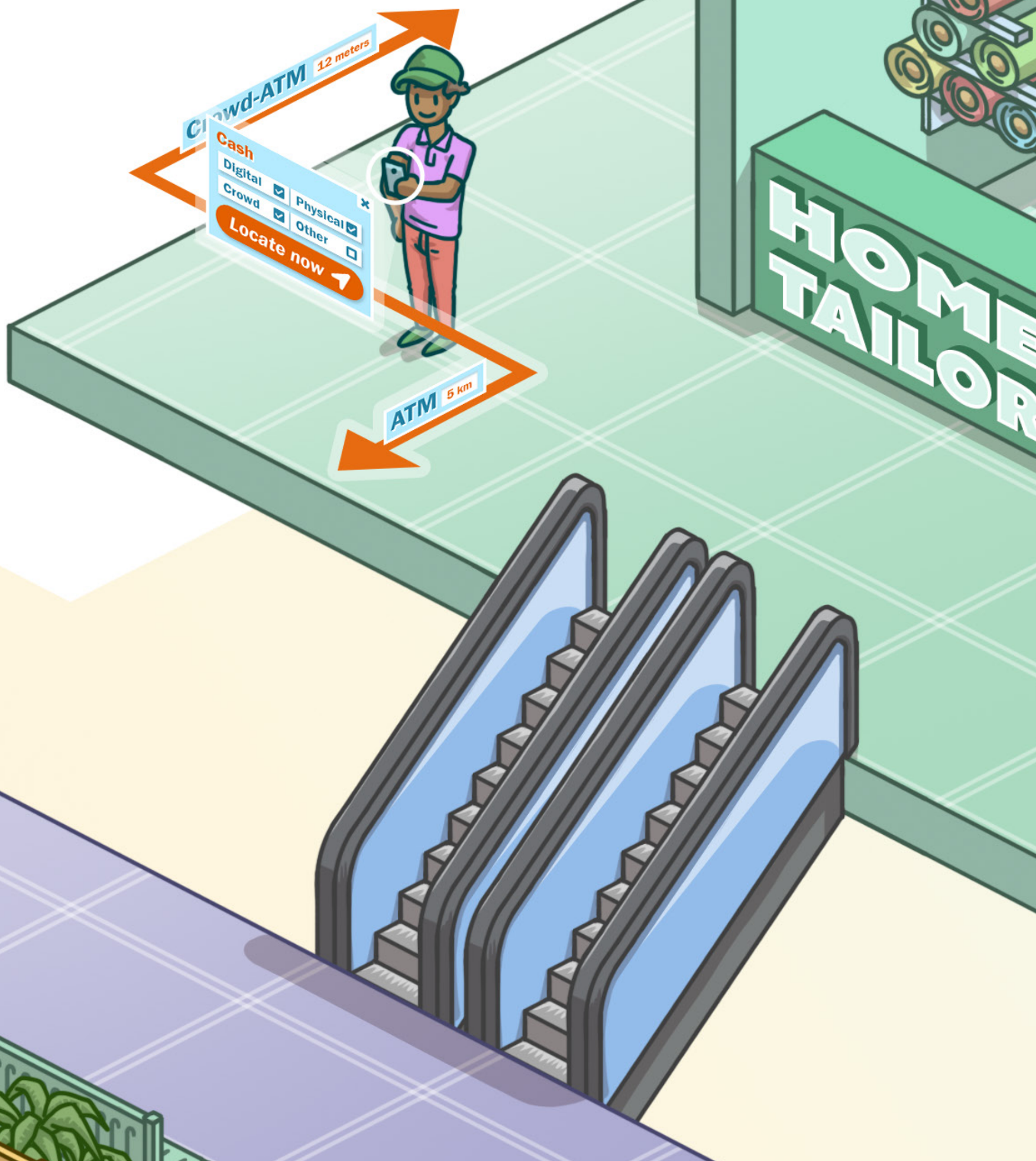
the optometrist and also order more lens fluid, so that I can pick it up while I’m there (**seamless personalized digital journeys**). Cool! I managed to save again, as I paid for it with my points. The ride is over in a flash when you have time to devote to things other than driving the car yourself. (**digital shopping; in-car commerce**).

Upon arriving at the shopping center, I turn my wizard off for the time being, as while I’m there I want to consciously experience the environment, and not be led by my wizard (**in-person emotional experiences; shoppingtainment**). It’s pretty cool how I can adjust the wizard depending on my needs or mood, and how these new center concepts work like a kind of “analog marketplace.” This is how it must have felt in a Turkish bazaar in Istanbul in the early 2000s. It is completely different each time. Most merchants and shops stay for only a couple of weeks and then move to the next city – like circuses travelling Europe. I love it. Each time is as exciting as the first time, so many things to discover, so many new smells (**pop-up economy**). The beauty is that if I’m in a hurry, I can still self-checkout in all these independent stores with the same app (**cross-merchant self-service checkout**). I can smell that a new coffee pop-up store is grinding beans, and notice how harmoniously the scent hangs in the air.

As I’m following my nose, there’s a vibration in my pocket. I’m walking by a major coffee house franchise, and as a Gold customer I get the recommendation to buy a Chai latte. The wizard had permitted the notification as it had no way of knowing that I was following the delicious coffee aroma. And normally, I would click on “OK,” go into the store find the coffee waiting for me on the counter. But today I’m deciding on trying a coffee at this small pop-up store – partly because the major coffee shop chain next door has just introduced a new robotic server, and I’m not at all in the mood for that today (**digital inside**).

As I arrive at the store, I can hear the owner speaking Italian, and ask Q what he’s saying. That’s the problem with these new technologies – you’re less inclined to learn new things, because most things are available at the click of a button. Whether it’s in a store, restaurant, or wherever, I’m constantly integrated in the digital world, and can very easily get the service I need wherever I am (**seamless personalized digital journeys**). My wizard knows me very well already. While I’m enjoying the aroma of my coffee, it whispers in my ear that the farmer who harvested the beans is named José. He’s

→ Cash



→ Human-Centric Description of This Future Scenario

married to Gloria, and they have five kids (**instant personalized information**). How fascinating! It now makes José's coffee taste twice as good. While sipping my coffee, I quickly give José and his family a micro-loan to help them grow their business – if others discover their coffee as well, there may not be enough supply around for all of us (**democratized external financing**)!

And what do I see? Felix walks by, a friend from my school days. I call out to him and invite him for a coffee. He's glad to accept – but he seems a bit stressed. I ask what's going on, and he explains that he has "ordered" CHF 50 from a Thomas L. from B. via his ATM app, and that they agreed to meet here on the ground floor. We're drinking coffee when suddenly his phone beeps and indicates that Thomas is two meters to the left of him (**crowd-augmented cash infrastructure**). Felix picks up the money and has to be on his way. I seriously have to ask myself what he needed cash for. But he was an oddball even back then at school. When I leave the pop-up store, I tap my smartwatch on the terminal to pay – I practically never use cash anymore, except for tipping in exceptional circumstances (**payment goes digital**). But I know that my parents often use notes and coins to pay. It gives them a sense of security and trust that they don't (yet) have in new technologies (**cash survives**). Perhaps that will change.

Before moving on, I quickly add three boxes of José's coffee to my (cross-merchant) self-checkout app by taking a picture of it. I instantly get a message that our apartment's water quality and coffee machine are a perfect match for those coffee beans (**instant personalized information**). But I don't yet click the purchase button. I first want to check with my wife at home. The Italian coffee shop partners with several home-delivery services, so if we decide to buy the coffee before 7 pm, it will be on our doorstep before we wake up tomorrow (**store now, buy later**). I ask to pay, authorize the transfer on my smartphone, instantly get a notification that the receipt has been stored (**digital receipt**), and that my coffee consumption for the day is one above average. I tell my Wizard that I invited a friend and only drank one of the two coffees while walking out.

My wizard reminds me again about the necklace for the anniversary gift. I pop into the jewelry store to look at a pearl necklace. The friendly saleslady shows me three different necklaces that I had pre-selected. Thanks to

an avatar of my wife, I can virtually look at her to see which one suits her best. My wizard quickly checks the supplier origin and provenance of the necklace (I don't want a necklace that might have been stolen) and the price of the necklace so that I can be sure I haven't bought any "junk." It also checks the reviews of my favorite influencers and whether I can afford it (**instant personalized information**). It's pretty cool that I can rely on this objective decision-helper. By now, it knows me so well that more than 90% of the time its decisions are right for me. I decide on the necklace made of liquid silver 925 with freshwater pearls, and make the purchase at the till on a partial payment – that is, CHF 200 is debited immediately from my bank account, and the remaining CHF 1,310 to be paid in 12 monthly installments. It's a service that the merchant can have activated, and is executed by a third-party provider (**data accessibility and mobility; interoperability**).

The merchant receives their money right away via transfer, and has no additional risk. My wizard forecasted this as the best financing option, compared against my budget planning. Q asks me if I want to take the necklace home myself, or if I'd rather have it delivered. I decide to leave the necklace at the store and have it delivered. After leaving the store I get a prompt to rate the saleslady – naturally, I gave her a five-star rating. At the same time, I receive the option to increase my home contents insurance, so that the necklace would be suitably covered. And very importantly, this purchase is posted as an anonymous entry in our family bookkeeping – that would be something if my wife were to see the purchase.

I repeatedly find myself really enjoying being able to handle and test the goods in the shopping center (**in-person emotional experiences**). After some wandering around, my wizard lets me know that I've now reached 10,000 steps. Since I'm rather proud of it, I post this and my accumulated sustainability points to my social network to get a little "recognition," and to show that the environment is important to me. In my wizard's Inbox, I find even greater recognition that has come in from my health insurance provider. As a thank you from them for keeping myself so fit, I receive the opportunity to have a personalized kinesiological analysis done, along with a coupon for 30% off the purchase of new running shoes. Q informs me that I could do the gait analysis today, and still get back home in time for when



→ Human-Centric Description of This Future Scenario

my kids return. I ask Q where the nearest shoe store is, and presto – he leads me there. The store recognizes me as I enter, and puts up images of custom-designed shoes on a display (**instant personalized information**). There, I can have the gait analysis done, and then test out some shoes. The testing involves racing against my virtual self on a course dedicated for that purpose (**digital inside; virtual reality**). It uses RFID to handle the stopwatch duties, and I have the opportunity to judge my performance against previous run times, and also against the pros. I'm delighted, and totally pumped up I buy the shoes. Q informs me that I can get a CHF 5 coupon if I rate the gait analysis on social media (**pay with a social-media post**). I get another coupon if I give the business the right to use my gait analysis data in order to support their product development (**pay with your data**). It's anonymized, of course. I can take the shoes with me, and on the way out the amount due is immediately debited (**seamless checkout**). I'm glad that I didn't have to wait in the long lineup at the till.

As I'm walking out of the shopping center, I notice the new Chevrolet showroom. It's still my favorite automotive manufacturer – with a hint of Swissness. Louis Chevrolet, the founder and namesake of the carmaker, was born in Switzerland – in La Chaux-de-Fonds to be precise.

The sounds of motors have drawn me in. But once inside, I notice there aren't any physical cars on display. Instead, I can take a virtual look at Chevy's latest lineup, and be inspired (**digital inside; mixed reality**).

I arrive home in time for my kids' arrival. As I'm opening the door, I hear a buzzing, and realize that a drone has landed in my front yard, with the pearl necklace inside. The drone had calculated its route in such a way that it would arrive at the same time I did – this new "Delivery wherever you are" service is super cool! The evening proceeds somewhat more eventfully than planned. We wanted to have a family movie and popcorn evening, streaming a classic from the 2020s – Top Gun II. But one of the health sensors on my youngest reported that his cough could be due to the COVID-29 virus. The online diagnostic, however, confirmed that it was just a normal cough, with no danger. After this happy news it's time for bed, as I'm looking forward to doing something for my sleep score. But before that a quick glance at my wizard to see everything I did today, and what I spent. This cockpit is fantastic! It provides me with an overview of which apps and services have access to my finances, which services I have released my data to, which data sources my wizard uses (**control cockpit**). "What would I do without Q?" I often think to myself. Yawn. Good night.





A Brief History of Mobile-Payment Innovation in Switzerland:

“Introducing Mobile Payment in Switzerland, or: Innovating Where the End Customer Has No Pain Point”

When customers don't feel that they have a problem, bringing new products to market becomes much more challenging – and interesting. So, how do we innovate when there is no real pain point?

This was exactly the situation we were facing when SIX identified in 2013 that mobile payment at the point of sale was strategically important. This is the less-known story of a well-known Swiss product: The corporate venture that SIX set up in collaboration with many Swiss banks would become known as Paymit (and would later merge with PostFinance's mobile-payment solution Twint).

*Imagine you're still in the pre-mobile-payment world. **Nobody back then thought they had a problem to digitally pay at a point of sale equipped with a digital-payment terminal.** Digital payment was easy: Take out your credit card, enter your pin, done. You could do so in virtually every shop, in virtually every corner around the world. **So instead of focusing on the point of sale, we focused on getting customers to use the app by helping them solve other payment problems for them.** We assumed that people who frequently use our app would also be more likely to use it for payment at the point of sale.*

*Our research identified several problems that people faced around digital payments. The most famous, and arguably successful, was helping people digitally pay/reimburse their friends – before this **P2P digital payment**, the choices were cash or bank transfer, both not very practical. P2P transfers especially gained wide adoption in restaurants: One person pays the bill while the others already reimburse that person via the app. Another popular problem we tried to solve was **enabling digital payments where setting up a digital-payment terminal is too expensive.** Instead of paying in cash, customers would be able to digitally pay by entering the seller's ID into the app (or by taking a picture of the seller's QR-code).*

I believe that there are many more interesting problems that this app could solve for people. The app could allow people to take out cash from merchants, it could allow merchants to generate a digital receipt and then store it inside the app, or it could automatically apply available

loyalty points. I also believe that there is an opportunity to make the app even more emotionally sticky: P2P could be augmented by allowing people to send an emotion (e.g., in the form of a pictogram) or a gift (e.g., a thank-you coupon for a beer at some local merchant) alongside abstract digital money. We proposed such a solution at the SIX/F10 Hackathon in 2016, called it “Paymotion,” and won.

Side note: Choice of technology is driven by customer needs and strongly influenced by existing infrastructure. While at Paymit, I was responsible for identifying the technology for the communication between the smartphone and the payment terminals in brick-and-mortar shops. As mentioned above, paying at point of sales equipped with a digital-payment terminal was not the primary focus of Paymit – but the app needed to exhibit this functionality. Different technologies had been adopted in different countries around the world: Bluetooth, QR-code scanning with the camera, scanning of barcode displayed on smartphone screen, and Near Field Communication (NFC). The best solution was, however, not available: Apple did not give third parties access to its iPhone's NFC functionality. We thus had to find an alternative technology, which would work with all mobile phones.

My research uncovered that people did not feel in control with the Bluetooth approach and that Bluetooth functionality would not be practical because it needed to be built into (or added to) the hardware of payment terminals. It uncovered that scanning barcodes on smartphone screens would not be practical because it would demand integration into the software of all the different cash registers. My research finally indicated that the best approach would be QR-code scanning: Sure, it would lead to slower adoption and usage at the point of sale since payment cards would be faster. But users would feel in control, and it would work with every mobile phone. And, only minor adjustments in the terminal software would be necessary to display QR codes on payment terminals' screens.

Thomas Eppler

Lead Innovation Research, SIX (ex-CTO Paymit)

SIX is a B2B business. To innovate, to co-create, and to be perceived as a partner, SIX must thoroughly understand the future challenges and opportunities of the B2B. This necessitates a good understanding of the B2B's own competition and clients.
In short, **SIX must put on its clients' shoes as well as their clients' shoes.**

What Business Opportunities Might Arise for Retail Banks in Brick-and-Mortar Commerce?

How Might They Solve Relevant Problems?

B2B or B2C. Existing problems. Possible future problems.
Not limited to traditional retail-banking products and services.

How Might They Reduce Costs?

Economies of scale/scope. Standardization. Outsourcing.
Microservices-based IT stack. Automation. Business model innovation.

How Might They Build Leverageable Capabilities?

Generate unique data.ⁱ Strengthen and/or expand customer interfaces.ⁱⁱ
Create network effects. Build platforms. Develop interconnectivity and interoperability.
Heighten brand equity and awareness.ⁱⁱⁱ Digital/tech skills. Etc.

→ Try to Leverage Existing Capabilities

- **Local anchoring and history**
- **Try to leverage existing capabilities**
- **Local anchoring and history**
- **Physical presence (branches, cash infra.)**
- **Swiss neutrality, stability, jurisdiction**
- **Reputation of reliability**
- **Reputation of security & privacy**
- **Reputation of discretion**
- Mobile customer interface (e.g., app)
- Personal human connection/relationships
- Understanding of clients' preferences
- Network of smart money
- Highly-vetted employees
- Reputation of attracting top talent^{iv}
- Aspirational brand (e.g., exclusivity)

→ Be Alert to the Changes in the Competitive Landscape

- **Providers of retail-banking services face increased competition.**
- **Providers of retail-banking services risk losing their customer interface(s).**
- **Providers of retail-banking services face increased unbundling.**

→ Be Aware of Key Possible Future Developments

- **Digital solutions expand, but brick-and-mortar survives**
- **Indoors, it's all about emotional experiences**
- **Digital outside, Digital inside**
- **Instant, yet personalized information**
- **Seamless, yet personalized digital journeys**
- **Payment goes digital and online**
- **Sustainable consumption is a niche market**

Bold denotes strongest capabilities of incumbent retail banks in status quo.

ⁱ Data may enable differentiation through better tailoring of digital services, better personalization of advisory services, or better investment strategies. Data may be sold to third parties (anonymized).

ⁱⁱ Customer interfaces may improve brand equity/awareness. Customer interfaces may be expanded into a platform.

ⁱⁱⁱ The brand is not only relevant for selling products and services, but also for attracting employees. War for talent.

^{iv} It used to be the case. But banking is changing. How banking is delivered and consumed, which skills are relevant, what is value to people, are all changing. The necessary talent is being wooed by every industry around the planet.

Possible Business Opportunities: Experiential

Brick-and-mortar places will survive because, sometimes, nothing beats the real thing. **Brick-and-mortar will most notably survive where it offers emotional experiences that can only be fully enjoyed in-person.**

Although talks of the upcoming “experience economy” have been around for almost three decades, brick-and-mortar places’ transformation is still ongoing. Just consider the recent development known as “pop-up stores.” Many more innovations are likely ahead.

Brick-and-mortar places are likely to experience serious pains (underserved need) in the status quo. Things haven’t yet evolved from the old steady state to the new steady state. Experimentation is still ongoing. The ecosphere supporting brick-and-mortar owners is therefore likely still in flux, and value propositions thus not yet optimal. **The space around helping brick-and-mortar owners provide experiences that can only be fully enjoyed in-person is thus likely to exhibit promising business opportunities.**

Platformization of Brick-and-Mortar Places

Temporary offerings *help brick-and-mortar places provide customers with the unexpected, novel, exclusive, Instagramable in-person experiences that they crave.* Think of a foreign chef who takes over a restaurant’s kitchen for a month (perhaps while the regular staff is on vacation). Think of a specialty coffee shop travelling from city to city, where they set up camp for only one or two months. Think of a mattress company setting up shop in an art gallery for an exclusive, one-time-only sleepover party surrounded by paintings and sculptures from renaissance masters.

There may be an opportunity for a neutral, trusted player to **operate a pop-up B2B marketplace** that connects owners of brick-and-mortar places with pop-up-experience providers, helping owners curate their spaces by facilitating matchmaking, rating participants, and taking care of contractual hassles.

Conflation of Online and Brick-and-Mortar Places

Our most likely scenario holds that, for consumers, there will be no pure offline anymore. Consumers will seamlessly and repeatedly oscillate between various online/digital services and brick-and-mortar places. Switching costs will be virtually zero because their data will travel with them.

Unsurprisingly, many business opportunities thus apply to both online/digital and brick-and-mortar places. But **there are business opportunities that are specific to brick-and-mortar places.**

Light blue boxes highlight the business opportunities that only apply to brick-and-mortar.

Business Rationale

For almost 20 years, brick-and-mortar places have been regarded as dying dinosaurs rapidly approaching the end of their useful life. At the same time, however, global e-commerce leaders have been opening physical locations en masse, while physical bookstores have been thriving. **Whether the number of brick-and-mortar places will decline is, in our view, a coin toss.** Some brick-and-mortar commercial places will thrive, some will barely survive, some will find new purposes (in ways we can’t imagine today), and some will disappear. Furthermore, **online sales will reach 40% (15% in groceries) by 2030.**

It is hence **worthwhile considering what future business opportunities this scope may hold** for the financial sector.

Sustainability rationale

Our alternative scenario focuses on one specific angle of sustainable development: **sustainable consumption.** But there are others. **Sustainable investment** comes perhaps first to mind. Or **cash** with its promise of freedom of choice (means of payment), of fairness (financial inclusiveness), and anonymity of consumption.

Supporting the future existence and diversity of brick-and-mortar places is also an endeavor in sustainability. We are social animals and need places where we can interact in-person with other members of our species. And for societies to work, its members must know “the other” – how else would they empathize with each other, be willing to support each other, and protect each other? The necessary random encounters and exposures are strongly facilitated by brick-and-mortar places.

The marketplace **could then be extended (ecosystem orchestration) to solve further adjacent problems of brick-and-mortar owners**: adding another side to the platform by providing an interface for customers to consult upcoming pop-up experiences (**customer interface**), and/or by interfacing with third-party digital apps, such as TripAdvisor, to advertise upcoming events (**API strategy**); offering (equity, debt) **external-financing solutions** to brick-and-mortar places in order to co-finance the pop-up investment in exchange for part of the upside; offering **insurances solutions**; providing **business intelligence** on already-planned pop-up experiences in their store's proximity.

Such a marketplace **could also help owners unlock the value of their underutilized brick-and-mortar places**. Think of a bookstore that gives way to a yoga studio after the sun sets, of a pharmacy that is also a pick-up place, or of a parking lot that is also a drive-in movie theater at night.

These third-party experience providers may take over entire brick-and-mortar places or, more commonly, occupy a space alongside other service providers. There may thus be an opportunity to **help a brick-and-mortar owner offer customers a seamless, unified experience at any given point in time and across time**. Most notably, by offering customers a seamless checkout across the various independent merchants and by ensuring that they do not have to install a new app every time a new store pops up – see “**cross-merchant self-service checkout**” later.

These services also **amount to a new digital customer interface** and **strengthens banks' brand equity and awareness**.

Democratizing External Financing

There may be an opportunity to **help brick-and-mortar places access external capital more easily and cheaply**. Platformization and growth require capital and are risky. Owners may have *insufficient capital* and/or may want to *share the risk* (in exchange for part of the upside). Or owners may want to turn their customers into *ambassadors* by giving them a financial stake in the business. Or they may want to *further enhance customers' unique brick-and-mortar experience* by them having

a financial stake: When we own something, we may experience it more strongly.

Digital ordering, digital receipts (of sales and purchases), digital contracts (external financing, insurance, employment) digital bills (real estate, vehicles) and real-time monitoring of money flows on bank accounts **could allow investors to rapidly and cheaply monitor business activity and detect fraud** (and other behaviors violating the financing contracts). Random audits could supplement the digital monitoring.

Automated Loyalty Membership

On-boarding to loyalty programs is inconvenient and takes time. Also, customers may be reluctant to join for fear of sharing too much data.

Digital-payment providers may **help merchants set up a loyalty program and eliminate on-boarding friction**. Customers could join the merchant's loyalty program at their first visit with just one click. Or they could pre-define that any loyalty program should automatically be joined.

The digital-payment provider may also act **as privacy-preserving intermediary**: The merchant may never know who the customer really is; and the merchant may not even be able to trace a customer's consumption despite rewarding the customer with loyalty points. Membership in a loyalty program would thus no longer mean that merchants can collect our consumption data and predict whether we have just had a bad break-up or are expecting a child.

“New Technologies and Digitalization of Social Lives Will Increase the Effectiveness of Loyalty Programs for Brick-and-Mortar Merchants”

Loyalty can be used to sway people's consumption – it sways them to certain features, payment methods, different kinds of products, or to certain merchants. Imagine there is a seasonal over-production of potatoes. When analysts say that with the usual consumption of potatoes, 30% of the production will go bad within the coming two months, the purchase of potatoes over other carb sources could be rewarded, thus reducing food-waste. This scheme might even be strengthened by making customers aware of the overproduction and the reasons for the rewards. We can think of local and confined trade associations that want to promote local consumption. The Corona-Crisis of 2020 has started the #supportyourlocal movements in many areas. People could not travel far for several weeks or even months, and went back to local stores as soon as possible, instead of commuting to the cities. Well-crafted loyalty programs on small scales could further strengthen these re-found relationships with a [insert name of your town] card that collects points at your barber shop that you can then spend at the bookstore around the corner.

Smartphones and further connected devices carried by customers will drastically increase the effectiveness of loyalty programs in swaying people's consumption by using proximity services to send tailored messages when a customer is near his favorite store and the system knows that his favorite clothing style is on offer. Ubiquitous connectivity can even enable more efficient production methods when usage and consumption patterns of a number of people are known and the data is generated, anonymized, and transmitted End-to-End between producer and retailer.

Advances in AI and data mobility will drastically increase the effectiveness of loyalty programs. The system could know that you are not willing to spend more than a certain amount, let's say 100 CHF. This could either avoid posting offerings above that threshold, or the system could calculate within a certain span if the merchant could be able to offer you a sought for item for just slightly below

100 CHF. The algorithms need to be more intelligent anyways. It will not make sense to promote a new watch of a certain kind if you have just bought a similar watch that has been recognized in the database. Also, special offers can be combined with the usage behavior of the customer. Intelligent systems could recognize the amount of pasta that is used for one month due to the amount that has been bought within the previous six months. The re-buying of pasta could be promoted by posting local offerings and informing shoppers about the duration of the offerings.

Digitalization of social lives will drastically increase the effectiveness of loyalty programs. In times where “Influencer” is becoming a real job, being able to broadcast that we have just graduated from “Novice” to “Environment ambassador” is likely to increase our social status.

Stefan Quermann
Managing Principal, CAPCO



Possible Business Opportunities: Instant Personalized Information

Everybody has situations where they highly value access to some information in order to help them make decisions, to make the best use of their scarcest resources (money and time). **But different people value access to different pieces of information.** Some may want to remember what they or their spouse thought of similar movies. Some highly value knowing what a popular influencer wrote about a new shirt. Some want to know what a knowledgeable friend said about a book. Others highly value seeing how a dish impacts their own health. And still others highly value knowing how this dish affects their environmental footprint. At the same time, **everybody values frictionless access to this information.** People highly value convenience and instantaneity, both of which suffer when there is friction in accessing the information.

Virtually everyone (large market) faces instances where accessing all the relevant information is a serious pain (underserved need) in the status quo. Everyone faces situations when they really value accessing a certain piece of information, but where collecting the data themselves is very costly (takes a lot of time). Think of the last time you had to leave the streaming service because you wanted to look up movie reviews in several newspapers or from a specific influencer. Think of the last time you couldn't remember the dimensions or color of a piece of furniture standing back at home in your living room. **The space around providing instant access to all information that is important to people is thus likely to exhibit promising business opportunities.** We must identify what group of consumers highly values ready access to what information in what circumstances. And then identify the circumstances in which access is a serious pain point in the status quo.

Closeness to financial institutions

Supporting people in their endeavor to make informed consumption decisions is closer to the DNA of incumbent financial institutions than it may seem at first sight. First, financial institutions have been supporting people in their consumption for centuries by providing personal loans, insurances, and payment solutions. Second, they have also helped investors make better investment decisions by offering data, intelligence, and advisory services. And third, **they are used to handling confidential, highly sensitive, and personal data** – including sending that data between legal entities (think of payment and billing data that may travel around the world).

First Steps for Financial Players

Ensure market deployment of real-time personalized-information display solutions that can automatically detect a product or service and can then display relevant personalized information. Consumers will want to see personalized information next to products on smartphone screens, in augmented-reality displays,

and on in-store displays; and they will want to hear it from their earphones and from in-store speakers.

- It may be a *separate application* that takes pictures/screenshots of products or of their bar codes in order to identify them. A more sophisticated version is a 'transparent AI-augmented filter' that automatically analyzes whatever is displayed on a display (see page 30 for more details).
- It may be an *embedded in a self-scanning and self-check-out app* for brick-and-mortar operators (see also the business opportunity 'Cross-merchant self-service checkout').
- And/or it may be *embedded in an online digital store* (incl. e-commerce platforms).

Connect bank-account data to display a personalized affordability assessment next to products and services, or to display personalized financing options.

Connect product-level payment data to display whether you already own a product, whether the product is interoperable with what you already own, whether you ordered the same dish last time in this restaurant, or whether the cupcake could be one too many for your cholesterol this week.

Connect loyalty-points data to display the rewards you have earned next to products, services, and merchants (brick-and-mortar, online shops).

Connect sustainability data to display personalized sustainability-impact information next to products and services. Financial institutions already carry the necessary data: Their wealth-management and asset-management units provide such sustainability data to investors.

Ensuring market deployment will allow **the building of the infrastructure backend in parallel** (e.g., connectivity platform, vault).

Personal-Data Connectivity Platform

Fast movers have a good shot at operating a core element of the future data-mobility infrastructure in the consumption space. The platform would provide a standardized **personal-data API** for third parties

to query all our personal data that sits across a wide range of digital services. The platform would log into these various digital services to access our data. It would consolidate the various data sources into a single data model and API. Importantly, the data would not be centrally stored – it would remain with the various service providers (**decentralized data storage**).

When the query includes a unique user ID, the platform **returns information about the product from the customer's personal data**. When a customer looks at say a movie in an app, the app provider can query the platform to learn whether the customer, a friend, or an influencer they follow has said something about the movie, or similar movies, in any streaming service, private chat, social-media post, etc. **Service providers can then directly display this information or use it to learn what they should display**. They may directly display a comment from a private chat. Or they may learn that they should display the public comment from some influencer.

Indirect monetization potential. It may allow retail banks to level the playing field with global tech companies on client data/understanding, thus improving their credit assessments, their product recommendations, and advisory services more generally.

*Open output interfaces may not immediately be available for all digital services. The platform may therefore need to use **screen scraping** to source the data until open APIs are available.*

*There can be **multiple connectivity platforms** behind the single personal-data API. Different specialized platforms are likely to dominate different types of personal data, from finance, to health, social media, e-commerce, film and music, video gaming, news, and cloud storage. Different platforms may even become dominant in different countries because of the sensitivity of the data.*

Service providers can be prevented from ever seeing the query or any personal data that is returned. Applications on smartphones may open an end-to-end encrypted connection directly to the data source, preventing the app provider and connectivity-platform provider from seeing any of the exchanged data. **Raw data, even in encrypted form, may never be exchanged.** The data sources may only send the results of the data query.

Information-Personalization Vault

People's views and preferences may be inferred from their digital activity and traces. But probably not all. People may explicitly need to specify that reducing cholesterol is their top priority, that they absolutely trust the opinion of some journalist or influencer, or that they want to set some money aside to build a house in a couple of years. If they are activist consumers, they may need to specify what goal(s) they want to support with their consumption, from improving (gender and racial) equality to environment. Consumers will likely prefer not to have to specify/share these points in every other app, and they will want a given product to display the same personalized information across apps and websites. There may be an opportunity for a neutral, trusted player to **operate a service that allows people to deliberately define their views and preferences**.

The service amounts to a **secure data vault (data custody)**. People can share a post or an article with their data vault (like they would we share it with a friend). Whenever they click 'like' for an article, whenever they publish a post, whenever they write a review for a book, it could automatically be shared with their data vault. They can also add personal notes, voice recordings, and documents directly to their data vault. Most notably, they can add their medical record, blood results, DNA characteristics, or purchase details (incl. specifications, color, etc.).

Like the connectivity platform, when the data vault is queried, it **returns information about the product from the customer's personal data**. Such a vault also gives people more control over what data service providers can query.

The service **amounts to a new digital customer interface and strengthens banks' brand equity and awareness**. Whenever the service is queried, the brand may be displayed next to the information.

Possible Business Opportunities: Seamless Personalized Journeys

Everybody highly values being free to decide for themselves what happens next, what step to take next. We all value our freedom to choose. It tells us that we are our own masters. And it ensures that we can choose what suits us best. **But different people prefer different paths.** Some may want to see the reviews on TripAdvisor, but then book through on the restaurant's own website. Some may then want to know what bus to take, some may want to order a ride, others may want to know how the traffic is, and still others may want to know when they have to leave if travelling on foot and whether it will rain. And clearly, not everyone wants to order the same menu item at a restaurant. At the same time, everybody values frictionless journeys. People highly value convenience and instantaneity, both of which suffer when there is friction between the steps they take.

Virtually everyone (large market) faces instances where they must overcome serious hurdles (underserved need) to travel their preferred journey in the status quo. We may need to re-enter the same data as they move to another app. We may need to wait at the checkout. Or we may not be able to pay with our favorite means of payment. **The space around reducing frictions in people's preferred journeys is thus likely to exhibit promising business opportunities.** We must identify which (parts of) journeys are a serious pain point for what customer groups in the status quo.

Closeness to financial institutions

Reducing the frictions that stand in the way of consumption is closer to the DNA of incumbent financial institutions than it may seem at first sight. First, financial institutions have always been reducing frictions hindering people's consumption. They transported people's gold coins between cities in the middle ages. And more recently, they have empowered people to go about their consumption without having to carry gold and banknotes in their pockets. In the process, **they have built the rails for people's highly sensitive (payment and authentication) data to securely travel with them to anywhere they want.**

Diversity of Mediums of Payments

Younger generations are spending an increasing amount of time in virtual online games. They are likely to handle in-game virtual currencies at a much younger age than they will get a digital bank account. **Some people in younger generations are likely to want to pay with their in-game virtual currencies outside and across virtual games.** Perhaps because it is their natural unit of account, because it is where they have their wealth, or simply because it has become a habit.

A small niche of consumers distrusts governments, central banks, and the money they issue. **A small niche of**

consumers is likely to refuse to use government-issued mediums of payment. Instead, they will want to pay with virtual currencies issued by a non-governmental entity (e.g., a tech giant, a mobile carrier, a video game producer, seller), with commodities (e.g., digital rights to gold), or with cryptocurrencies (decentrally-issued natively-digital currencies). **Offering such services could hedge against the low-medium probability of non-government-issued currencies becoming dominant.**

A survey found that 50% of people would be willing to share their data (and accept lower privacy) in exchange for free or discounted products, see WEF, Oliver Wyman, 2018, The Appropriate Use of Customer Data in Financial Services, White Paper (September 2018), page 10. They have been paying with their data at some services. **A niche of consumers is likely to want to pay with their data,** more specifically, to pay with 'usage rights to their data'. Merchants may, for example, be interested in learning about the digital journey that customers took, what other merchants and products they considered, and what types of products/brands they tend to buy. Allowing people to pay with their data **could also create the necessary demand in order to build the data-mobility infrastructure backend (personalized-data connectivity platform).**

Many people are anyways constantly posting and tweeting about their day, from pictures of the food they are about to it, to reviews of places they have visited. Just like influencers, anyone could get rewards (e.g., loyalty points, discounts, exclusive access) by sharing about a brand on the public Internet or in private chats – **'Pay with a Tweet'.**

People may prefer to pay later, perhaps spread across several installments. But today, this oftentimes involves receiving a bill in paper format or as an electronic file, and then having to remember and manually trigger the payments. There may be an opportunity to **digitize billing in order to make "shop now, pay later" seamless at the PoS and when payments are due.**

Providing new mediums of payments is unlikely to suffice for incumbent financial institutions to regain the digital payment customer interface. But providing new medi-

ums of payments may **help financial institutions retain existing and gain new clients** for their other services.

It may also **strengthen banks' brand equity and awareness**. Being an early mover offers the promise of establishing forward-thinking thought leadership with which customers and employees want to be associated.

Biometrics-Data Vault

Fast movers may have an opportunity to **help brick-and-mortar places offer biometric authentication to any person, even if that person is a first-time visitor and walks in empty-handed**. You could walk empty-handed into a shop you have never been to, find a product, **pay with your face**, and walk away. Specifically, there may be an opportunity for trusted players to **provide a secure biometric-data vault accessible via a secure network**. Secure connectivity may be achieved by building upon the open Internet (e.g., using path-aware internet communication protocols, quantum encryption). If not, it would require building a proprietary communication network from the ground up (e.g., low-orbit satellites, cables).

The biometrics space offers the prospect of **strengthening banks' brand equity and awareness in terms of 'security' and 'custody.'**

Biometrics include fingerprint scan, retina scan, facial recognition, and various behavioral biometrics such as gait, smartphone typing (BioTyping), voice recognition, and lip motion. BioTyping monitors how the user enters their PIN code in terms of pressure (heavy or light), of the surface they touch (large or small), and of touch motion (how the user moves their fingers). See e.g., Worldline, 2020, Future Payments (January 2020), page 15.

Cross-Merchant Self-Service Checkout

People will want to seamlessly check out at brick-and-mortar places. But customers are unlikely to be willing to install an application on their smartphone for every other brick-and-mortar place. There may be an opportunity for a neutral, trusted player to help brick-and-mortar places by **providing a cross-brick-and-mortar self-scanning and self-checkout application**. In shops, products could be scanned (via the bar code, or object-recognition algorithms), added to the digital shopping cart, and paid for in the app while walking out.

This app **could then be built upon (platform) to solve further adjacent problems of brick-and-mortar consumers**. We could be allowed to leave our purchases at the various brick-and-mortar shops and later have them all delivered to our doorstep in one delivery (**cross-merchant bundled delivery**). A dress we just tried on could be reserved in the digital shopping cart, allowing customers to think the purchase over, and later at home purchase it with just one click from the same brick-and-mortar merchant (**store now, buy later**), with the option of home delivery or pick-up. The app could also extend into pre-purchase. It could provide a digital shopping list (**cross-merchant shopping list**) for grocery stores and supermarkets; for each product on the list, it could automatically select the right brand based on shopping history; it could also automatically allocate items across (brick-and-mortar or not) merchants based on our past consumption, preferences, and merchants' live inventories; it could offer to have (part of) the shopping list prepared for us by an employee or by a third-party shopper (**crowd-sourced shopping**); and it could then let us choose between delivery, pick-up, and picking out ourselves. Inside stores, we could be guided to the products (**indoor navigation**); perhaps set to show the fastest route, preventing crowd formations. We could reserve a time to visit a brick-and-mortar place in order to limit the number of visitors and/or avoid waiting times (**book an appointment**). In restaurants, we could take a photo of the QR code placed on the table, get the menu inside the app, order, and later also pay directly inside the app (**digital menu**). Such QR codes could also be attached to seats in movie theaters or to pumps at gas stations to order (and have it then brought us). In hotels, we could use the app to check in (by building upon "Strong-authentication-as-a-Service"), find our room, and unlock the door (**cross-merchant keys**).

Furthermore, such an app would also **generate product-level consumption data**, which can be built upon to deploy many more new solutions (for more details, see 'electronic receipts' later).

The service **amounts to a new digital customer interface** and could even help retail banks defend their payment interface inside brick-and-mortar.

Amazon, Google, and Facebook will likely not be adopted by brick-and-mortar places for fear of letting a competitor in (all of them are already active in online shopping).



“Revitalizing Brick-and-Mortar Retail With Mobile Self-Checkout”

The conventional brick-and-mortar store journey has not been effectively disrupted in more than a century. A US grocery retailer, Piggly Wiggly, is generally credited with creating the in-store experience that we are still familiar with today in the early 20th century: enter a store, browse products, select what you would like to purchase, then proceed to the checkout area to buy.

But this journey all too often features friction for the shopper at the most vital moment: payment.

In a conventional brick-and-mortar store scenario, the moment a user decides to purchase a product is not the moment they actually buy it. In fact, there is a significant disconnect; the shopper must locate the checkout area (which can be difficult in larger stores) and then, when they reach it, they often have to wait in a line for service. **Each of these points of friction at the checkout reduces the chance of the customer completing their purchase and increases the chance of some or all of their basket being abandoned.** Indeed, according to the Adyen Retail Report 2019, long lines lead to £284bn in initially abandoned sales annually. These in-store frictions are becoming increasingly apparent and troublesome as shoppers are becoming used to online convenience and instantaneity. When purchasing online, shoppers buy with the convenience of just a few clicks and with no waiting in line.

MishiPay’s mobile self-checkout ‘Scan & Go’ solution has been designed to address this issue and revitalize the brick-and-mortar retail store experience. Our technology enables shoppers to use their own mobile phone for their entire shopping journey. They can scan existing barcodes on their chosen products, are able to view additional product and price information, images, applicable promotions and reviews, and then add it to their basket. When they’re ready, they can then pay with the tap of a button using a variety of convenient payment methods. The shopper receives an instant in-app digital receipt (eliminating the inconvenience of printed paper versions), and they’re free to leave the store. The purchase is immediate, and there is no waiting in line for the shopper. The retailer benefits from increased sales, and the shopper benefits from a superior in-store experience that increases the frequency of their return to the store.

This mobile self-checkout can then serve as a new communication channel with shoppers to offer additional product information, purchase suggestions, how-to guides,

product stock/location information and loyalty bonuses. **Turning the shopper’s phone into a “pocket checkout” also helps merchants free up floor space** that would otherwise be devoted to checkouts and the associated equipment and materials. This allows stores to create additional fitting-room space, capacity for stock storage or the creation of new experiential zones. Perhaps more importantly, it **also frees up staff to engage with customers.** A recent Pricewaterhouse Coopers report stated that 59% of consumers feel companies have lost touch with the human element of customer experience. Liberating staff from behind the checkouts enables them to provide more valuable, productive service on the shop floor. What’s more, it **unlocks unlimited transaction-processing capacity for the retailer** by enabling shoppers to pay from any location in the store at the same time, effectively disrupting the linear “one after the other” model devised by Piggly Wiggly over a century ago.

Scan & Go technology offers multiple benefits to retailers, but **perhaps the most valuable benefit is the data insights it generates.** When retailers offer scan-and-go, they can find out not just what their in-store customers purchased, but what they didn’t purchase, and why. They can understand how often their shoppers visited their stores, how long they stayed and their journey while they were there. Just like online, this data can then be interpreted and utilized by the retailer, and used to offer tailored content to the shopper, from discounts and stock information to product recommendations and invitations to relevant brand events. Shoppers within a specified radius of the store can also be re-targeted when the item they scanned but didn’t purchase is reduced in price, or when the size they wanted has come back into stock. **These datapoints have been utilized by brands in their online operations for many years, but their stores are data black holes in comparison.** The low entry cost of setting up a mobile self-checkout puts this technology into the hands of companies of all sizes. Reportedly, some 48% of single-store retailers are interested in sales data analytics capabilities.

Finally, the COVID-19 pandemic has revealed an additional benefit and led to a significant acceleration in the development of, and adoption of, mobile self-checkout solutions. Mobile self-checkout **creates a safer environment for both shoppers and staff** by eliminating the need to queue at a checkout or to touch store hardware.

David Grenham
Marketing Director, MishiPay

Possible Business Opportunities: Control

People will let digital gadgets and solutions into ever more (intimate) aspects of their lives and will buy or consume ever more products online. **People will leave ever more digital traces behind them**, from sensitive personal data, to stored passwords, payment details, and (automatically-renewing) digital subscriptions. The increased interconnectivity and interoperability of digital services will make this situation worse. **People will give ever more service providers access to their data**. The immediate prospects of convenience and instantaneity will drive people to continue doing so carelessly.

A survey found that 84% of people feel that they do not have sufficient control over the way organizations use their data, see WEF, Oliver Wyman, 2018, The Appropriate Use of Customer Data in Financial Services, White Paper (September 2018), page 10. **A substantial number of consumers (large market) will likely feel overwhelmed and powerless (under-served need) by their digital exposure** in the status quo. We may no longer remember where we stored the same password, what digital services have access to which data, and what data processing we have consented to. We may no longer remember all our active subscriptions and/or their cancellation conditions.

Closeness to financial institutions

Helping people manage risks and protect what is most valuable to them has always been core to the DNA of incumbent financial institutions. Financial institutions have long provided custodial and insurance services to their clients. Up to this day, they offer physical vaults for keeping non-digital valuables safe. More recently, they have extended into offering custody for digital representations of assets – from mediums of payments (e.g., CHF) to financial securities (e.g., equities, bonds).

Electronic Receipt

Digital receipts generate product-level consumption data, which can be built upon (platform) to create new solutions. Digitizing receipts could be realized by digitizing billing at the point of sale since a bill mentions the specific products. Even when we do not pay on account, a digital bill could still automatically be generated in the background to serve as digital receipt.

Product-level consumption data could then be used to **provide personalized information to buyers**, such as whether we already own a particular movie or book, whether the product is interoperable with what we already own, whether a pillow matches the size and color of our sofa, whether we ordered the same dish last time in this restaurant (and whether we liked it),

whether the cupcake could be one too many for our cholesterol this week, whether our annual dentist visit is due – to name just a few.

Product-level consumption data would thus **readily provide buyers with an automatically generated overview of all the things they own**. This may enable algorithms to recommend what to wear, considering e.g. the weather, our schedule, and what we wore last week. The overview may be extended into a platform connecting producers and sellers with buyers, **allowing merchants and sellers to communicate** product-related updates, maintenance reminders, related products, etc. The overview could **extend into an e-commerce marketplace**, allowing buyers to reorder the same products, order related products, or buy product insurance. This overview could also scrape the Internet to **aggregate relevant information** such as product-relevant news, reviews, and tips. This overview could also become a foundational element of the **sharing/second-hand economy** – either itself becoming a sharing and resale platform, or connecting to third-party platforms. This overview may also **expand/facilitate the collateralization** of one's possessions.

This overview of all the things one owns would also **allow one to compute the sustainability impact of buyers and sellers**. A seller's carbon footprint could easily be computed by aggregating the sustainability impact of the building they are in, the specific chairs and tables, the food and their supply chain, etc. Sellers could then broadcast their sustainability score to attract consumers. Financial institutions already carry the necessary sustainability data: Their wealth-management and asset-management units provide it to investors.

Product-level consumption data would **readily give brick-and-mortar places a live overview of their inventory** by automatically comparing receipts of their purchases with receipts of their sales. Any seller may then **broadcast their live inventory to attract convenience-seeking and instantaneity-thirsty customers** by appearing as the seller in online searches, next to Instagram pictures of products, etc. Customers may book/reserve products from brick-and-mortar merchants, have an employee set them aside, and pick up them on the way home.

Product-level consumption data may also help financial institutions **better assess sellers' credit score and/or offer better conditions** because it may provide a better and cheaper picture of business activity.

Control Cockpits

Every item that we buy and sell, every contract that we enter, everything leaves a digital trace (in a digital receipt, an email, a line on the credit card statement). This data can be collected, run through an AI, and stored in a cockpit to **provide sellers and buyers with a one-stop-shop overview of their contractual obligations and rights**, such as payment schedules, automatic subscription renewals, warranties, etc.

A cockpit could also **provide buyers with a one-stop-shop overview of where payment details are stored, what service can automatically trigger payments, which data is sent to where, and what loyalty programs they have joined**.

Real-Time Fraud Detection (Utility)

The advent of instant settlement will necessitate real-time fraud detection, which can only be achieved through automation and AI.

Real-time fraud-detection services exhibit scale-based quality improvements. Fraud detection algorithms become better with more data because algorithms learn from previous fraud cases – the more data, the better. Additionally, detecting a case of fraud for one customer may signal a higher likelihood of fraud for similar customers (e.g., payment details stored at the same online shop, a recent visit to the same brick-and-mortar shop) – the more customers, the better the system. Fraud-detection services also exhibit **scale-based cost reductions** because of the economies of scale involved in developing and running these algorithms.

Strong-Authentication-as-a-Service

Financial institutions could provide their already-existing strong-authentication capabilities as a **digital-identity service** to third parties. It could take the form of a second-factor authenticator app that smartphone users can select. Or it could be directly embedded in the offerings of app developers (e.g., to digitally sign contracts)

and brick-and-mortar owners (e.g., to digitize the check-in at hotels).

It would **strengthen banks' brand equity and awareness in terms of 'security' and 'custody.'** The authentication service would open multiple times per day: every time we onboard on a new service, every time we log into a service, and every time we pay with a payment app.

If the feature is pre-installed on smartphones, it could even be used instead of the mobile phone number. Today, when we buy a new smartphone and want to set it up, we get a code to our phone number to authenticate ourselves. But phone numbers were never meant to fulfill this role, and their security protocols are found wanting. This is especially dangerous because the smartphone has become our master key to the digital world – without it, we can hardly function anymore. Additionally, it would have the benefit that if we lose our smartphone (and thus our phone number) on vacation, we could simply buy a new phone and authenticate ourselves to have the whole thing working again (this would not be possible with a phone number as second factor since we couldn't receive the code).

Best-Execution Partner

It is common knowledge that search results, product recommendations, and advertisements are all tailored to consumers. But so are the prices. **It has been reported that prices on e-commerce sites seem to be higher if you are on an Apple device**, which suggests that you are a wealthier individual. See e.g., Wall Street Journal, 2020, On Orbitz, Mac Users Steered to Pricier Hotels (23 August 2012). The digitalization of brick-and-mortar places (e.g., smart shelf labels) may extend price tailoring to everywhere.

Trusted players may act as partners by, for example, **providing a privacy-preserving filter, sending notifications when prices deviate from the norm, or offering to purchase the good on their behalf** in order to ensure that customers get the best possible deal.

Such a service may **strengthen banks' brand equity and awareness in terms of 'trustworthy partner.'**

“Society Wants Digital Receipts.”

*The checkout process at the point of sale (POS) in 2020 is almost completely digitalized. You can pay with your payment card, use your mobile phone or your watch, and, even pay in crypto-currency. But **you still need to wait for the printout of your receipt**, so you can prove to the shop owner that you paid for what you walk out with. You then **still have to store the receipts**⁷⁶ at home since the paper receipt also serves as a warranty. Undoubtedly, physical receipts are a real pain point for customers in the status quo. And customer surveys indeed indicate that there **is a strong consumer demand for digital receipts**.¹ Having all their purchasing data in one place, has many advantages for consumers: for example, they will be able to see how healthy their purchase was, or which electronics product are still under warranty.*

*At the same time, digital receipts not only make the POS more efficient, they also **help merchants and producers easily track their goods**. This would, for instance, speed up the process and save money in cases of product recalls.*

*Even governments are starting to mandate digital receipts.⁷⁷ A **regulation mandating merchants to send e-invoices to tax authorities** will come into force in France in 2023.*

*For all these reasons, we strongly believe that in 2030 digital receipts will be as common as paying with your card today. **In 2030 we will have an end-to-end digitalized process for digital receipts** with data automatically sent to customers' digital wallets.*

Bedrija Hamza
InnoTech Lead, Viseca



⁷⁶ Klaus Fuchs, Fabian Schmid, 2019, Digital Receipt Study: Drivers and Barriers to Adoption of Digital Receipts, ETH & University St. Gallen Auto ID Lab (October 2019), survey of 239 Swiss consumers.

⁷⁷ See e.g., GS1 Sweden, 2019, White Paper: Digital receipts.

Possible Business Opportunities: Cash

Cash usage will decline, but cash will not disappear, neither as a medium of exchange, nor as a store of value. Only 23% of people say they would go completely cashless.

Guaranteed access to cash in crises will remain very valuable to people. People will increasingly become cognizant of growing climate- and cyber-risks, materializing in temporary shutdowns of digital infrastructures and electricity grids, and thus of the possibility of temporary unavailability of digital means of payments. People have also historically expressed a strong desire to hold cash in times of (economic, currency, geo-political) crises as a store of value – as shown by the strong increases of cash holdings, specifically in the form of higher-denomination banknotes, during crises. **Access to cash will therefore remain very valuable to most people.** People have seen payment terminals experience temporary interruptions. People will also remember that food supplies in times of crises may only be available to the fastest customers. To ensure they always have a functioning means of payment at hand, most people will keep some cash as backup, in a wallet, under a mattress, or in a vault. But they will only rarely use it. And when they do, they will not need to have their backup replenished immediately. **Instant access to cash, however, will be very valuable to only a few people all the time.** A niche of consumers will continue to regularly use cash for payment. But our interviews have revealed that many regular cash payers refill their cash stock only once a week. So only a small minority needs continuous and instant access to cash.

Cash withdrawal and deposit services **account to 10% of banks' operating expenses.** It includes maintaining ATMs, counting, storing, and moving cash around. See e.g., EY, 2019, The End of Cash (September 2019), page 4. It is a **serious pain for banks** because they are under cost pressure from investors and (new) competitors. *Cash solutions are non-differentiating for banks*, but customers require banks to have them as part of their offering (hygiene factor). So, banks are *willing to outsource cash services*. **Operating utility services for banks is thus likely to amount to a promising business opportunity.**

A series of interviews has also revealed that **only large merchants experience substantial cash-handling costs.** There may be business opportunities here as well.

In 2019, the annual operating costs of the cash infrastructure were over CHF 2 bn in Switzerland. It includes the costs of the Swiss National Bank (e.g., printing), of the banks (e.g., cash centers, transporting, ATMs), of brick-and-mortar commercial places. The annual operating and maintenance costs of an ATM are around CHF 30 k today (not including the costs of the network infrastructure connecting ATMs and banks). See SIX, 2019, Future of Money (November 2019), page 30.

(Armored) vehicles and ATMs have repeatedly been targeted by criminals, contributing to the high operating costs, but also putting people's lives at risk – from the employees transporting the cash to anyone who happens to be or live there. Criminals are increasingly violent, carrying automatic weapons (e.g., Kalashnikovs) and using explosives. Several recent incidents could have easily left people injured or dead.

A series of customer interviews has revealed that **access to cash is not a serious pain for customers in Switzerland today.** Today's ATMs and branches cover everywhere, sometimes multiple times. Hence, any solution that demands a change of behavior from the end-customer will need to be particularly inventive to be adopted.

Besides the narrow economic rationale, there is also a **sustainability rationale** for considering the future of cash in detail. Cash may indeed be a crucial element of sustainable development. Digital means of payment and of storing value may be more convenient and faster, but a cashless society could well fall short in other areas relevant for sustainable development. Most notably perhaps, cash ensures availability of a means of payment even in times of crises (**crisis resilience**). Climate- and cyber-risks are likely to continue to materialize in temporary shutdowns of digital (payment) infrastructures and electricity grids. Furthermore, cash promises **freedom of choice** of means of payment, promises of fairness in the form of financial **inclusiveness** (e.g., of poor and elderly), and ensures **anonymity** of consumption.

Centrally Operated ATM Infrastructure (Utility)

Switzerland currently exhibits an oversupply of cash services: Many places are served by multiple branches and multiple ATMs – sometimes, we only have to cross the street to go from one to the other. A centrally operated cash infrastructure can **reduce the number of ATMs by 30-40% while continuing to provide the same level of coverage.**

The ATM software is non-differentiating. Central development yields **economies of scale for ATM software** (cost mutualization).

Further scale-based cost benefits arise from centralizing the transport of cash. It can optimize how much to carry and which paths to take, **reducing the total kilometers travelled by cash transporters.**

Together with the Swiss cash ecosystem, SIX is already undertaking efforts to increase efficiency by centralizing cash activities. It has deployed a unified Multi Vendor Software platform, which runs on all Swiss ATMs, excluding PostFinance.

Crowd-Augmented Cash Infrastructure

Many experiments have already **shown the potential that engaging the crowd may hold**, from short stays (e.g., AirBnB), to mobility (e.g., Uber), or delivery (e.g., Uber Eats, Annanow).

Merchants may offer cash withdrawal services (**P2M**). The experience for a customer would be akin to how we pick up parcels at merchants today. Such ATM services would *increase traffic and consumption* at the merchant. And it would *lower merchants' cash-handling costs* because they have less cash in the cash register at the end of the day, and because they may smoothly get rid of large-denomination bills.

The ubiquity of digital gadgets and connectivity may also be leveraged to engage everyone else. People could hand out cash to third parties (**P2P**) and see the equivalent amount immediately transferred to their accounts (instant settlement).

Cities may also offer cash withdrawal services for its inhabitants during opening hours (**P2C**). City employees are unlikely to be swamped by withdrawals as cash payments will fall drastically.

Mobility providers (e.g., taxis, Uber), parcel distributors (e.g., Post, DHL), or food-delivery companies (e.g., Uber Eats) could also be partnered with to **crowd-augment the cash-transport infrastructure**.

The crowd could be incentivized to offer such ATM services with a transaction fee per distribution.

A crowd-augmented infrastructure can **reduce the number of ATMs while keeping the loss in coverage marginal**.

It remains, however, to be seen whether people will be willing to withdraw cash from merchants or strangers.

Digitizing Cash Management

There may be an opportunity to **help brick-and-mortar operators reduce cost and time spent on handling cash**, thus freeing up resources that could be focused on activities that are perceived as value-adding by customers. In other words, helping operators shift away from payment management and toward **customer engagement/loyalty**.

Solutions could help with **tracking cash in real-time**, in cash registries, in vaults, and in-transit between registries, vaults, and banks. They could help with **detecting counterfeits** by leveraging advances in AI. They could **automatically generate necessary documentation** for audits. They could have a single interface that allows them to have an overview across all their bank accounts (**bank account aggregation**). And cash transporters, whether armored trucks or the crowd, could stop at brick-and-mortar places and act like mobile ATMs that distribute cash and allow cash deposit (**ATM hailing**).

Such back-office digitalization **would then allow a further reduction in the costs of cash transport and improve a crowd-augmented cash infrastructure**. The real-time data on cash location ameliorates cash forecasting. A bank-account aggregator also carries valuable data to track cash in the system, as brick-and-mortar operators tend to have multiple bank accounts, and vary where they deposit their cash.

Reduction of the Amount of Cash in ATMs

Most times, ATMs carry more cash than is being withdrawn, to guarantee that there is always enough available. This **excess cash turns ATMs into interesting targets for criminals**, increasing the costs of operating the cash infrastructure (insurance costs, ATM replacement costs) and increasing the risk to lives. Reducing the amount that ATMs need to carry **makes ATMs less-interesting targets for criminals**.

One possibility could be to **engage the crowd**. In addition to reducing the number of ATMs, it would also spread cash across multiple entities, reducing the amount of cash any ATM needs to carry while keeping the amount of withdrawable cash constant by area.

People could order a certain amount of cash in advance. The cash would be available the next day at the chosen ATM, merchant, or city agency. A notification would inform the user when the cash is available for pickup. And the cash would be reserved for a certain time. Ordering could be done through the banks' app or over the phone. Higher prices could be demanded for instant-withdrawal services at ATMs. **People may be able to order cash at home,** akin to ordering a pizza, and would get the cash delivered to their doorsteps.

Such a service would also **strengthen banks' digital customer interface.**

Low-Likelihood Scenario

The Sustainable Consumer

Likelihood of occurrence: Low

Abstract. In developed countries, the vast majority of people will take their sustainability impact into account before purchasing any goods or services, and will not readily choose the cheapest product or service.

Early-detection signals. Perception of a lack of progress toward sustainability; growing anger and impatience over the lack of progress; high number of social protests; spread of smartphones; growing distrust in unfettered capitalism; disillusionment with business leaders, investors, and governments as change agents; growth in second-hand economy; ease of access to sustainability data; sustainability as status.

Primer on activism. **Consumer activism** describes actions by consumers that aim to influence how/what goods and services are produced. These actions range from purchases and boycotts (**activist consumption**), to employer boycotts, information provision, litigation, and legislative initiatives.

Activist consumption is less of an anomaly than popular belief. To be sure, although every generation tends to believe that it is pioneering activist consumption, it is not new. Consumers acting in alignment with their values is not only not a new phenomenon, it is not even an anomaly: *It has continuously taken place throughout history.* The United States are a case in point.⁷⁸ Consumers have consistently used their buying power for political, moral, and ethical purposes throughout the history of

Description

Are you influenced by the green, eco, and bio labels printed on products? Would you like to know whether it supports dictatorships around the world? Whether the producer supports work-life balance, flexible work, working from home, part-time, and single parents? Whether the producer offers apprenticeships, supports gender and racial equality, pays fair wages, and provides education in poor countries to the family members of employees? Or whether the product supports dictatorships, warlords, or drug kingpins? **If you do, you are not alone. Far from it.**

the United States. Activist consumption started even before the US War of Independence, with the 'non-importation movement' in the 1760s that aimed at stopping the import of goods from Great Britain to support domestically produced goods.

"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

United Nations ('Brundtland Report')

United Nations, 1987, *Our Common Future*

Ever more people are considering their sustainability impact when making purchases. Today, in 2020, half of consumers self-declare as striving for sus-



Key drivers of the Scenario



Intensifying Anger and Impatience With Society Falling Short on Sustainability.



Soaring Uptake of Smartphones, Facilitating and Sustaining Activist Consumption.



Growing Awareness That Activist Consumption Is Necessary to Lift Society Onto a Sustainable Path.

78 See e.g., Lawrence Glickman, 2009, *Buying Power: A History of Consumer Activism in America* (Chicago University Press: Chicago, IL).

tainable consumption. People can broadly be divided into two camps.⁷⁹ On the one hand, over half the people say they would stop purchasing a brand if it did not align with their social or political values, and that they are willing to pay higher prices for more-environmentally friendly products, and are willing to change their consumption habits to better support sustainability. On the other hand, around 40 percent of people, mainly exhibiting below-average income, say they do not consider sustainability in their consumption decisions.

Sustainable consumption could, for example, be seen in action in Europe at the company Fairphone. Created in 2013 with a mission to produce smartphones under ethical/sustainable conditions,⁸⁰ it pre-sold 25,000 phones for 325 Euro (EUR 8mn) in 2013 before it had produced a single phone. Since then, it has sold fairly produced phones to over 250,000 people.⁸¹ In America, the impact of sustainable consumption could, for example, be seen in 2017 when the department store chain Nordstrom dropped Ivanka Trump's clothing line in response to growing calls for boycott.⁸²

But surveys may be too optimistic. In other surveys, respondents have been found to adjust their answers to match societal expectations and because answers tend to reflect how people would like to see themselves. Their

actual behavior may thus substantially deviate from their survey answers.⁸³ Randomized field experiments found the sustainability label to increase sales by over 10% when prices are unchanged. They also found that when prices of sustainability-labelled products increase 10%, sales still increased by over 10% on the expensive goods, but fell on cheaper goods.⁸⁴ Despite what they say, it appears that **today only 10-15% of consumers in developed countries (are willing to) engage in sustainable consumption even when it means paying higher prices.**⁸⁵

Trend Toward Responsibility

"Increasingly, consumers hold brands accountable for the impact of their conduct on employees, society, and the planet as a whole."

Sascha Lehmann, Nils Liedtke, Phyllis Rothschild, Eloy Trevino, 2020, *The Future of Brand Strategy: It's Time To Go Electric*, McKinsey (May 2020)

Over 80% of corporations say that sustainability is more important to their business than five years ago, and will become even more important in five years.⁸⁶

79 A survey of 15,000 individuals across 11 countries worldwide (incl. US, UK, Germany, India, China) found that 49% would be willing to pay higher prices for environmentally friendlier products and 61% would be less willing to buy (and 38% have already stopped buying) from a company that is not taking its environmental responsibilities seriously; but it also found that 42% (almost half of which have below-average income) do not consider sustainability in their purchasing decisions and are not willing to pay higher prices for more-sustainable products (ING, 2020, Learning from Consumers: How Shifting Demands Are Shaping Companies' Circular Economy Transition, February 2020). A survey of 8,000 individuals across eight markets (incl. US, UK, Japan, Germany) found that nearly two-thirds (64 percent) of consumers around the world will buy or boycott a brand solely because of its position on a social or political issue (Edelman, 2018, Earned Brand Study, October 2018). A survey of 1,000 Americans found that three-quarters (76%) would refuse to purchase a product if they found out a company supported an issue contrary to their beliefs (Cone Communications, 2017, CSR Study, May 2017). And three-quarters (76%) of Millennials consider a company's social and environmental commitments when deciding where to work and nearly two-thirds (64%) won't take a job if a potential employer doesn't have strong corporate social responsibility (CSR) practices (Cone Communications, 2016, Millennial Employee Engagement Study, November 2016). A survey of European consumers found that 58% are willing to change their consumption habits to better support sustainability (Nielsen, 2020, Seven Forces Driving the Future of Europe's FMCG and Retail Market, January 2020). Julius Bär, 2020, Global Wealth and Lifestyle Report (January 2020), page 21, "This [sustainability-impact] awareness is making consumers more mindful of how companies behave. Younger adults are quick to suspect dishonesty in corporate leaders and want more transparency on the origin of goods."

80 Meaning *not relying on minerals from conflict regions and ensuring proper labor conditions*.

81 See e.g., BBC, 2015, Can An Ethical Smartphone Change The World? (16 December 2015).

82 New York Times, 2017, Nordstrom Drops Ivanka Trump Brand From Its Stores (2 February 2017).

83 Tim Bartley et al, 2015, Looking behind the Label: Global Industries and the Conscientious Consumer (Indiana University Press: Bloomington, IN), page 66.

84 Tim Bartley et al, 2015, Looking behind the Label: Global Industries and the Conscientious Consumer (Indiana University Press: Bloomington, IN), pages 67f. One randomized experiment involving Banana Republic clothes finds a 14% sales increase for expensive products while no change for cheap products when sustainability labels are added. Another randomized experiment involving coffee finds a 8-13% sales increase when sustainability labels are added; it finds that this sales increase holds for expensive coffee even when their price is increased by 10% and explicitly states that the increase is due to the more-sustainable production process; but for cheap coffee, it finds that sales drop 30% when the price is also increased.

85 Tim Bartley et al, 2015, Looking behind the Label: Global Industries and the Conscientious Consumer (Indiana University Press: Bloomington, IN), pages 66 and 69, "Generally, the research to date shows that some segment of consumers is willing to pay more for standards that do not directly benefit them, but the size of this segment ... probably amounts to a minority of consumers in affluent countries ... below the rosy estimates of 60-80 percent from survey research but above the lower estimates of around 10 percent".

86 Bain & Company, 2018, Sustainable Economy (August 2018), 81% of corporations say sustainability is more important to their business than five years ago. And 85% expect that it will be even more important in five years.

Sustainable Consumption

(aka conscious consumerism, ethical consumption, moral purchasing)

Sustainable consumption is aspirational – an ongoing process, a journey. Sustainable consumers **aspire to consider all dimensions that are relevant for sustainable development and do not readily choose the cheapest product or service**. They consider the impact on the well-being of themselves and their families, the impact on society, as well as the impact on future generations. They pursue that goal consistently, learning and evolving along the way. **But when making a purchase, they may explicitly consider only a subset of 4-5 dimensions** because they have previously weighed these 4-5 dimensions the highest in terms of their sustainability relevance. Many sustainable consumers took their baby steps with green/eco/bio labels.

Different sustainable consumers **may differently assess the sustainability impact of a product because they put different weights on different sustainability dimensions**. People may disagree about the sustainability impact of plastic. They may have different views on the likelihood of a future innovation fully resolving plastic's adverse impact. Or they may have different views on what causal impact plastic has on the environment or on people's health. As a result, sustainable consumers may put more or less weight on plastic usage and thus be less or more inclined to consume plastic-wrapped products.

Different sustainable consumers may also assess the sustainability impact of a product differently because of their different personal circumstances. Paying CHF 2 more for a product with lower plastic usage may threaten a poor person's economic security. For this person, the sustainability impact of the cheaper product with higher plastic usage may be better. The opposite may be true for a wealthier person.

Examples of sustainability dimensions for a cup of coffee. The consumer's own material/economic well-being, financial stability, security, health, freedom, or taste. The supply chain's diversity (age, social class, disability, gender, race, etc.), labor conditions, number of trainees and apprenticeships, education for the families of employees, wage distribution, usage of plastic and water, fine-particle pollution, (risk to) animal welfare, usage of conflict resources, connection to dictatorships or drug lords, or national-security risks.

64%

say they would buy or boycott a brand based on its position on a social or political issue

49%

say they are willing to pay higher prices for environmentally friendlier products

10%-15%

actually willing to pay higher prices today for more sustainable products in developed countries

10%

sales increase caused by sustainability label (when prices also increase 10% as a result of sustainability, then sales only increase for expensive goods)

This activist consumption is not a fad. It will persist and grow stronger over time. The confluence of three developments have driven the recent rise in activist consumption. These developments will not only not recede, but will further strengthen – and continue to spread activist consumption in the future.⁸⁷



The first development is an ***intensifying anger and impatience with society falling short on sustainability***. The 2010s have already been described as the decade of social protests.⁸⁸ People around the world took to the streets, protesting insufficient progress on gender and racial equality,⁸⁹ a lack of economic security and prospects,⁹⁰ a denial of political rights, and our increasing environmental degradation. In 2019 alone, there were protests across six continents in both liberal and autocratic countries.⁹¹



The second development is the ***soaring uptake of smartphones, facilitating and sustaining activist consumption***. People can always find like-minded people, wherever they might be around the world, and connect with them whenever and wherever needed. People can easily access digital data to assess sustainability impact whenever and wherever needed.

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The World's Data at Your Fingertips



Search engines will find every article, blog, or social-media post ever written about a company.

Sensors, cameras, and satellites will record everything that happens in the surrounding of a company.

Companies themselves will, in time, provide radical transparency to their customers by leveraging advances in **privacy-preserving data processing**. These systems allow companies to let third parties send queries to their databases while ensuring that no private or sensitive information is revealed.

- Algorithms from third parties may be allowed to crawl through a company's legal documents, presentations, and e-mails, yet be confined to only extract information about the company's supply chain.
- Algorithms from third parties may query a company's HR database to diversity information reveal (gender, age, etc.) while ensuring that it cannot reveal any personally identifiable information (e.g., the age or salary of a specific employee).



The third development is a ***growing awareness that activist consumption is necessary to lift society onto a sustainable path***. There is a growing disbelief that technology and business leaders will solve this problem if only left to operate unencumbered. Appeals to elected officials, investors, and business leaders have had little effect.

87 Reaching the same conclusion: New Yorker, 2019, The Story of 2019: Protests In Every Corner Of The Globe (30 December 2019).

88 The Guardian, 2019, Streets on Fire: How A Decade Of Protest Shaped The World (23 November 2019).

89 A UN Report finds that the world for women is falling short of the vision adopted 25 years ago at the UN Conference in Beijing in 1995, especially in terms of economic empowerment and violence. See UN, 2020, Commission on the Status of Women: Review and Appraisal of the Implementation of the Beijing Declaration *6 March 2020, E/CN.6/2020/3). WEF, 2020, 5 Charts Reveal Key Racial Inequality Gaps In The US (2 June 2020).

90 The millennial generation is the first generation worse off than their parents. See e.g., Christopher Kurz, Geng Li, Daniel J. Vine, 2018, Are Millennials Different?, FEDS Working Paper No. 2018-080, "Millennials are less well off than members of earlier generations when they were young, with lower earnings, fewer assets, and less wealth." Consider also that youth unemployment in Spain in 2011 stood at 43%. The Guardian, 2019, Spain's Unemployment: One in Five Under 30 Still Looking For That First Job (30 March 2011).

91 New Yorker, 2019, The Story of 2019: Protests In Every Corner Of The Globe (30 December 2019).

The Many Ways of Activist Consumption

Environmental-activist consumers purchase products that support the environment and walk away from those that are not. But there must first exist a market – environmentally friendly products must be produced for consumers to behave in this way.

Environmentally friendly products offer a business the prospects of differentiating vis-à-vis a customer group. But producing environmentally friendly products may involve substantial upfront investments, from abandoning certain yield-increasing fertilizers, to building new factories and supply chains. So, the future demand for environmental-activist consumers may be too uncertain for producers to make the necessary investments.

But all is not lost. If the business risk is too high, producers or consumers may take a crowdfunding approach. A smartphone maker may promise to make a green version of its next smartphone if, for example, at least 10m people worldwide deposit the future sales price in an escrow account.

This pre-financing approach is just one of many more-creative ways that will allow activist consumers and/or producers to create new markets.

In the following, we **focus on climate activism to illustrate in more detail why these three developments will further strengthen; and how they will eventually turn sustainable consumption into the new mainstream.** We focus on climate activism not because we view the environment as more important than other sustainability dimensions. And not because we believe the environment is the only dimension in which society is falling short. But simply because it has probably been the issue that has received the most – yet still too little – attention over the past 20 years.

The Rise of the Climate-Activist Consumer

Reports warning of man-made global warming have been around for over half a century.⁹² The United Nations organized its first conference dealing with environmental degradation in 1972. It has been argued that climate change became real news in the 1990s.⁹³ At the very latest, climate change was brought global awareness in the 2000s by former US presidential candidate Al Gore's

Oscar-winning documentary *An Inconvenient Truth*. The 2010s was the hottest decade on record, including the seven hottest years ever recorded.⁹⁴ In 2019, the Oxford Dictionary's word of the year was *climate emergency*, reflecting not only the public's growing awareness, but its growing sense of urgency and immediacy regarding the need for action to halt global warming.

These discussions and cautionary voices may have been around for decades, but people have only started being seriously affected by climate change since the late 2010s.⁹⁵ **Global warming's adverse effects are increasingly no longer only a distant possibility** for the young and future generations. It is no longer only giving some distant island people wet feet as rising water levels start drowning their homes. It is no longer only melting some Arctic ice and glaciers. **Its effects are now being experienced by people in developed countries, rising in frequency and severity.** In late 2019, California shut off part of its power grid serving

92 See e.g. New York Times, 1956, Warmer Climate on the Earth May Be Due To More Carbon Dioxide in the Air (28 October 1956).

93 National Geographic, 2018, Climate Change First Became News 30 Years Ago. Why Haven't We Fixed It? (July Issue).

94 NOAA, 2010, 2019 was 2nd hottest year on record for Earth say NOAA, NASA (15 January 2020). Kate Marvel, 2019, This Was the Decade We Knew We Were Right, Scientific American (30 December 2019), "It began with the warmest year on record; it then broke that record at least five times."

95 A survey of 30,000 individuals across 28 countries found that the majority in almost all countries expects climate change to have a large or moderate impact on their lives, and that Middle Eastern and Eastern countries expect a bigger impact on their lives than Western countries (YouGov, 2019, International Climate Change Survey, July 2019).

almost a million people to prevent wildfires.⁹⁶ Year after year, the US West Coast's summers have been darkened by wildfire smoke that lingers for weeks above cities.⁹⁷ And just as the 2010s ended, the 2020s started. The wildfires that hit Australia in early 2020 made the imminence of climate change's effects blatantly clear, exposing human powerlessness against the forces of nature, even in developed countries. The images conjured up an end of the world feeling most of us only knew from movies: Days and nights were indistinguishable, communication and electricity was down, and when the curtains finally rose, it presented a scene as powerful as the one they had just experienced – the destruction of over 20 percent of its forests,⁹⁸ and, lying among the charred trees, the carcasses of up to a billion dead animals.⁹⁹ And later that same year, California experienced five of its 10 biggest fires – all burning at once, devastating an area half the size of Switzerland,¹⁰⁰ and keeping street lights on, even at noon.

"This Was the Decade We Knew We Were Right ... We have known that carbon dioxide traps heat for over a hundred years. We have known that we are changing the planet for decades now. There is no consolation in being right."

"Nothing is eternal and nothing is infinite. There were once forests in the Sahara—if not quite the Amazon, still lush and tropical, clustered around the largest freshwater lake on the planet ... This was climate change; it was likely not the fault of humans. But the existence of past climate change does not mean we are not responsible for it this time."

Kate Marvel

2019, *Scientific American* (30 December 2019)

As extraordinary as these events seem today, as ordinary they might become without intervention. **Warmer summers and milder winters are expected to give**

way to extreme weather, from extreme heat, to torrential rains, destructive flooding, year-long droughts,¹⁰¹ never-ending tornado and hurricane seasons,¹⁰² and raging wildfires. Besides skiing on snowless mountains and snorkeling amid snow-white corals, we might find **life punctuated by one major disaster after another, each disrupting our ways of life as the coronavirus pandemic did in 2020.** There will be many more periods of confinement. The smoke from wildfires raging in front of our cities will make the air unbreathable. Heat-waves will disable cars and public transportation, will make cities smell like a giant landfill, and will make it too dangerous to walk. Torrential rains and storms will make it impossible to walk or drive. There will also be periods of food shortage as hurricanes and extreme storms will ground planes, push ships back into port, litter roads and rails with trees and other debris, destroy production facilities, and damage crops. There will likely also be periods during which we will not only be confined, but also cut off from the outside world as nature comes down on our communication and electricity infrastructures. And these are just the obvious examples we can easily foresee. We live in a complex system, **there will be many indirect, non-linear, additive effects likely to create major disasters in ways we cannot even imagine.**

"You can't solve the climate crisis alone. And we also can't solve it without you."

Mary Annaïse Heglar

2020, *Here's Where You Come In, Wired* (April Issue)

Technological advances and free markets have led to incredible breakthroughs and created tremendous wealth, from reducing poverty around the world, to progress in curing diseases, increased life expectancy, or bringing the world's information to everyone's finger-

96 Guardian, 2019, PG&E Shutdown: 800,000 People to Lose Power to Prevent California Wildfires (9 October 2019), "With windy, dry weather in the forecast and warnings of extreme fire danger, Pacific Gas & Electric utility said it will start turning off power to 34 counties in northern and central California ... Some of California's most destructive blazes in recent years were started by PG&E power lines."

97 New Yorker, 2020, How to Combat Climate Depression, The Climate Crisis Newsletter (20 April 2020).

98 Guardian, 2020, 'Unprecedented' Globally: More Than 20% of Australia's Forests Burnt in Bushfires (24 February 2020).

99 HuffPost, 2020, Number Of Animals Feared Dead In Australia's Wildfires Soars To Over 1 Billion (7 January 2020).

100 The Download, 2020, Suppressing Fires Has Failed. Here's What California Needs to do Instead. MIT Technology Review (17 September 2020).

101 Some forecasts even predict decades-long megadroughts in some places around the world.

102 Union of Concerned Scientists, Climate Impacts: The Consequences of Climate Change Are Already Here [accessed 23 February 2020], "Mega-storms like Hurricane Harvey have gone from occurring once every 100 years, to once every 16 years."

tips.¹⁰³ They have led to leaps in efficiency and in environmental performance of production processes. But witnessing the unhalted degradation of the environment and acceleration of climate change, many people will grow increasingly skeptical. And eventually, they will **lose trust that technology, business leaders, or investors will be humanity's saviors if only left unencumbered**.¹⁰⁴ Younger generations already took the lead in the mid-2010s.¹⁰⁵ And realizing that their action is needed now, **ever more of us will turn into climate activists**.

The life of a climate activist could feel lonely. You may have no one to share the journey with. You may not have someone to act as mentor. You may even get the evil eye at dinner parties, that is if you get invited at all. But not anymore: The **widespread uptake of smartphones creates global communities for all interests, niche or not**. With social media in every pocket, we can share achievements, share praise as if others were standing next to us, or share information and knowledge. We can find emotional support during moments of doubt and adversity. And, of course, we can keep tabs on each other, ensuring environmentally unfriendly behavior does not go unpunished (e.g., group exclusion). Smartphones allow all of us to connect with other climate activists from around the world, prompting many more of us to join the movement.¹⁰⁶

Climate activists will continue to demand change from elected officials.¹⁰⁷ Previous social protests have led

governments to take action. In 1970, some 20 million Americans took to the street.¹⁰⁸ The Environmental Protection Agency was created before the end of the year, and was followed by several legislations (Clean Air Act, the Clean Water Act, the Endangered Species Act). But **delegating the issue to governments alone is unlikely to suffice**.¹⁰⁹ Environmental degradation and global warming have continued over the past 50 years despite these legislations – though it would have been worse without them. The rate of new laws will likely be slow because finding consensus on what measures to take will be far from trivial, even among climate activists: They may disagree on how to weigh a climate measure's potentially negative impact on people's economic security, employment, or progress in medicine.¹¹⁰ And even where they find consensus, powerful lobbies will slow down lawmaking and water down rules. Laws will likely be reminiscent of the tax codes around the world today – too complex to be rapidly enforced, and littered with loopholes (aka 'exemptions') for the powerful to exploit.¹¹¹

Climate activists will not give up so easily. They will turn their efforts to the market, wielding their power as participants in the economic sphere – as investors,¹¹² employees, and consumers – voting with their wallets as well as their feet.¹¹³ Inspired by Mahatma Gandhi's words "Be the change you wish to see in the world." and wanting to be on the "right side of history," many will engage in **activist consumption** – many more

103 Among many, see Bill Gates, 2019, Interview: Bill Gates Explains Why We Should All Be Optimists, MIT Technology Review (March/April Issue).

104 A survey of over 34,000 individuals across 28 markets found that people are losing trust in emerging technologies, in technology companies, and in unfettered capitalism (Edelman, 2020, Trust Barometer - Trust in Technology, February 2020).

105 Led by Time's 2019 Person of the Year Greta Thunberg, the sixteen-year-old Swedish climate activist.

106 Smartphones have reportedly helped people start and sustain social movements/protests during the 2010s. See e.g., John T. Jost et al, 2018, How Social Media Facilitates Political Protest: Information, Motivation, and Social Networks, *Political Psychology* 39(S1), 85-118.

107 A representative survey of US citizens found that when asked by a person they like and respect "about half of Americans say they would sign a petition about global warming (55%) or vote for a candidate for public office because of their position on global warming (51%) ... three in ten Americans (31%) would support an organization engaging in non-violent civil disobedience against corporate or government activities that make global warming worse, and one in five (20%) say they would personally engage in non-violent civil disobedience." (Leiserowitz, A. et al, 2019, Climate Activism: Beliefs, Attitudes, and Behaviors, November 2019. Yale University and George Mason University. New Haven, CT: Yale Program on Climate Change Communication).

108 Economist, 2020, Green Day: Environmental Protest (22 April 2020).

109 A survey of 8,000 individuals across eight markets (incl. US, UK, Japan, Germany) suggests that half (53 percent) of consumers espouse the view that private markets are a more promising path to societal change than via governments (Edelman, 2018, Earned Brand Study, October 2018).

110 AI has, for example, been heralded as a key driver in future medicine and drug development. But training large AI models may have substantial adverse environmental impacts. It "can emit more than 626,000 pounds of carbon dioxide equivalent—nearly five times the lifetime emissions of the average American car (and that includes manufacture of the car itself)." (MIT Technology Review, 2019, Deep Learning Has A Terrible Carbon Footprint, 6 June 2019).

111 Atlantic, 2016, The Tax Code for the Ultra-Rich vs. the One for Everyone Else (15 October 2016); Economist, 2018, Overhaul tax for the 21st century (29 August 2019), "Today's tax systems are ... marred by the bewildering complexity and loopholes".

112 In some instances, the crowd was nonetheless able to create change acting as investor. It created funds to directly invest in environmental start-ups (acting as VCs) and to approach large incumbent corporations in order to set up joint ventures producing environmentally friendly products.

113 Also known as 'boycotting'.

than would have been imaginable just a few years ago will do so. For some of them, it will mean doubling down on activist consumption. For most, it will mean substantially changing how they consume.

But **not every climate activist will engage in environmentally friendly consumption**, not around the world, not within their own rich countries.¹¹⁴ Environmentally friendly consumption is more expensive. Environmentally friendly consumption sometimes excludes one's otherwise favorite brands.

And environmentally friendly consumption is also time intensive. Different activists interpret data points differently and have different views on the causal environmental impact of say plastic usage. Different activists thus need access to different digital data in order to calculate a product's environmental-impact score according to their views. Yet, even with the Internet in their pocket and the world's data at their fingertips, this digital data still needs to be found, verified, and synthesized.¹¹⁵ And oftentimes, rough guesses will be required as some data will simply not be available – most notably, precise data on supply chains and production processes will likely be missing.

They will try to pull laggards and deniers into environmentally friendly consumption by appealing to their self-interest. The digital sphere can be both a frightening stick and a delicious carrot. A few may join out of fear of online 'consumer shaming' in front of a global audience (e.g., 'flight shaming'). And some others may be attracted by the prospect of social acceptance and status from sharing pictures and proof of their environmentally friendly lifestyle and achievements (e.g. 'train bragging').¹¹⁶ Flight shaming seems to have reduced air travelers in Sweden, where the movement originated, and triggered discussions inside

companies and among lawmakers on restricting air travel.¹¹⁷ But the overall effect will likely be limited: Most consumption is done privately; and V12car lovers roll among themselves, immune to external voices.

Actions directly aimed at convincing others will likely only experience limited success. But their own consumption will indirectly convince others to engage in environmentally friendly consumption in two ways.

First, **trailblazers' actions will lead to environmentally friendly products becoming more attractive to a wider audience**. Their actions will redirect R&D and innovation efforts of corporations toward environmentally friendly products, over time reducing prices and increases quality. Just think of vegan products, which suddenly popped up in shopping centers and gradually took over more and more shelf space as they became tastier. Or think of Tesla cars, which gradually became affordable and convenient enough (charging-station coverage, range) for the mass market.

Second, **trailblazers' actions will make it possible to instantly and conveniently pull real-time, personalized environmental-impact data, at low cost, anytime and anywhere**. The necessary data is already being collected, verified, cleaned, and aggregated in the investment space, where 'impact investing' and 'ESG investing' are booming.¹¹⁸ It is only a question of time for digital solutions aimed at consumers to also hit the market, savvy (social) entrepreneurs are unlikely to miss this (social-)business opportunity. And it is only a question of time for companies to pro-actively collect and share data on their supply chains and production processes in order to position their products with environmentally friendly consumers.

114 Not least because climate change is a public good, subject to the classic problem of free riding.

115 Sourcing, cleaning, aggregating, synthesizing, validating/verifying, and making all this data available when needed takes time and effort. Business Insider, 2019, Train-bragging has become so popular in light of Greta Thunberg's activism that a Swedish Facebook group devoted to the topic now has over 100,000 members (19 December 2019).

116 Business Insider, 2019, Train-bragging has become so popular in light of Greta Thunberg's activism that a Swedish Facebook group devoted to the topic now has over 100,000 members (19 December 2019).

117 Thomas Roulet, Joel Bothello, 2020, Why "De-growth" Shouldn't Scare Businesses, HBR (14 February 2020), "10 Swedish airports have reported considerable declines in passenger traffic over the past year, which they attribute directly to Flygskam ['flight shaming']." Bloomberg, 2019, Flight Shaming Puts a Dent in European Travel (26 September 2019), "companies across Europe are reconsidering travel policies, and individuals are asking whether jetting off to sunny spots for holidays is worth the environmental cost ... In France, where the #avihonte (aviation shame) hashtag is trending, some lawmakers have proposed a ban on most internal flights."

118 For a discussion of the explosion in digital data sources as input for investment decision-making and asset lifecycle management, see SIX, 2020, Data, The Future of Financial Information (February 2020).

The actions of trailblazer activist consumers will lead to the lowering of entry barriers, convincing new people to try environmentally friendly consumption. As the movement grows further, hurdles will continue to fall, convincing more people to try. This is the virtuous circle they will have started through their relentless efforts.

One of the many medium-term impacts will be that **the second-hand economy, lending/sharing economy, and repair economy will explode in size.** Sustainability-conscious consumers will turn toward second-hand products and repairing in order to reduce waste. This will turn re-commerce/resale¹¹⁹ and repair/remanufacturing¹²⁰ into the fastest-growing retail markets.

From Atomistic to Holistic Activist Consumption

Seasons will go by, some disappearing, others becoming more extreme. Ever more people will join, purchasing environmentally friendly products and walking away from those that are not. But this is just one of many sustainability dimensions in which society is falling short. **Elsewhere too, the actions of trailblazing activists will prompt ever more consumers to take those sustainability impacts into account as well.** Eventually, the mainstream consumer **will strive to consider all dimensions that are relevant for sustainable development** before purchasing a good or service.

119 Forbes, 2019, Mindful Consumption, Peak Amazon And The Participation Decade - 8 Retail Predictions For 2020 (13 December 2019), "Expect more shoppers to think twice before buying new, creating new opportunities in the repair, resale, and rental economies." Department stores and producers have already entered the resale market in the 2020s, examples include Patagonia, Macy's, Nordstrom, Gap; see e.g., CNBC, 2020, Gap is the latest retailer to get into resale to try to fix its business (20 February 2020).

120 The apparel company Patagonia is a leader in this space with its wear-worn stores, repairing and recrafting worn clothes since the mid-1970s. See e.g. The Atlantic, 2015, One Retailer's Unusual Message: 'Don't Buy So Much Stuff' (29 May 2015).

→ Human-Centric Description of This Future Scenario

Ich bin ein sustainable consumer, in 2030

I'm puzzled. It can't be?! They don't have my favorite brand of Limoncello. "Probably not enough predicted demand," I'm told. "How can that be? I've been a loyal Limoncello consumer here as long as I can remember. And I always restock on Wednesday." I reply. The young man shrugs and mumbles, "You know how these algorithms are – black boxes." I concur and start looking at the other Limoncello brands. I have to say the labels look fantastic! Ever since they stopped placing all these green/eco/bio labels on the products, they've become so much better. But I, too, have changed. The artistic design, catchy slogans, and vivid colors don't trick me anymore. But I'm diverging. I scan the bottles, and a sustainability ranking immediately flashes up on my screen. Only two brands have a high score (**personalized sustainability information**).

I ask my digital chatbot, Q, to show more details.

A cockpit opens. Both brands are indistinguishable, and doing really well on all of my high-priority sustainability dimensions, on diversity, CO2 emissions, water usage, plastic, even on number of apprenticeships. But there it is. They aren't that high on my predicted liking. The algorithm really knows my taste. I don't like this. I ask to see all the shops and restaurants carrying my favorite brand inside of 10km. None. That's strange. But then again, it is the best Limoncello brand out there. I ask to extend the search to Switzerland. There is one place! Some restaurant behind a mountain, behind the lake, behind another mountain. But the sustainability score is horrible. It must be the transportation costs to have it delivered tonight. I really need it tonight. Well, I don't 'need' it. But, I love to finish dinner with a Limoncello shot – it just feels strange without it, like lunch without an espresso shot, Easter without eggs, or a World Cup final without Germany.

So again, I ask Q for more information.

To my surprise, the culprit is not the transport, but the brand itself. The company got audited. The inspector found that it had been lying for years about the number of apprenticeships and the salaries. The open apprenticeship positions were fake. And employees had to bring back a portion of their salary the next day in cash. I can't believe it! We should be further by now. We have all this data, computing power, and AI. We should have algorithms detecting fraud as soon as it occurs. No, before it even occurs!

I know this all sounds like a lot of work, but sustainable consumption is quite seamless nowadays. Well, at least when your favorite brand doesn't get blacklisted, and there is no alternative that is good enough – which really never happened to me.

But back to making the world into a better place. As I was saying, consuming sustainably has become seamless because I'm constantly online anyways, interacting with a digital interface. Whether it's searching for products, looking up additional information, or adding it to my digital shopping list. So, checking their sustainability record is not even a click away – it's right there, next to any product or service (**seamless integration**). It's next to products in online shops. It's on the digital displays next to products in supermarkets. It's on the digital menus in restaurants. It's next to apps in the AppStore. It's even next to companies on LinkedIn and stock-trading apps. And when it's not there, I simply take a picture and immediately see the score on the smartphone screen.

When I tap on the score, my cockpit opens (**sustainability-information cockpit**). My cockpit ensures that the score is always calculated the same way – the way I want it to be calculated. Most of us have been shopping like this for several years now. Choosing the product with the best sustainability score. Choosing the merchant with the best sustainability score. Choosing the distribution channel with the best sustainability score. Some of us have even developed our own sustainability label. My family's stamp of approval is quite restrictive. It signals that a product or service contributes exceptionally to sustainability. I can't remember more than four Limoncello brands ever getting this label.

It took some time to get us here, however. Setting up the cockpit took time. Assessing the sustainability impact of different dimensions took time. Weighting them took time. Choosing among providers of sustainability-impact scores took time. Finding trustworthy sustainability data providers took time. But like so many other families, we saw it as an opportunity to connect. I can still see us debating at breakfast, sending each other articles during the day, and watching documentaries in the evening. In the beginning, we delegated the impact assessment of the different sustainability dimensions to well-known companies. We then assigned weights to these dimensions and aggregated across them. For example, we relied on Fairtrade to assess everything labor-related.



Fairtrade's overall sustainability-impact score is based on an assessment across all labor practices, from safety to wages. Scores range between -100 and +100. If the score is high enough, the product also gets the familiar Fairtrade label. What we love is that Fairtrade lets us browse the underlying sustainability data – we also like to read the individual movie reviews that go into the aggregated ratings on 'Rotten Tomatoes' or 'Metacritic,' after all. As we became more proficient, we started experimenting with lesser-known companies. We also started assessing the impact ourselves when we couldn't find one that was good enough. We are still regularly tweaking how we compute our overall score. It is truly a learning journey.

Nowadays, my cockpit shows my sustainability impact in real-time and compares it to my performance last year. I can combine my consumption with my investments to get an overall score. I can see the aggregated score for my family. I can send a request to a friend to share their impact with me. And I can read relevant news. A former trader once told me that my cockpit reminds him of the Bloomberg terminals of the early 2000s. I can also connect to a wide range of service providers – an entirely new ecosystem has sprung up around sustainable consumption (**sustainability-related services**). I can connect with an advisor to discuss consumption and investment strategies. I can then connect with a sustainability coach to help me implement these strategies by gently nudging me into reducing some of my bad habits. My coach really outdid himself this year, almost completely cutting my alcohol consumption. And I mean how amazing is it that he knew it would only work if he didn't touch my beloved Limoncello.

On my way home, I run into an old friend, Daniel. He looks proud and points to his T-shirt, "I'm wearing a fifth-hand shirt, dude!" (**second-hand economy**). My eyes glow. He has never quite been on board with this sustainability movement. He used to say that we will never make a difference. He finally came around! I'm so proud. While we're still hugging, he starts bragging about how difficult it was to get this shirt. I'm perplexed. "The second owner of the shirt was a player from my favorite baseball team," he says. Now I'm depressed.

I walk away, shoulders hanging, hoping that this day finally comes to an end, when my pocket starts vibrating. A notification in my cockpit. Must be bad news again. I really can't get a break today. And again, it concerns my favorite Limoncello brand. And again, the message is not as expected. The management has been replaced. Apprenticeships opened. And the money returned to employees.

It is fantastic that we can nowadays instantly get everything with little effort. But there is a flipside: We have all gotten so used to being instantly satisfied, that we have forgotten some things take their time.

Our mission is big, and it will take a long time to get us there. We must not get disappointed by not already being there. And we are making progress in the right direction. Our efforts and sacrifices are making a difference – like so many others, I would otherwise still be drinking the wrong kind of Limoncello tonight, and the night after that.

And for those who haven't yet joined our movement, we just have to find creative ways to make it in their personal interest to consume sustainably – even if it is for the wrong reasons, it still contributes to making society a better place.

Assessment of the Probability of Occurrence



Despite the deterministic nature with which we described this scenario on previous pages, **a mainstream sustainable consumer scenario is *far* from certain.**



In 2020, the majority of people say that they would boycott companies based on their values and that they would be willing to pay higher prices for products that are better aligned with their values. But talk is cheap, and some may not actually do as they say. We prefer underestimating the true number.

We assume that in developed countries only a small niche of very-passionate, affluent consumers (10-15% of consumers) engages in sustainable consumption even when prices increase in the status quo.



The current trajectory points toward a continued increase in consumers' willingness to engage in sustainable consumption.

As our climate-activist story suggests, there are good reasons to expect the three developments that drove the increase in the past not only to not recede, but to further strengthen. We interpret this to mean that **a future spread of sustainable consumption beyond a small niche market is very likely.** We again prefer to be cautious.

We assume that a **niche market in developed countries** will be inclined to engage in sustainable consumption with an 80% likelihood, even when prices increase.

We assume that the will be inclined to engage in sustainable consumption with a 50% likelihood, even when prices increase.

But even if people are in principle inclined to engage in sustainable consumption, they may not actually do so.

Sustainable consumption demands considerable commitment and sacrifices from people. But the world is likely to respond in only small, incremental, barely noticeable steps. A perceptible impact could take years to materialize. In the meantime, people may lose confidence that their sacrifices are worth their while, and return to old habits. ***We view the possibility as having a 50% likelihood for the mass market and 5% for the niche market.***

Sustainable consumption necessitates data, lots of it, to assess a product's sustainability impact. But data may not be easily available, it may be of insufficient quality, or it may be too expensive. High barriers may discourage people from trying sustainable consumption. Uncertainty about the sustainability impact may drive people to stop consuming sustainably. ***We view this possibility as having a 10% likelihood.***

Sustainable consumption is unlikely to be the cheapest form of consumption. A crisis that adversely affects people's income and job security could require them to rethink their immediate priorities. People inclined to consume sustainably may simply go for the cheapest product and put money aside as a reserve for future crises. This retreat from sustainable consumption may be only temporary, but other crises could follow. Even people in developed countries may be prevented from engaging in sustainable consumption on a lasting basis. ***We view the possibility as having a 20% likelihood for the mass market and 10% for the niche market.***

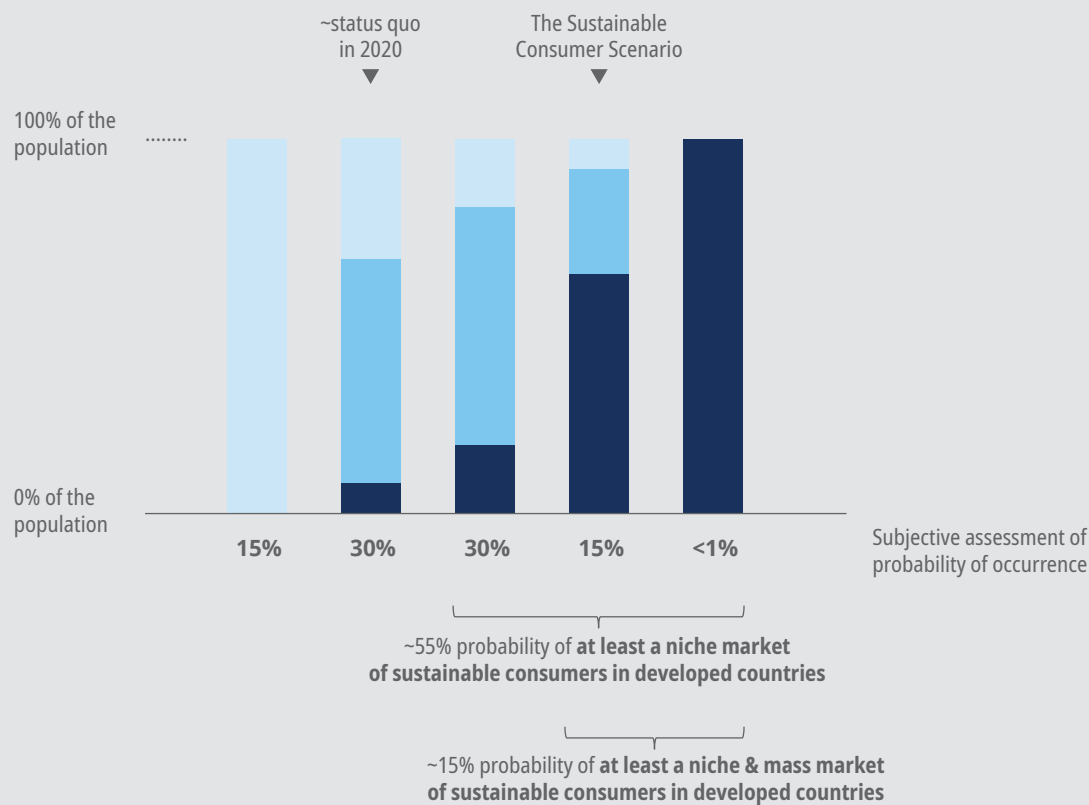
People must believe that sustainable consumption is necessary to lift society onto a more sustainable path. But society could suddenly be lifted onto a sustainable path by a technological breakthrough or a visit from a friendly alien race, followed by a series of other miracles. People would no longer need to engage in sustainable consumption because any consumption would be sustainable. ***We view this possibility as having a 5% likelihood.***

People must believe that sustainable consumption is necessary to lift society onto a sustainable path. But people may regain confidence in the ability of the state to steer society in the right direction. For instance, successful management of crises such as the coronavirus could refuel people's trust in their government. People may believe that their actions are not necessary because the government will take care of this sustainability thing. ***We view the possibility as having a 20% likelihood for the mass market and 5% for the niche market.***

Furthermore, the coronavirus pandemic of 2019-20 reduces the probability that the status quo will persist in the future. The pandemic is expected to reduce economic output (recession) for several years. People's experience of this downturn may be negative or positive, but it will not be neutral. If it is negative, people may become reluctant to play with the inner workings of the growth machinery. If it is positive, more people may be inclined to experiment with sustainable consumption.

The resulting **subjective probability assessment** is summarized in the probability-mass graph on the next page.

Exhibit 8



<i>Sustainable/Ethical Consumption</i> Consumers who engage in sustainable consumption. They aspire to consider all dimensions that are relevant for sustainable development and do not readily choose the cheapest product or service. But when making a purchase, they may explicitly consider only a subset of 4-5 dimensions because they have previously weighed these 4-5 dimensions the highest in terms of their sustainability relevance.	<i>No Sustainable Consumption</i> Consumers who sporadically consider sustainability-impact information. They use this data similarly to how most of us consider green/eco/bio labels today – to help us decide between good-enough choices (tie-breaker) or to exclude certain products. Consumers who never consider sustainability-impact information. They will, however, likely be interested in some of the data used in sustainability-impact assessments for other purposes. For example, they may want to know whether the milk was produced locally and how it was produced because they are concerned about their own health. Or they may want to know the origin of the coffee beans and the people who were involved because it enhances their drinking experience.
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Non-sustainable consumers will likely also **prefer personalized information** over today's standardized labels.

“Our Aim Is to Position Switzerland as a Premier International Hub for Sustainable Finance.”

If the Swiss financial centre can successfully position itself as a global leader in the area of sustainability and sustainable investment it will herald unprecedented opportunities for development, not only for the Swiss financial centre, but also for Switzerland and our environment.

To achieve this, we must consider sustainable investment not merely in a narrow financial context, but also within the broader discussion regarding sustainable consumption and how it can help enable a more sustainable lifestyle for us all.

We at SFTI steadfastly believe that the financial industry can contribute in making a difference, driving change, and embedding sustainability in our daily lives.

Swiss Fintech Innovations

“Sustainable Finance Is a Great Opportunity for the Swiss Financial Centre.”

...

“Our Aim Is to Position Switzerland as a Premier International Hub for Sustainable Finance.”

Swiss Bankers Association

2020, Sustainable Finance in Switzerland: From Pioneer to a Premier International Hub (June 2020)



SIX is a B2B business. To innovate, to co-create, and to be perceived as a partner, SIX must thoroughly understand the future challenges and opportunities of the B2B. This necessitates a good understanding of the B2B's own competition and clients.

In short, **SIX must put on its clients' shoes as well as their clients' shoes.**

What Business Opportunities Might Arise for Retail Banks in Brick-and-Mortar Commerce?

How Might They Solve Relevant Problems?

B2B or B2C. Existing problems. Possible future problems.
Not limited to traditional retail-banking products and services.

How Might They Reduce Costs?

Economies of scale/scope. Standardization. Outsourcing.
Microservices-based IT stack. Automation. Business model innovation.

How Might They Build Leverageable Capabilities?

Generate unique data.ⁱ Strengthen and/or expand customer interfaces.ⁱⁱ
Create network effects. Build platforms. Develop interconnectivity and interoperability.
Heighten brand equity and awareness.ⁱⁱⁱ Digital/tech skills. Etc.

→ Try to Leverage Existing Capabilities

- Local anchoring and history
- Physical presence (branches, cash infra.)
- Swiss neutrality, stability, jurisdiction
- Reputation of reliability
- Reputation of security & privacy
- Reputation of discretion
- Mobile customer interface (e.g., app)
- Personal human connection/relationships
- Understanding of clients' preferences
- Network of smart money
- Highly-vetted employees
- Reputation of attracting top talent^{iv}
- Aspirational brand (e.g., exclusivity)

→ Be Alert to the Changes in the Competitive Landscape

- Providers of retail-banking services face increased competition.
- Providers of retail-banking services risk losing their customer interface(s).
- Providers of retail-banking services face increased unbundling.

→ Be Aware of Key Possible Future Developments

- Digital solutions expand, but brick-and-mortar survives
- Indoors, it's all about emotional experiences
- Digital outside, Digital inside
- Instant, yet personalized information
- Seamless, yet personalized digital journeys
- Payment goes digital and online
- Sustainable consumption is a niche market
- **Sustainable consumption is mainstream**

ⁱ Data may enable differentiation through better tailoring of digital services, better personalization of advisory services, or better investment strategies. Data may be sold to third parties (anonymized).

ⁱⁱ Customer interfaces may improve brand equity/awareness. Customer interfaces may be expanded into a platform.

ⁱⁱⁱ The brand is not only relevant for selling products and services, but also for attracting employees. War for talent.

^{iv} It used to be the case. But banking is changing. How banking is delivered and consumed, which skills are relevant, what is value to people, are all changing. The necessary talent is being wooed by every industry around the planet.

Possible Business Opportunities: Sustainable Consumption

Every sustainable consumer has situations where they highly value access to some information in order to help them consume sustainably, to feel more confident that they make the best use of their scarcest resources (money and time).

But they differ in whom to trust to provide this data. They will disagree on whom to trust to provide impact data. Some will rely on professional sustainability-rating agencies. Others will rely on the assessment of peers or friends, and still others will assess the impact themselves. They will also disagree on whom to trust to provide reliable data on the amount of plastic usage. Some will again rely on professional data providers, while others will rely on peers, friends, or themselves.

And they differ in what amounts to sustainable consumption because different sustainable consumers differ in how they assess the sustainability impact of a product (see page 58). They will disagree on how to weigh different sustainability dimensions such as plastic usage, fine-particle pollution, gen-

der equality, number of apprenticeships, animal welfare, or national-security risk. They will disagree on how to assess the sustainability impact of say plastic usage. They will disagree on how to weigh total usage of plastic; usage relative to industry, society, geographic region averages; different plastic types; likelihood of recycling; etc.

At the same time, **every sustainable consumer values frictionless access to this information.** People highly value convenience and instantaneity, both of which suffer when there is friction in accessing the information.

Virtually every sustainable consumer (large market) faces instances where accessing all the relevant sustainability information is a serious pain (underserved need) in the status quo. Everyone faces situations when they really value accessing a certain piece of information, but where collecting the data themselves is very costly (read: takes a lot of time). **The space around providing instant access to sustainability**

Starting Point

In developed countries, the vast majority of consumers will consider their sustainability impact before purchasing any goods or services and will not readily choose the cheapest product or service. They will not view sustainability as merely a tiebreaker. Instead, they will be willing to accept lower quality, less taste, poorer convenience, or higher prices – in exchange for (for the sake of) a better sustainability impact. **From cheaper to fairer.**

The Sustainability of Doing Business With Sustainability

Supporting people in their endeavor to consume sustainably furthers sustainable development on two levels. It helps to align production and economic development with sustainability. And it embraces the liberal values that we tend to associate with sustainable development by empowering people to act in alignment with their beliefs and values.

Profits are not inherently in conflict with sustainable development. No profit is typically the wrong path toward the highest sustainability impact: The security of future jobs, the capacity to invest in R&D, the motivational effect of future windfalls, and the distribution of value to public shareholders are all relevant for sustainable development. Sustainable corporations must, therefore, take all of these dimensions into account in their decision-making as well.

Closeness to Financial Institutions

Supporting people in their endeavor to consume sustainably is closer to the DNA of incumbent financial institutions than it may seem at first sight. First, financial institutions have been supporting people in their consumption for centuries by providing personal loans, insurances, and payment solutions. Second, they have also helped investors make better investment decisions by offering data, intelligence, and advisory services. This expertise could be leveraged in the consumption space. Third, they have been generating sustainability data for investors since the 1990s. This data trove could be leveraged in the consumption space.

information that is relevant to people is thus likely to exhibit promising business opportunities. Just like it is good to be in the business of providing information to investors in the investment sphere.

We must identify what group of consumers highly values ready access to what information in what circumstances. And then identify the circumstances in which access is a serious pain point in the status quo.

First Steps for Financial Players

*The first steps are **similar to the ones for the business-opportunities cluster 'Instant personalized information' in our most-likely scenario.***

Ensure deployment of real-time information display solutions. For more details, see the business-opportunities cluster 'Instant personalized information' in our most-likely scenario.

Connect own sustainability data that has been prepared for investors by their wealth-management and asset-management units.

Connect bank account data and product-level payment data to compute people's sustainability-impact score across their consumption and investments. These historical scores can then be displayed in a cockpit.

Partner with incumbent green/eco/bio labels to distribute additional information next to products carrying their labels.

Partner with ESG-data providers that are specialized in providing financial information to investors.

Partner with a consumer-goods producer to provide in-depth data about its entire supply chain(s). The producer can elevate its brand by highlighting their superior sustainability impact.

Ensuring market deployment will allow the **building of the infrastructure backend in parallel** (e.g., connectivity platform, cockpit).

Sustainability-Data Connectivity Platform

Fast movers have a good shot at operating a core element of the future data-mobility infrastructure in the consumption space. The platform provides a standardized **sustainability API** for third parties to access a wide-range of sustainability data relating to products, services, merchants, and companies. The platform verifies, cleans, aggregates, and consolidates multiples data sources into a single data model and API.

Sustainability Cockpit

Some of people's sustainability views and preferences may be inferred from their digital activity and traces. But probably not all. And consumers will likely prefer not to have to specify/share their sustainability views in every other app, and they will want a given product to display the same sustainability information across apps and websites.

There may be an opportunity for a neutral, trusted player to **operate an information-personalization service that stores people's sustainability views in the form of a set of rules and preferences.** The service would itself connect to the sustainability API to source relevant sustainability data.

When the query to the service includes a unique user ID, the service **returns sustainability information about the product that is tailored to the user's views and preferences.** Shopping apps and transparent AI-augmented filters can then display personalized sustainability information next to any product or service.

The cockpit also allows users to **consult their sustainability-impact score across consumption and investment, dig deeper, get advice on how to improve their impact, and access sustainability-related news and webinars.** The service may even exhibit daily interactions if it becomes the platform for a social network centered around sustainability, similarly to LinkedIn being the social network around 'professional connections.'

The user can **seamlessly launch the service from within apps and websites by clicking on the displayed sustainability information.**

The sustainability cockpit **may carry unique data and insights on consumers, which can be built upon (platform) to deploy many new solutions.** Operators have access to product-level consumption data and to sustainability-behavior data. Consumers' behaviors in the context of sustainability may contain unique insights into their preferences, beliefs, and views. Which sustainability data someone accesses/considers reveals something. How they assess the sustainability impact of different data points reveals something. Who they trust to provide reliable sustainability(-impact) data reveals something. And so does their actual consumption and sustainability impact.

Consumers' consumption and sustainability-behavior data may be leveraged to improve credit assessments and to better personalize advisory services, from financial advisory to life coaching. A holistic understanding of consumers – possibly on par with the knowledge that global tech giants have – may be gained by combining people's payment data, consumption data, and sustainability-behavior data. Such *data may considerably improve financial institutions' understanding of their mass-market clients.* It may even help them better understand their (U)NW clients, (U)HNWIs' partners, and their children. This data helps bank advisors gain a

better understanding of their customers' values and priorities and risk affinity. The advantage of this new angle in customer engagement lies in two aspects: customers seeking to reduce their carbon footprint and tracking their progress in the cockpit, and banks adding these parameters into their portfolio assessment.

Consumers' consumption and sustainability-behavior data may be monetized by selling insights to third parties such as merchants, service providers, product manufacturers, investors, and lenders. Sustainability-cockpit operators services may themselves monetize this data by selling it to third parties. Or they may indirectly monetize it by helping consumers monetize their data.

*Consumption, payment, and sustainability-behavior data is very sensitive. Advanced capabilities in **privacy-preserving technologies** will therefore be necessary to process this data any further.*

*The **informational content of consumers' consumption and sustainability-behavior data may, however, not be unique.** Global tech companies may have similar insights in their data troves. In this case, this data may level the playing field, and potentially prevent customers from defecting to the highly personalized services of the global tech giants and/or attract new customers.*

Industry Pioneer Doconomy

The Swedish fintech Doconomy was founded in 2018. Mastercard is one of its shareholders. Its mission is to combat climate change. It tackles climate change by **inspiring change in everyday behavior in order to reduce unsustainable consumption and carbon emissions.**

Together with Mastercard, it offers a **cockpit and payment card that tracks your carbon impact of every single transaction.** It also allows you to offset your carbon footprint by supporting UN-certified projects that reduce, avoid, or remove greenhouse gas emissions.

Open Standard by OfnK

The German non-profit Organisation for Sustainable Consumption (OfnK) has published an **open framework explaining how to calculate consumer carbon emissions based on standard payment transactions.** This approach delivers standardized methodologies for both banks and the scientific community, and connects both worlds. It also allows researchers to access consumer carbon-related information on a larger scale **as well as permitting banks to provide best-in-class calculations based on the latest scientific research.**

Green Fintech Innovator ecolytiq

German fintech startup ecolytiq **drives the OfnK approach to the next level.** By building up on the standard and adding much needed context & content, ecolytiq helps consumers understand their impact and guide them toward a more sustainable lifestyle.

The startup is a chosen member of Visa's Fintech Partner Connect Programme.

Sustainable consumers will likely demand a variety of sustainability-related services. Sustainable consumers will want to have an overview of their overall sustainability impact. They will want to browse through their history of year-to-date sustainability impact, compare their impact to previous years, see projections for the full year, and share it with peers. They will want an overall impact assessment across their entire consumption – aggregating consumption across online and offline channels, across payment apps and cards, and across digital and cash payments. They will want an overall impact assessment across consumption and investment. And they will demand help to reflect on their sustainability impact, understand how to improve it, and nudge them into taking action.

Access to such services is valuable to consumers because it is very important to them to consume as sustainably as possible. Doing it themselves is a serious pain (underserved need) for them in the status quo because it demands serious effort and time (inconvenient). It also amounts to a large market.

The provision of such services is thus likely to amount to promising business opportunities.

Further Opportunities

The sustainability space offers the prospect of many further new profitable businesses. In the following, we mention only some of the services that the market may demand. Specifically, we mention services that are likely to be less contested because they require access to a wide range of deeply-revealing sensitive data on people. Service providers will thus need to have a trustworthy reputation and history of care and discretion with people's data.

There may be an opportunity for trusted players to **help consumers access currently-missing digital sustainability data**. Consumers may demand sustainability data that is not yet digitally captured. Instead of each consumer regularly visiting a farm to check on the cows, they will prefer delegating the task to a third party in order to benefit from the economies of scale. The same rationale underlies financial-information providers in the investment space.

There may be an opportunity for trusted players to **help consumers share a trustworthy sustainability impact ('build your own brand')** with their peers. They

may want to share their sustainability impact to gain social status, to be accepted in a group, or to simply to monetize it. But others may suspect that the data has been manipulated. Fake images could have been used as inputs (deepfakes), or the sustainability impact could have been computed on a subset of the actual consumption, for example excluding the recently purchased V12-powered car. A trusted neutral auditor may help them by confirming the veracity of the consumption data and by assessing its completeness. This auditor may check whether the buying habits fall within what similar consumers purchase, and whether the eating patterns make sense.

Similarly, trusted players may **help merchants, service providers, and product manufacturers share trustworthy sustainability data** with consumers. Consumers are highly aware of the ubiquity of fake news, tampered data, and of bending reality on self-reported data (fraud).

There may be an opportunity for trusted players to **help consumers monetize their audited consumption data and sustainability-behavior data**. As already mentioned, trusted players may audit the veracity and completeness of the data. Trusted players may act as privacy-preserving intermediaries so that data can be shared without revealing any personal information. Trusted players may allow consumers to pay with their data by sharing it with third-party service providers in exchange for a fee reduction on their services. Trusted players may operate a platform allowing consumers to connect with potential buyers of 'data usage rights.' They may act on behalf of consumers to auction these rights: They are likely to negotiate better prices because they act on behalf of a large set of consumers, increasing their bargaining power.

There may be an opportunity for trusted players to **help merchants, service providers, and product manufacturers better understand their (potential) customers**. Merchants, such as retailers and restaurants, should carry products and use furniture that fit the sustainability views of their (potential) customers. And product manufacturers and service providers need to know what people are likely to consume in the future. Trusted players may provide merchants and service providers with insights on consumer preferences from

(anonymized) product-level consumption and sustainability-behavior data.

Similarly, trusted players may **help investors and lenders better assess the future revenues of a company**. Investors need to know what people are likely to consume in the future. People's sustainability views may help them better assess whether a company's products will sell in the future.

Finally, there may be an opportunity to **provide efficient cash solutions**. Sustainable consumers may want to support cash availability in order to ensure crisis resilience, freedom of choice (means of payment), anonymity (of consumption), and financial inclusion.

Brand Promotion Potential

Offering services in the sustainability space is likely to strengthen brand, increasing loyalty and attraction. Sharing values, working together toward a larger purpose, and helping customers where it matters most to them are likely to facilitate emotional connections. Being an early mover offers the promise of being perceived as a forward-thinking thought leader with whom customers and employees want to be associated.

Some private companies are already moving. Take Microsoft, which recently announced that it will invest USD 1 bn to offset all the emissions it has ever produced. Or IKEA which will invest USD 2.5 bn to bet climate positive by 2030. Undoubtedly, this is to better align itself with the expected future preferences of consumers and employees.

Monetization Potential

Solutions in the sustainability space may be monetized in different ways. Customers, merchants, service providers, product manufacturers, investors, and lenders may pay directly for the services they consume, from access to a cockpit, to sustainability data, and other services. One side of the market may finance the other: Merchants, service providers, and product manufacturers may pay to distribute their sustainability data/impact in order to increase the sales of their products and services. The sustainable-consumption space may be monetized indirectly by selling the data elsewhere (akin to how many digital services are monetized through advertisers). The space may also be monetized indirectly by strengthening banks' brand equity and awareness.

Risk-Mitigation Potential

Smaller business opportunities may also exist in more-likely less-extreme scenarios (see Exhibit 8 on page 68).

Hence, the risk associated with innovating around sustainability can be mitigated by first focusing on market segments that are robust in multiple future scenarios. Specifically, by catering to the small niche of customers that (i) already exists today and (ii) will also exist in more-likely less-extreme future scenarios. The resulting capabilities, networks, and assets can then be leveraged to move into riskier spaces at lower investment costs (due to economies of scale/scope).



“Leveraging Payment Data for Sustainable Consumption and Sustainable Investment”

As discussed in the previous sections, a shift toward conscious and sustainable consumption is becoming increasingly ubiquitous. Financial institutions are well aware of this shift and, as a consequence, are expanding their investment portfolio offerings to ESG funds. As banks are becoming more and more familiar with how climate change affects their clients' investment decisions, innovations like 'sustainable banking' and 'green banking' are on the rise as well. In this regard, there is yet another hidden treasure trove awaiting discovery – helping consumers understand their own environmental impact by using a source that is easily available to banks: payment transaction data. If bank statements were a book or a diary, they would be able to tell an individual's everyday story: from the food a person eats, to hotels and flights booked, to (luxury) items purchased.

As e-commerce and electronic payment transactions are gaining more traction – a change in consumer behavior that is additionally fuelled by lockdowns due to COVID19 – the aforementioned transaction data provides deeper insights on peoples' shopping habits. A recent study published by KPMG found out that four out of five consumers considered the aspect of sustainability when making their purchasing decisions.¹²¹ Price Waterhouse Coopers 'Generation Z' study revealed that consumers of this specific age group are willing to spend more money on sustainable products.¹²²

As mentioned earlier, banks have been and continue to be trusted advisors for what their clients can do with their money. So far, this has been limited to the investment sphere, yet banks can actually go even further: As the Organization for Sustainable Consumption laid out in their recently published Open Standard, it is possible to determine an individual's carbon footprint based on their financial transaction data.¹²³ Through bank and credit card statements, banks are in a position to provide the data necessary for calculating individual carbon footprints. German software company ecolytiq has already put OfnK's calculation methods into practice by developing technology that is able to determine individual carbon footprints through bank transaction data.

Awareness of a specific problem – in this case the individual carbon footprint – is the basis of change. In a further and even more crucial step, this technology also provides bite-sized content intended to nudge consumers toward more sustainability-oriented behavior: suggestions on how to adopt healthier eating habits, using public transport instead of the car, etc. This aims to help decrease individual carbon footprints. Rendering sustainability attractive is key to success on a large scale and supports the customer dialog between banks and their customers.

Once consumers understand what their personal climate impact is, and how to reduce it, they can offset their remaining carbon footprint by donating to charitable organizations or – by making sustainable investments. This funnels consumers into another core business of banks by turning everyday consumers into everyday investors. All of this can be achieved by using their online banking application. These are minor changes in traditional online banking processes, but they turn passive bank account owners and consumers into active prosumers. In addition to this, this technology turns the somewhat abstract notion of sustainability into more tangible, everyday action. Providing this high level of transparency and consumer empowerment also opens up new business perspectives for banks as it creates the basis for customer dialogues on investment decisions within the fairly new and complex ESG investment landscape. To put it another way: The path leads from sustainable micro-investments, i.e. everyday purchases, and their associated CO2 compensations, to advising bank account owners on ESG investment plans. The more bank clients understand what sustainability actually means and what role they play in the big picture of climate change, the better the quality of customer engagement in terms of ESG investment plans is going to be. Banks have at their disposal an incredible wealth of knowledge to leverage this opportunity – they just need to use it.

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121 KPMG, 2020, Nachhaltigkeit, Consumer Barometer 01/20 (February 2020)

122 PWC, 2020, Gen Z is Talking. Are you Listening? Europe Consumer Insights Series (June 2020)

123 Organisation for Sustainable Consumption (OfnK), <https://www.ofnk.org/standard>

4 Method

We use a five-step process to identify our scenarios.¹²⁴

- We start by abstracting the system under analysis (aka first-principle approach). We use conceptual frameworks such as jobs to be done (JTBD).
- We consider a vast array of factors across all STEEP dimensions (social, technological, economic, environmental, political) and identify possible future developments (or ‘projections’) for each of these factors.
- We then assess how both individual and combinations of developments might impact the system under analysis. This is both a rational as well as a creative exercise. We select those developments with the greatest impact.
- It is difficult to work with this unstructured information about the future. We therefore synthesize the most relevant possible developments in the form of scenarios, while ensuring internal consistency.
- We finally challenge this set of future scenarios from various angles to reduce the likelihood that we missed key developments.

Our set of scenarios does not aim to provide a map of all the foreseeable future variability. **We aim to provide a set future statements that we believe are most helpful for strategic decision-makers.**

We strive for a heterogeneity in the sources of data and information. A large and diverse number of people were involved throughout this exercise in the form of workshops, brainstorming sessions, interviews, and reviews. We attended conferences, read lots of books, papers, blogs, and watched our fair share of science-fiction movies.

A note of caution. We try to ground all our statements on empirical (qualitative and quantitative) data. But this data does not give definitive answers regarding how likely a development might be, or what its potential impact might be. The data must be interpreted and creatively expanded. Hence, **our future statements capture our empirically informed subjective beliefs.** To help each of you make up your own mind, we pay special attention to always explicitly discussing our assumptions, reasoning, arguments, and supporting evidence.

If you disagree with our assessments, or if you believe we missed a crucial development/scenario, please contact us. This is a learning journey for us.

¹²⁴ For a more detailed analysis of our future-research approach, see Birte Karoline Manke, Tobias Lehmann, Michael Katz 2020, Applied Strategic Foresight: Learnings from Trend Transfer at SIX, Marketing Review St. Gallen, 888–895.

Note to the Reader

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The views expressed in this paper are those of the authors and core team, and do not necessarily reflect those of SIX or of those having contributed. For more information about this report, please contact us at: research@six-group.com.

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