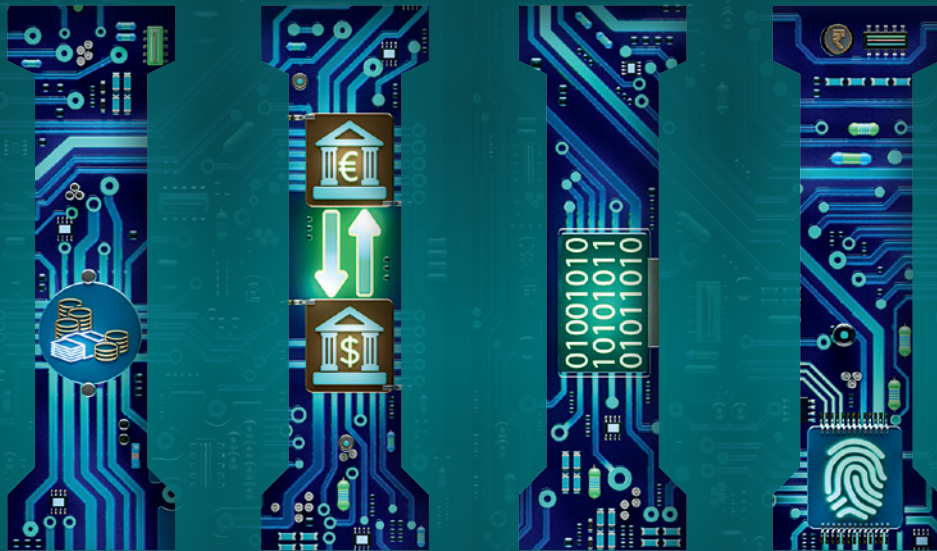
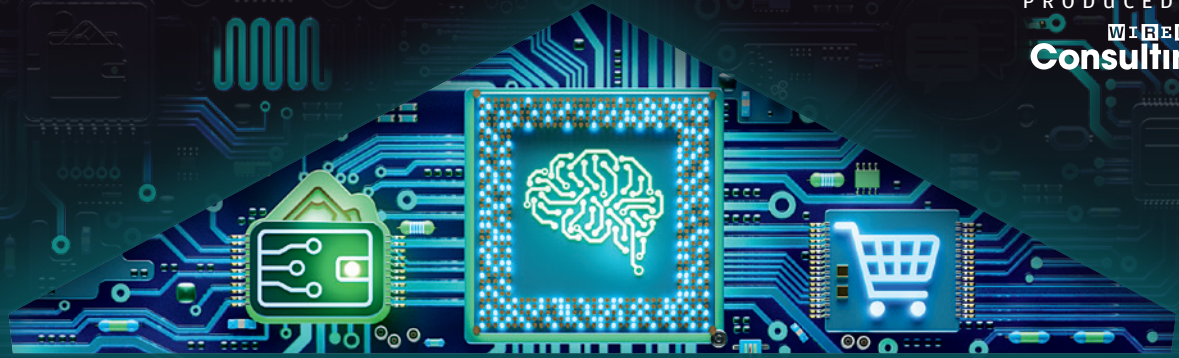


# PAYMENTS UNBOUND

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# BANK TO THE FUTURE

ARTIFICIAL INTELLIGENCE MINTS A NEW ERA

CAN BLOCKCHAIN  
REWIRE GLOBAL  
FINANCE?



ENTER THE RETAIL  
STORE OF  
TOMORROW



# PAYMENTS UNBOUND

## CONTRIBUTORS

Here are a few of the thinkers and innovators who have contributed to the volume...



From digital wallets and blockchain to biometrics and artificial intelligence, new technology is upgrading the hidden circuitry behind global payments.

Discover what the future holds—and what it means for you....

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Bonnie Buchanan, Head of the Department of Finance and Accounting at Surrey University

Jie Chang, VP & Global Head of Digital Commerce at Mondelez Int.

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Tony Craddock, Director General of The Payments Association

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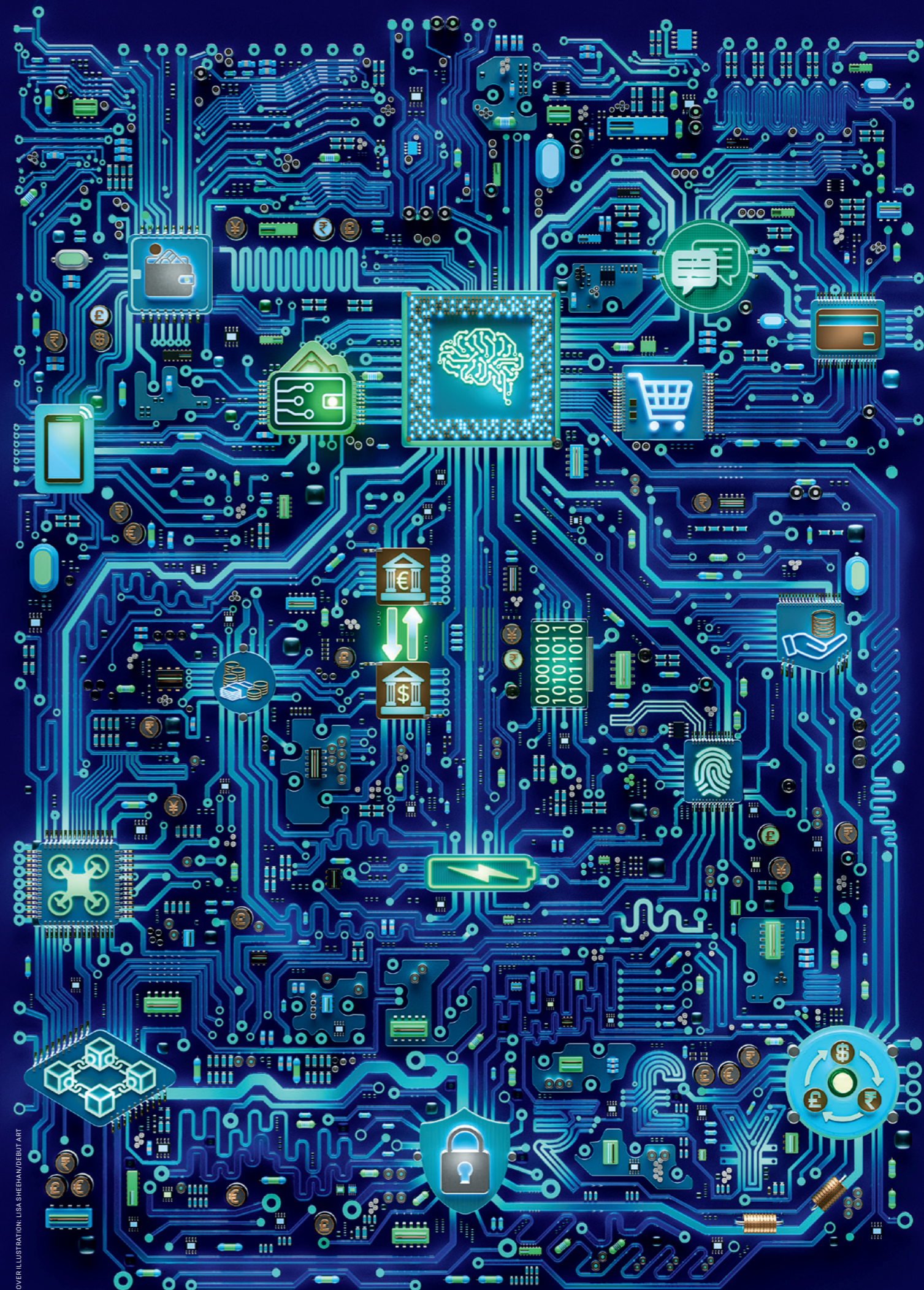
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COVER ILLUSTRATION: LISA SHEEHAN/DEBITART



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# Building a smart grid

FIRST WORD

When you hit a light switch, you just expect the bulb to go on. You don't see the generators, the grid or any of the activities that happen behind the scenes to make it happen. In many ways, payments are the same.

Take a simple credit card payment. In the few moments that the customer is in contact with the point-of-sale terminal, that transaction could have

hit perhaps eight different systems. It will have been back and forth between the acquiring network, the card issuer, and the bank. It will have gone through multiple risk platforms. Both the payment and the user will have been verified. Then there will have been compliance, clearing and settlement, as well as money flowing between multiple institutions. All of that happens in microseconds.

The more invisible a payment is, the smarter it is. If you think about it, that is the magic of ride sharing apps—the checkout experience is to just get out of the car. When the rider leaves the vehicle, the payment is automatically triggered. But that type of frictionless transaction is only possible if there is a partner that is able to handle all the back-end complexity. What people don't realize is when you carry out a payment on most online marketplaces, that's us. J.P. Morgan powers the grid.

As transactions grow in size the process becomes even more challenging. Moving \$10 in real-time is relatively easy, but when it's \$10 million, well, then it starts to get interesting. If you send money to the wrong person, it can be extremely difficult to get it back.

With cross-border payments there's an additional layer of complexity, as there are also compliance considerations and cultural nuances to factor in. In Germany, customers prefer to pay for goods on a 14-day invoice, which is a completely different payment flow to a credit card transaction in the US or a real-time transaction in Singapore. Being able to deal with all these moving parts, while ensuring absolute reliability and security is what makes the hidden world of payments so complicated.

That's why a key focus for the future of payments is proving identity. We are currently shifting



By Mike Blandina, Global Head of Payments Technology, J.P. Morgan

from payments based on credentials such as valid card information to identity-based payments where the transaction is verified by establishing who's actually behind it. There's a variety of ways to do this, because preferences change depending on the age of the customer. Millennials or Gen-Zs are happy to scan their palm. Baby boomers might want to use their phone or other device.

Another technology we think could ensure reliability in the coming years is blockchain, as it could allow financial institutions to securely share information with each other. If banks pooled their customers' account information, it would become possible to validate all the details in a payment before it was sent. You would know for certain it would complete and that could greatly speed up the process.

Innovations like this will ultimately help build a smarter payments grid, in which information, money, and assets can be moved in ways that will power the next generation of businesses.

Of course, all of this work is made possible by the ever-growing prominence of the developer.

Developers create the integrations and experiences that make payments, however large or small, as simple and seamless as flicking on a lightbulb. It's why, with our online Developer Portal, we will make key J.P. Morgan data, APIs and tools available to third party fintechs and firms. We believe the role of the developer and technologists will continue to grow as new payment innovations come to light, and we hope to empower them with the right tools and technology to build their dream solutions.

In this issue we will take you behind the scenes of payments, so you can see how these trends—and more—are transforming this unseen world. The companies and people driving them are quietly impacting all of our day-to-day lives. Enjoy reading their stories, and enjoy the magazine.



# Travel's new flight path

Expedia's Vice President of Global Payments, Jing Yang, on how the industry is navigating the future of fintech

## TRILLION DOLLAR QUESTIONS

fixed the bugs. Every merchant and consumer that transacted with that bank's card is benefiting from our analytics.

**Expedia recently launched a platform that provides payment tools to others. Why does that make sense for you strategically?**

Expedia Group is well known for its flagship traveler-facing brands, namely Expedia, Hotels.com and Vrbo, but we also have a large business-to-business (B2B) segment that powers businesses, like Walmart and SoFi, with our own tech. So whether you are a large bank or a small travel agency and want to break into travel or expand your current offerings but don't want to deal with all the complexity—supplier connectivity, payments processing, fraud prevention, and so on—you can come to Expedia Group.

Making swift, easy payments core to your brand differentiates your offer from competitors. We have built a reliable and scalable platform that ensures less revenue loss and a better platform experience that builds trust with both travelers and suppliers.

**It seems every online marketplace now offers “buy now, pay later” as a payment option. How do you ensure it is being used responsibly?**

There's no doubt that “buy now, pay later” (BNPL) is booming. But businesses must be conscious of the fact that it is a form of easy-to-access credit for shoppers. First and foremost, any BNPL [provider] needs to be financially sound and their practices need to be sound too. My advice is to ask a lot of questions of any provider before onboarding their services.

For example, look at the APR. How does that benchmark against what is acceptable in the industry? Enquire about the underwriting practice, too—make sure they have the right technology to underwrite a customer accurately, so that you can be reassured that you are working with responsible lenders.

**How do you think innovations in digital ID will change the industry?**

Expedia Group recently leveraged digital ID services to level up our customer loyalty offer. We recently launched OneKey, a unified loyalty program that brings together Expedia, Hotels.com and Vrbo so travelers have a universal login and can earn and spend rewards across the brands.

With this universal login, travelers can store their mileage from different airlines and hotels, their passport numbers, and their travel preferences, all in one place. We find providing this convenience keeps the customer within your ecosystem for longer—boosting sales and raising customer satisfaction.



**By Jing Yang**  
Vice President of  
Global Payments,  
Expedia Group



**F**ind managing a single trip stressful? Try overseeing a billion. That's how many the travel tech company Expedia Group has clocked up over the past decade. Now averaging 500,000 transactions across its platform every day, the Seattle-based business processes billions of dollars in payments and refunds each year. Jing Yang, Vice President of Global Payments at Expedia Group, is responsible for ensuring they all go smoothly...

**What's the secret to getting payments right?**

For any business, large or small, I advise capturing as much internal payments data as possible before investing in strong payment analytics and using this data to quickly spot trends and identify issues.

Like many companies, Expedia Group grew through acquisitions. As the company acquired new brands, it assimilated the payments data and consolidated the information into a single global payments platform, making for a powerful bank of knowledge.

In 2022, we prevented nearly \$2 billion in fraud attempts, ranging from fake listings to credit card fraud—and helped not only consumers, but the wider business community. Many times, our business intelligence detected configuration or coding problems on an issuing bank system that the issuing bank itself did not know about. We notified them and they

THE INSIDE TRACK

# START



COMMUNITIES

# WOMEN IN PAYMENTS

**Women are still a minority at the highest levels of the payments industry:** Only 40 percent of fintechs have appointed a woman to their boards. To help improve gender diversity, J.P. Morgan has been collaborating with Women in Payments, a global organization that works to boost women's presence in the boardroom. Here, we take a look at some of the issues, ideas, and inspiring people on our minds right now.

## WHAT NEEDS TO CHANGE?

Two J.P. Morgan payments leaders outline some of the problems facing women in the industry—and how they can be addressed

### THE CHALLENGES

8

More than half the labor force in the United States is made up of women, yet they are highly underrepresented in corporations, particularly the fields of finance and technology, and especially at the senior level. Several factors contribute to this imbalance...

#### You can't be what you can't see

The lack of female representation in leadership positions is the product of a number of issues. Poor training for hiring managers on inclusivity practices can slow women's career growth within organizations. Failure to prioritize the needs of working mothers, such as providing access to paid maternity leave, can damage retention and cause demotivation in the workplace. Another issue is gender stereotyping. Labeling women as "bossy" when they show assertiveness, or framing women as caretakers or nurturers and men as leaders, subconsciously relegates them to certain roles and can ultimately hinder their progression. The lack of women in leadership positions is a self-perpetuating cycle because underrepresentation can discourage the next generation of women from aiming for the top.

#### Your network is your net worth

There is no doubt that who you know is just as important as what you know. Even with the best qualifications in the world, women's careers are often stifled by not being a part of the "old boys' network". Networking and informal hiring often takes place in spaces that exclude or, at the very least, feel unwelcoming or inconvenient to women. Think: Members' clubs, the golf course, or late-night drinks and breakfast briefings that don't work with childcare responsibilities.

#### The "glass cliff" problem

When women are promoted to senior leadership positions, they can find themselves isolated and facing what is known as the "glass cliff". In this scenario, a female leader is left alone and teetering on the edge, while trying to deal with an unsustainable position or an inherited business issue. Empirical data from the UK's University of Exeter and others show women are overrepresented in leadership positions in businesses that are overexposed to high levels of risk, performing poorly on stock markets, or where the leadership role is precarious. Women in these scenarios have often been hired to "clean up the mess" left by previous leadership. The outcomes can reinforce the idea that men are more capable and successful as leaders.



**By Angelica Valencia**  
Executive Director,  
J.P. Morgan

### THE SOLUTIONS

The issues facing women in payments are global and deeply entrenched—but that does not mean they are insurmountable. Here are some of the solutions we can champion...

#### Improve access to industry—starting from childhood

Reaching out to young women and supporting them to study science, technology, engineering, and math (STEM) subjects, or to learn more about payments, is a key way to build confidence from an early age and to promote the industry. This can be done via in-school talks and visits. It can be done by equipping schools' careers advisory teams with information about pathways into the industry. Or it can be about collaborating with, and financially supporting, charities and organizations dedicated to boosting young women's financial and banking literacy.

#### Be the company that makes the change

I believe those of us already working in payments have a responsibility to encourage women to join us and to take steps to help other women access the industry. It doesn't just have to come in the form of big collaborations with action groups. From setting diversity objectives with our HR teams to actively participating in knowledge-sharing forums, or investing our time, capital, and intelligence in underrepresented communities—there is a wealth of measures we can take, both as individuals and within our organizations.

#### Lift everyone up

Many of the challenges facing women are systemic, from lack of access to maternity pay to long-standing social barriers. These all require deep changes to regulations and to global working cultures. The challenges are also intersectional. Age, class, sexual orientation, and race, among other factors, all influence women's access and agency in our industry.

With that in mind, we can deliver combined agendas that make the industry more inclusive to everyone. Professional networks can and should be leveraged to bring different communities together; we find where one underrepresented group is promoted and supported, others are lifted up, too.

Mentoring is another important way to meet other women in the industry and to find role models to learn from, ask questions of, and emulate. This creates communities of women that can support and advocate for each other—vital for preventing the "glass cliff" problem.



**By Christine Tan**  
Head of Payments Advisory for Asia Pacific,  
J.P. Morgan

## ON OUR RADAR...

Two innovative women disrupting the way we pay



**Caecilia Chu**  
CEO and Co-Founder, YouTrip

**When Caecilia Chu was growing up in Hong Kong,** her family was relatively poor. "There's a Chinese word that captures 'life essentials'—*yi shi zhu xing*—what you eat, where you live, how you travel," she says. "My parents taught me to work hard, study hard, and get myself covered in these areas."

This ethos also furnished her with a business idea. "I remember realizing the one thing that cuts across all those essentials is the fact that they must be paid for," she adds. "Payments can impact a person's life in a meaningful way that creates value."

This led Chu to found YouTrip in 2016. Based in Singapore and Thailand, the fintech equips users with a multicurrency digital travel wallet, enabling

them to spend more than 150 currencies without conversion fees. It quickly rose to become Singapore's favorite such provider. YouTrip also has a small- and medium-sized enterprise (SME) proposition, YouBiz, a corporate payment tool that offers one percent unlimited cashback on all card spends, plus the ability to save on foreign transaction fees.

As a woman in payments, she is attuned to corporate tokenism when it comes to diversity. To understand a business's true values, she says, look at their hires, not their marketing. "Actions speak louder than words. The CEO, the key decision-maker, of YouTrip is a woman. That shows what we believe in as a company and how we think about women."



**Irana Wasti**  
Chief Product Officer, BILL

**BILL is a leader in financial automation software for SMEs.** Hundreds of thousands of businesses rely on it to efficiently control payables, receivables, and spend and expense management workflows.

Irana Wasti, BILL's Chief Product Officer, has more than 20 years' experience in the tech industry. But despite this wealth of experience, Wasti admits, "I never had a female manager or mentor." Instead, she looked to the women in her family for inspiration. "I grew up with four generations of hardworking women. My mom, grandma, and great-grandma paved the way for me. They encouraged me from a young age to think about my career, how ambitious I want to be, and how to make the impossible possible."

Wasti says her relatives' ability to get business done in the face of family commitments and challenging economic circumstances is echoed in the success of many female-led enterprises. "I notice that many women-owned businesses start to scale when there is adversity in the economy."

For women starting careers in the payments world, Wasti has this advice: "Don't let the numbers deter you." While there are still too few women in positions of leadership in the industry, Wasti is a believer that this is all the more reason to aim high. "Be the change. Find mentors, sponsors, and allies to back you, and become that role model for future generations."



### OPINION

## GENDER PARITY IS JUST GOOD BUSINESS



**By Kristy Duncan**  
CEO,  
Women in Payments

**Gender parity is a good thing for everybody, no matter your own gender.** It's a good thing for employees, and it's a good thing for organizations at large. There's a simple reason: Businesses make smarter and better decisions when they move to gender parity.

Why? Let us count the ways.

With more women in the boardroom, you have more people who understand and can anticipate the needs and demands of your female stakeholders.

When women are in senior positions, a business

is also equipping itself with people who are typically more risk-averse to manage and mitigate exposure.

By hiring more women, you are providing your company with role models to others at the lower levels of your organization and outside of it, making it a more attractive, aspirational place to work.

As a consequence of all this, you increase innovation. Organizations with women in top management jobs produce 20 percent more patents than companies that are purely led by men. Diversity isn't just about social payback. It also has an ROI.



SOURCES: WWW.JPMORGAN.COM/PAYMENTS/BOUND/SOURCES  
ILLUSTRATION: ANA YAEI

9



1

THE NETHERLANDS

“PAY BY BANK” GOES INTERNATIONAL

In the Netherlands, 70 percent of e-commerce payments are by bank-to-bank transfer (a.k.a. “account-to-account”) via the iDEAL system, a sign of what can be achieved through the combination of open banking and instant payments. In 2023, iDEAL was acquired by the European

Payments Initiative (EPI). This association of 16 different European lenders wants to create a pan-European payments system, and the acquisition heralds the potential for the development of a cross-border account-to-account network.



3

SAUDI ARABIA

LEADING THE MIDDLE EAST IN REAL-TIME PAYMENTS

The Middle East is now the fastest-growing RTP market in the world. RTP transactions are expected to increase at an annual rate of 30.6 percent between 2022 and 2027, reaching a value of \$2.6 billion. This is being driven by Saudi Arabia, which is attempting to modernize its payments infrastructure and increase the

adoption of digital payments as part of its 2030 Vision. With around two-thirds of the Saudi population currently under the age of 25, digital wallet usage is already high, and by 2027, it is estimated that the majority of payments in the Kingdom will be electronic.



2

UK

DIGITAL MONEY GAINS MOMENTUM

The concept of Central Bank Digital Currency (CBDC) continues to gain momentum in the UK, with the Bank of England recently publishing a consultation paper on a potential digital pound, written in conjunction with HM Treasury. The focus will now move onto a design phase over the next two to three years, which will examine the technology and policy requirements, and seek

input from the public. This is happening in parallel with CBDC activity on the continent. The European Commission published a proposed legal framework for a digital euro on June 28th 2023, and the European Central Bank is leading reviews to determine how a digital euro could be designed, distributed and regulated.



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4

GERMANY

WATCHING THE DEVELOPMENT OF PSD3

Open banking is booming in Germany. According to analysts, it has the highest number of third-party providers (TPPs) in continental Europe. These are the companies that use APIs to access customer bank account information in order to provide commercial services. The sector is watching closely, therefore, as the European Commission moves to update its laws governing

digital payments. The upcoming Payment Services Directive 3 (PSD3) framework has ambitious, wide-ranging goals, including “improving the functioning of open banking”. In practice, it will almost certainly require banks and financial institutions to move towards standardized APIs, improving quality and accessibility.



5

BRUSSELS

EUROPEAN LAWMAKERS SAY YES TO DIGITAL ID WALLETS

The European Parliament has voted in favor of creating a European Digital Identity (EUDI) wallet, where citizens can store IDs, health cards and other documents in a smartphone wallet. The goal is to have a digital ID solution available for 80 percent of the population by 2030 (approximately 350

million people). Use cases include payment verification and opening bank accounts, among many others. This will build on the groundwork done by local solutions such as DigiD in The Netherlands and SPID in Italy, and is considered an important step towards creating a digital ID card in the region.



6

NIGERIA

COULD E-PAYMENTS SUPPLANT CASH?

In Nigeria, 63 percent of all point-of-sale transactions were conducted in cash in 2022. Yet e-payments are rising fast, driven by the wide availability of mobile phones. Electronic payments revenue is now growing by 35 percent per year, the fastest across the continent. Other African countries are also rapidly following suit, with the continent’s

domestic e-payments market expected to grow 20 percent per year until 2025. This compares to a global revenue growth in e-payments of seven percent. What’s more, growth is set to remain high for the foreseeable future, as electronic and digital payments still account for only five to seven percent of payments in the region.



REGIONAL TRENDS WATCH

# What’s the buzz in EMEA?

Europe, the Middle East and Africa are proving fertile grounds for innovation...

**E**urope, the Middle East and Africa (EMEA) comprises a diverse set of countries with a multiplicity of cultures, business environments and consumer preferences. What unites the whole region, however, is that payments innovation is typically driven by regulation. To navigate this diverse ecosystem, and the challenges and opportunities it presents, it is therefore essential to understand those regulatory drivers and the payments themes that are taking shape in response.

One driver is new technological standards. The UK, South Africa and Switzerland, for instance, have all migrated to ISO 20022, and the Eurozone has expanded its existing use. This standard aims to move towards one common language for payment messaging, and enrich the data in payments messages for better, faster and more secure processing.

Another trend is the new series of regulations and initiatives in the Middle East that are enabling incredible progress towards real-time payments (RTP), with Saudi Arabia, Bahrain and the UAE leading the way.

And then there are the regulations relating to local programs such as UK Faster Payments and the Single Euro Payments Area, which are evolving as digital retail places ever-greater emphasis on the seamless secure processing of payments. For example, the UK has recently quadrupled its faster payments limit from £250,000 to £1 million.

Payments innovators within EMEA approach this fast changing landscape with expertise, curiosity, and a clear belief that payments can deliver more value tomorrow than ever before. Here are six developments to watch...



**By Sara Castelhana,**  
Head of Payments and Commerce Solutions for Europe, Middle East and Africa (EMEA)

SOURCES: WWW.JPMORGAN.COM/PAYMENTS/EMEA/SOURCES

ILLUSTRATION: MANUEL LEONARDO



# Will air taxis ever take off?

If they do, payments would fly co-pilot

## REALITY CHECK

**F**rom Newark Airport in New Jersey to downtown Manhattan. This journey can take more than an hour by car and yet millions of people take it each year. Which is where Archer Aviation, based in California, spies an opportunity. Using electric vertical take-off and landing aircrafts, known as eVTOLs or air taxis, Archer hopes to enable people to complete the trip in a few minutes, for around \$100 per head.

“We are trying to improve urban air mobility for trips of around 20-50 miles,” says Adam Goldstein, Archer’s Founder and CEO. “That’s trips that take 60-90 minutes on the ground that we can replace with a five-to-ten-minute flight in the air.”

Archer is not alone in its mission. Powered by advancements in electric propulsion—motors, batteries, and electronic controllers—the eVTOL sector has gathered momentum in recent years, absorbing billions of investment dollars and producing a cadre of new businesses. Some of these are backed by major aerospace and automotive companies; startups such as Archer have gone public. According to a report by market research company IMARC Group, the global eVTOL market will reach \$24.1 billion by 2028, growing at an average of 13.6 percent annually. Yet despite the hype, there are still no commercial services in operation.

So, what will it take for the eVTOL industry to break through the gridlock—and what would this new transport ecosystem



mean for the world of payments?

The idea of urban air mobility has been around for more than a century, but its appeal has grown in major cities where the roadway infrastructure is bursting at the seams. In the past, it has been achieved by helicopters, but these are noisy which limits the number you can put in the air. Because they’re expensive to operate and maintain, they’re also generally reserved for the extremely wealthy.

EVTOLs take off and land vertically, just like a conventional helicopter. But since they’re electric, they produce fewer emissions and they’re potentially much quieter. The electric power train enables the propulsion to be distributed across multiple small rotors, which rotate more slowly, rather than relying on a single fast rotor.

This set-up is also potentially safer. The simplicity of an electric motor means there are fewer points of failure, and the impact of a failure is less because there are backup rotors. “With so many rotors you get a redundancy proponent and that redundancy can, in principle, improve safety,” says Farhan Gandhi, Director of Rensselaer Polytechnic Institute’s Center for Mobility with Vertical Lift. “For a helicopter you have one rotor. If that fails you have a disaster.”

There are several configurations of eVTOL aircraft, and they generally carry between two to six passengers including a pilot. The most conventional configuration is

the “lift-plus-cruise”, which uses a set of rotors to lift the aircraft and another set to propel it forward. They don’t need a runway, so can arrive close to the destination, but their fixed wings also enable them to cruise like a plane.

Archer, founded in 2018, has raised more than \$1 billion to launch its 12-rotor, lift-and-cruise eVTOL, called Midnight. By 2030, the company hopes to have 6,000 aircraft in the skies. It plans to begin by shuttling passengers between cities and airports because that’s where there’s particular customer demand. “Not only are the routes unpredictable from a time perspective by car, but you also typically want to build in some type of buffer there, to make sure you don’t have any issues,” says Goldstein. The company intends to launch a route between O’Hare and a Chicago heliport, in addition to the one between Manhattan and Newark, by 2025.

Chartering a helicopter is a complicated process, and for eVTOLs to become part of everyday life, the experience must be frictionless. The fintech world has an opportunity, therefore, to bring the hot field of “invisible payments” to these companies. The capacity of their trip-booking apps to incorporate smart “card-on-file” capabilities, whether through connecting to a digital wallet or securely storing card credentials on-cloud, would enable the payment for the flight to be triggered and completed in the background without the need for passenger input. The consent for the payment would instead

**For eVTOLs to become part of everyday life, the experience must be frictionless. Fintech has an opportunity to bring invisible payments, digital wallets, on-cloud credentials and more to these companies.**

be established at the flight booking stage, leading to a seamless customer experience comparable to ride-sharing apps.

In the future, eVTOLs themselves may come to represent a new platform for next-generation payment integrations. If these vehicles eventually fly longer routes—as some speculate—on-board systems could interface with the digital wallets on passenger phones to enable those passengers to easily pay for extras. This could include in-flight amenities such as Wi-Fi or music, as well as “upon landing” services—imagine disembarking to find a hot coffee waiting for you and a town car ready to go.

But reaching this future won’t be straightforward. Before any company can use their eVTOLs commercially, they must have their systems certified by the regulators, which is time-consuming and expensive. It’s made more difficult because there is a shortage of dedicated technical specifications for eVTOLs. “In principle, the pieces of the puzzle are in place,” explains Gandhi. “What needs to be demonstrated is safety.”

To date, not a single aircraft has been certified by an aviation regulator. In the US, there are four stages to certification with the Federal Aviation Authority (FAA). Archer has achieved the first.

There are also some practical questions about how eVTOLs will operate in a city. Will they go as the crow flies or will there be highways in the skies? How high will they go?

Also: Where will they land and where will they take off? Archer will use existing heliports, but new “vertiports”, as they’re known, will need to be built if

they’re to scale to satisfy the projected demand. In anticipation of offering air taxis by 2026, Dubai has unveiled plans to build four vertiports, each with two launching pads, and there are also moves to build them in various European cities. But it’s not always easy to find space in densely packed urban environments. “The policy part, the infrastructure part, and the regulation parts are lagging behind the technology,” Gandhi continues.

According to Gandhi and Goldstein, it’s only a matter of time before companies obtain the required certification, because they’re already working with the regulatory boards. While this is going on, they expect that the practical preparations for eVTOLs will accelerate. The FAA, for instance, has released vertiport design standards that specify safe dimensions for takeoff and landing areas.

Within a decade, Gandhi and Goldstein expect we’ll see these machines whizzing across city skylines, and as confidence in them grows, intricate networks should too. But how many of them fly, and how often, depends largely on the public’s response.

“There is already a degree of community acceptance in eVTOLs, because helicopters exist and fly these same routes every day,” says Goldstein, “but if you put more of them in the air, that might change.”

Further ahead, provided battery capacity develops, there’s the prospect of those regional eVTOL trips becoming reality. “The question is not whether eVTOLs will become mainstream,” Gandhi adds. “The question is more to what extent.”

**By WIRED**



## COINAGE CORNER

**As the pace of change ratchets up, the jargon arrives thicker and faster. Here are four new terms to help you sound plugged-in...**

### RWA:

“Real-world assets”—such as property, commodities, even payment advances—represented by tokens on a blockchain. But is it the future?

### Naked computing:

Stop giggling at the back. This describes users interacting with a computer merely via gaze and gesture, as enabled by advanced augmented reality headsets. So, no keyboard, mouse, or touchscreen required.

### To architect:

When slick-talking technologists devise a new system or solution, they don’t “design” it anymore—they “architect” it. Certainly sounds impressive.

### Friendly fraud:

A legitimate online purchase that is later disputed (think: your kids levelling up in a game by using your card without your knowledge). With friends like these...

Above: Archer’s Midnight eVTOL craft. Below: Passengers fly in comfort





VISUAL TIMELINE

# The evolution of retail banking

Its history reaches back centuries—and as the world changes, it's undergoing further transformation

**R**etail banking—also known as consumer or personal banking—first emerged in medieval Italy. But fast-forward 600 years, and you will see its transformation has been radical. This is in no small part thanks to major technological and social revolutions that have forced banks to evolve to meet the financial needs of an increasingly broad, and demanding, customer base. Here's how it started and how it's going...

START HERE

1407

**First "deposit and clearing" bank**  
Banco di San Giorgio in Genoa, Italy, is the first to accept deposits, provide loans, and facilitate transfers between customers.



1695

**World's first joint-stock bank**  
Completely disconnected from the state and owned by shareholders ("joint-stock"), the Bank of Scotland is formed to provide banking services to Scottish businesses.

18th/19th century

**Growth of provincial banks**  
The industrial revolution brings economic growth beyond major cities, and local banks start to proliferate, serving the needs of smaller communities.

1967

**First ATM and bank card**  
Introduced first in the UK; two years later, Chemical Bank brings the idea of "24-hour cash on demand" to the US.



1960s/70s

**Electronic funds transfers**  
Digital money transfer networks such as ACH (US), BACS (UK) and SWIFT (International) begin to emerge, increasing the speed and ease of transactions.

1950

**Birth of the high street bank**  
The post-WWII baby boom fuels increased need for banking services. This heralds the birth of the branch-based banking networks.

1933

**Commercial banking breaks away**  
To restore trust following the 1929 Wall Street Crash, the 1933 Banking Act (US), and similar regulations around the world, separate commercial from investment banking.

1980

**At-home banking**  
Channel 2000, a predecessor to online banking, is launched by Bank One to provide customers access to their accounts from home using their telephone and television.

1984

**Telephone banking**  
Introduced by Girobank in the UK, signaling the start of branchless banking.

1994

**Online banking**  
As the consumer internet grows, Stanford Federal Credit Union introduces online banking.

2014-15

**Neobanks**  
The first banks to provide online-only consumer banking services emerge, disrupting the marketplace.

Future

**Invisible banking**  
Thanks to open banking and AI, the consumer will engage less with traditional banking infrastructure. Smart devices will trigger automatic purchases, bank accounts will make intelligent money-management decisions, and embedded payments will make lengthy checkouts a thing of the past.



2017-19

**Open banking**  
Regulations worldwide mandate banks to provide access to customer data. This enables interoperability between financial institutions and third-party organizations.



TWO SIDES OF THE SAME COIN

# What will be the most significant shift in credit over the coming decade?

Credit has been a crucial part of our everyday lives for decades. But over recent years, a wave of technological innovation—big data, algorithms, machine learning—have brought about notable changes. The credit marketplace has expanded, welcoming a raft of startups and new kinds of agile credit products designed to suit new kinds of borrowers. This has spurred traditional financial institutions to evolve, while for regulators it has posed new questions. In this moment of flux, many are wondering: What will the future hold? We asked two experts for their takes on two megatrends...

The rise of "buy now, pay later"



**Christopher Woolard**  
Partner at EY, former Interim Chief Executive, Financial Conduct Authority and Chair of the Woolard Review

"Buy now, pay later" (BNPL) enables consumers to stagger the cost of a purchase over an agreed period of time, often with no fee or interest. Instead, the BNPL provider's revenue mostly comes from taking a percentage of the purchase—and retailers have jumped at the proposition. According to Insider Intelligence, based on current trends, BNPL will account for \$680 billion in transaction volumes worldwide in 2025. Though the explosion of BNPL began during lockdown, it's already evolving again, and we can expect to see more expansion into new categories. You can find BNPL options for rent, gas,

even groceries. In the future it may also become more common in physical shops, particularly for mid- and high-ticket items, because it increases basket size and conversion rates.

As this develops, we can expect BNPL providers to increasingly offer accounts with virtual cards for consumers to store in their digital wallets. That would mean consumers can just tap their device on the terminal at any checkout where that particular provider is accepted. This is already happening in the UK, Australia, and New Zealand.

The rise and maturity of BNPL will spur innovation in traditional credit offerings. Banks are already integrating BNPL features into their credit card programs, particularly to appeal to younger customers. I also expect to see the growth of various hybrid-type credit products so that their customers aren't restricted to specific retailers.

It's not all good news for BNPL providers, however. The ability to offer zero percent interest relies on a low interest rate environment, as BNPL providers often need to borrow to fund their operations. If interest rates continue to rise, these models will become harder to sustain.

Then there's future regulation, which will require BNPL providers to carry out the same kind of affordability checks as banks. This will be good for consumers, and probably for the long-term sustainability of the industry. However, it will significantly reduce the revenues of those whose models depend heavily on customers paying fees for missing an interest-free to a low-interest offer, even if this is a harder sell.

Each type of credit comes with its own nuance. BNPL has its benefits for many customers compared to higher cost alternatives, but first it must overcome these pressing existential challenges around its long-term business model and ensure it meets new regulations."

New data sources expanding access to credit



**Jeff Softley**  
Group President, Experian Consumer Services

"Lenders have traditionally calculated a potential borrower's credit score by reviewing their record of repaying loans in the past. But this data doesn't exist for everyone. In the United States alone, more than 50 million people have a thin or nonexistent credit history.

Relying solely on a customer's traditional credit history can leave broad swaths of the population unable to access financial products, such as credit cards, mortgages, or even straight-up loans. This is why expanding the types of data used to make decisions is so important.

Machine learning and expanded data can create a holistic view of a potential borrower's ability to repay a loan, even without a traditional credit history.

Recurring payments for such items as utilities, cell phones, and rent have not traditionally been included in a consumer's credit history, and for this reason their responsible history for making such payments could not positively impact their credit score. Until recently, there has also not been a sound mechanism for the ongoing reporting of these positive payments because there has been no requirement to report them to the credit bureaus.

As technology develops, so do the possibilities for consumers. Our product Experian Boost enables customers to raise their credit scores by self-reporting payment data for Netflix subscriptions, cellphones, utilities, and more. Since it was launched, four years ago, 90 million points have been added to scores and the average consumer gets a 13-point increase through the platform.

Our internal analysis demonstrates that these categories of payment, which show a continuous commitment over time, are predictive of future credit risk. That's exciting because as our digital footprints grow, there will be millions of new data points that can potentially be incorporated into evaluations to help expand access to credit. The future is about broadening into data across more categories, and enabling consumers to choose which data they share and when.

Advancements in technology will enable us to analyze this data more accurately, paving the way for lenders to expand their business by extending credit to more borrowers without assuming more risk. It also promises a future of greater financial inclusion, because low-income communities and communities of color have been disproportionately affected by limited credit histories. Leveraging expanded data sets and tools enables us to welcome previously underserved consumers into the mainstream lending economy." **By WIRED**



# Meet the developers solving some of the biggest challenges in payments

From upgrading paper checks to tackling new forms of fraud, smart thinking is remaking the landscape

**W**hen it comes to creating a faster, more seamless payments system, there will be no single solution that makes the breakthrough. It will involve entrepreneurs and innovators isolating and solving specific problems and gradually chipping away at the causes of friction.

Here, we take a look at four developer-led fintechs, each of which are focused on solving a separate challenge to help move the payments industry forward...

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**PROBLEM: The widespread use of paper checks**  
**WHO'S SOLVING IT? PJ Gupta, CEO & Founder, Checkbook**

Despite being at the forefront of technological development, the US is somewhat of an outlier in payments—it still relies heavily on paper checks. Approximately 40 percent of business-to-business (B2B) payments are still made using this method. Not only is this slow, it's expensive—the average cost of sending a paper check is \$8. Considering that 12 billion checks are sent a year, this quickly adds up. And then there's the environmental impact of all that paper and the associated delivery miles.

If Checkbook has its way, this would all be a thing of the past. Founded in 2015 by PJ Gupta, who has spent more than two decades as a technologist in the financial services industry, the company has developed a platform that can transform paper checks to online digital payments.

Instead of sending a check, a company that wishes to make a payment will send the information—such as the amount, the recipient's name, email address, and other details—to Checkbook. This can be done with a CSV file or via Checkbook's application programming interface (API)—a way of facilitating the integration of two separate computer systems, allowing direct connections. Once it has the information, Checkbook will then make the actual payment via whatever digital payment method the recipient prefers, such as Automated Clearing House (ACH), virtual card, FedNow or Real-Time Payments (RTP). Many companies do not have the capability to offer these digital payments methods, but Checkbook does, enabling it to convert what would have been a paper-based payment into a smooth digital transaction. It also does all the follow-up with the recipient, ensuring they have got the payment.

Some of a company's list of payees, however, may still want a paper check because it's what they are used to. So, Checkbook will still make the payment and it will actually send a physical check. But it then starts to communicate with the recipient. As Gupta explains, “over the course of time we evangelize them to the ease, and convenience of online payments. Our conversion rate has been very high, it's north of 90 percent.”

Checkbook estimates that in the next three-to-four years, check volumes will fall by 50 percent as companies digitalize and legislation targets this area. However, Checkbook will continue to target the billions of checks still being processed each year. [checkbook.io](http://checkbook.io)

## DEVELOPER SHOWCASE



**PROBLEM: In-house payment tools are hard to build**  
**WHO'S SOLVING IT? Tom Harel, CTO & Co-Founder, Routable**

As companies grow and scale beyond having to make more than a few dozen payments a month, two trends usually emerge. The first is that they are forced to increase the size of their finance and accounting departments so they can handle the higher throughput. The second is they start trying to build internal tools so they can automate as much of the payments process as possible, or as Tom Harel, Co-Founder of Routable describes it, “they stitch together a few different separate Frankenstein-type systems.”

Harel understands the difficulty this can entail, because he started his career building these types of internal tools for companies. Not only is it time-consuming and complex, but many firms just don't have the in-house skills to create effective systems. This is why he, along with partner Omri Mor, established Routable in 2017.

The company is a B2B automation product that allows businesses to send and receive business payments at scale. Routable provides modern and easy-to-use APIs so companies can get access to its advanced payments infrastructure in a matter of minutes, saving time, money, and resources, as this means they don't have to build these tools themselves. The solution integrates straight into the company's enterprise resource platform (ERP), which is used to manage business processes such as payments. Routable can integrate with all of the major ERPs including NetSuite, Sage Intacct, QuickBooks, as well as many other systems.

In addition to extending its domestic payment option offering to enable faster payouts, Routable is expanding internationally by adding ever more currencies. The company is also exploring how to use artificial intelligence to complete routine accounting tasks for clients, such as matching purchase orders. [routable.com](http://routable.com)



**PROBLEM: Digital wallet fraud**  
**WHO'S SOLVING IT? Soups Ranjan, CEO & Co-Founder, Sardine**

Ever since e-commerce first emerged, companies have been battling fraud. As a result, systems to detect anomalous online transactions are relatively well-developed, checking simple indicators such as whether a transaction is coming from a new location, or if there is a sudden change in shipping address. But a new challenge has emerged. How can you identify when funds from a stolen card are used to load a digital wallet when many of the usual fraudulent activity signals will not be present. When money is being moved to a digital wallet, there is, for instance, no

shipping address to check.

This is a problem that Ranjan has seen often. He helped to develop the security systems for digital assets at Revolut and Coinbase, before co-founding Sardine, a fintech that offers fraud and compliance technology that analyzes consumer behavior.

For example, when the payment was being made, was the screen auto-filled by the browser? That is a positive signal, as it suggests that it was the regular user. Alternatively, were the card details copied and pasted? That could indicate stolen credentials. Another area to track is mouse movement, which indicates a live human, rather than a bot. Or, if the fraudster added some automated mouse-movement into their system, is there natural variance, or does it move in a straight line?

As for the future? Ranjan says that Sardine is “continuously improving our behavior biometrics solution, making it faster and also solving for more advanced forms of attacks. Also we've just announced a new product, SardineX, a consortium which is meant to bring together banks and fintechs and payment processors together.” The idea is that different parties will co-operate and share information on the best ways to combat fraud in the new payments environment. [sardine.ai](http://sardine.ai)



**PROBLEM: Legacy financial infrastructure**  
**WHO'S SOLVING IT? Wade Arnold, CEO & Co-Founder, Moov**

Many companies still rely on legacy financial infrastructure for handling payments. This is typically not a problem for traditional e-commerce models, where payments are one-directional—a customer selects a product and then checks out with a card or digital wallet. But online retail is changing. Take a food delivery platform, for example,

which can have multiple payment flows.

Wade Arnold, Co-Founder of Moov, and an experienced software engineer, explains that “some of that money gets split and paid to the restaurant, some of that money gets split and goes to the driver, and some of that money gets split and paid to the platform. That all has to happen in seconds rather than days.” Many legacy platforms are just not designed for two-sided marketplaces. They operate in a linear fashion, have slow settlement speeds and limited payment options.

Moov is a new kind of payment processor that offers ledger infrastructure and helps developers embed modern payments systems in their products. It offers direct integrations with all the major payment rails in the US, and these can be accessed via a single cloud-native API. As a result, Moov makes it easy for developers to set-up pay-in, storage, and pay-out functionalities for their products. Instead of spending their time wrestling with restrictive legacy infrastructures, developers can bypass the existing structures and use Moov's integrations to add the new features and payment options they need. This makes it well suited to the type of complex bi-directional and multi-party payments flows that are becoming increasingly common. Plus, Moov's most critical code paths are free and open source.

One exciting area that Moov is working on is earned wage access. Many workers want to be able to access their salaries more than twice a month. Often what prevents companies from doing this is that they are stuck with standard payment rails that involve days-long processes. “Sometimes they are actually paying in on a Monday before a Friday payroll,” says Arnold. With instant payments options, like push-to-debit or real-time payments, companies could make money available quicker, with no impact on their business, and provide a better experience for their employees. [moov.io](http://moov.io)

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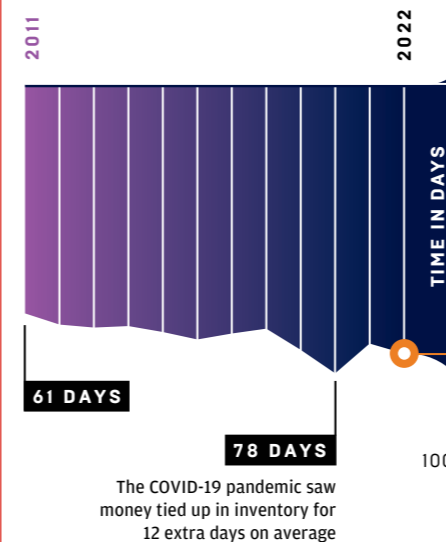
## DATA-VIZ

# Fast money

Turning product into cash as rapidly as possible is a business basic. But how long does it take right now?

## A DECADE IN BRIEF

**HOW DID WE GET HERE?**  
Average time in days to convert inventory back into cash



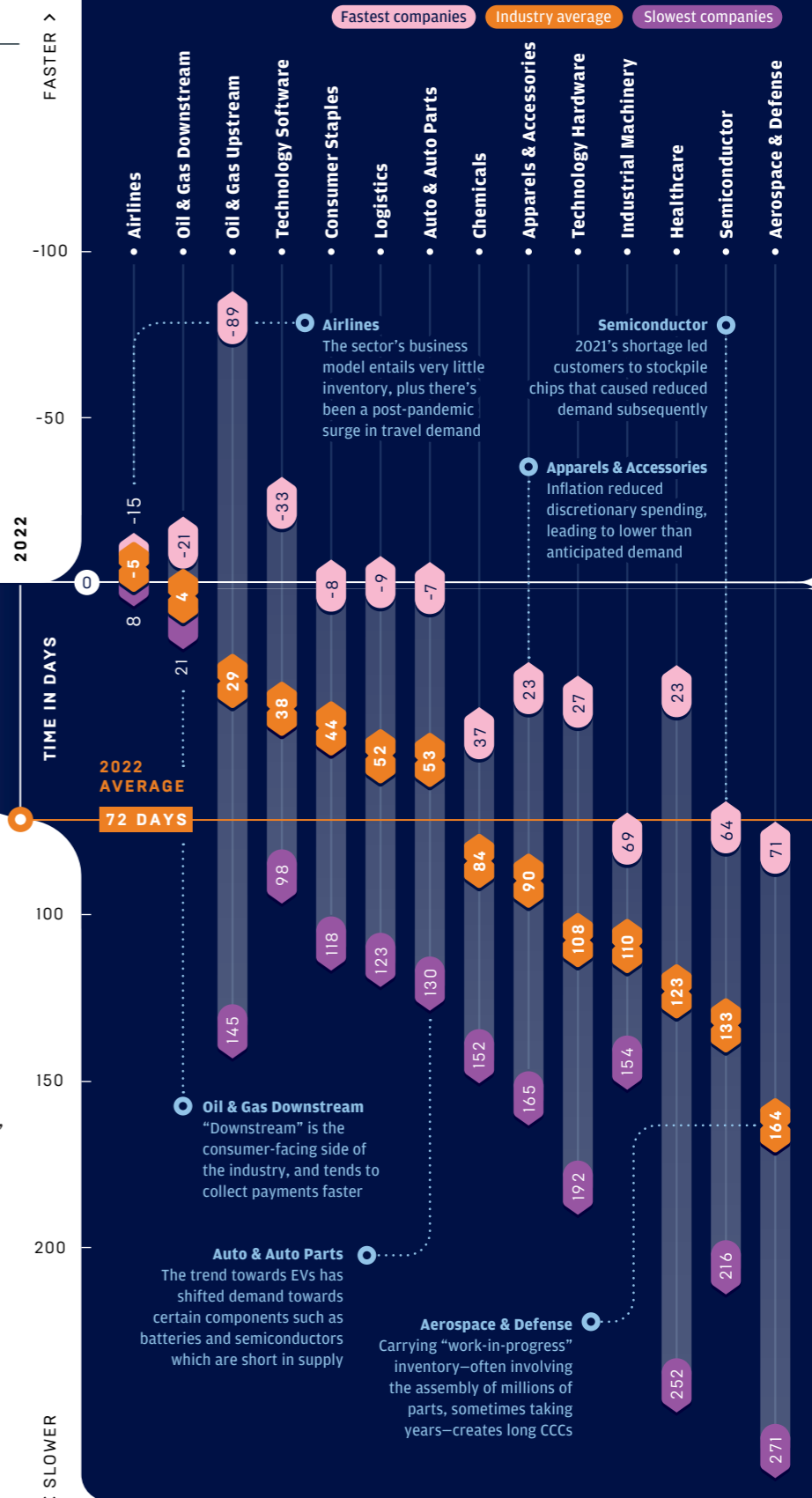
**As the maxim has it:** "Revenue is vanity, profit is sanity, but cash is king." That's why it's vital not to have money tied up for too long in inventory that's sitting in a warehouse. The faster you can sell your product and collect your payments, the shorter your "cash conversion cycle" (CCC). Factors such as higher demand and efficient internal processes all therefore shorten the CCC. And a low CCC is a sign of a company on the front foot: Having greater liquidity means the business is better placed to meet financial obligations, absorb shocks and invest in growth.

So, how has the recent cocktail of global events—the pandemic, the downturn, the war in Ukraine—impacted the average S&P 1500 company's CCC? We visualized data from J.P. Morgan's Working Capital Index Reports to find out...

## A DIVE INTO 2022

### CCC BY INDUSTRY

Corporates saw an average deterioration in their CCC by 2.7 days compared to 2021. In general, this was because global disruptions such as the Ukraine war caused companies to hold more inventory on a "just in case" basis. But how did individual industries fare?



## QUESTION: HOW CAN YOU HAVE A NEGATIVE CCC?

Here's the full equation...

$$\text{CASH CONVERSION CYCLE} = \text{A} + \text{B} - \text{C}$$

**A** Days to turn components into products and sell them  
**B** Days to collect payment  
**C** Days to pay suppliers



# How no-strings-attached payments are transforming philanthropy

Mobile money has enabled “direct giving” to take off—and it’s effective

WIRED OP-ED

**A** new concept took hold in the international development world in the mid-2000s: Microcredit. These small loans for those living on \$2 a day or less were seen as a panacea for lifting people out of poverty, with 211 million borrowers by 2013. Yet the idea soon became controversial largely because some struggled to make repayments. Six microcredit studies published in 2015 found that the effects of these programs were only modestly positive rather than transformative.

Now though, thanks to the huge take-up of text message-based mobile payment services in some of the world’s poorest nations, the idea is back without the catch. “Direct giving” entails sending money directly to those in need but as a donation not a loan.

It’s a fruit of the “effective altruism” movement, which advocates taking action in an evidence-led manner. GiveDirectly, a New York non-governmental organization, is currently leading the way. Its formation was inspired after a raft of peer-reviewed studies showed how powerful direct giving could be. Cash empowers people to change their own lives in the most impactful ways, because individuals—better than anyone else—understand what they need most. Spending money locally also benefits the community by improving trade, employment, and standards of living for other people in the area.

In 2016, the Overseas Development Institute looked at evidence from 165 studies on direct giving and found it often had desirable consequences way beyond core objectives. A program aimed at food expenditure or education, say, would also help people develop savings or investments in livestock or agriculture, helping with self-sufficiency in the long term. In a Malawi village, where residents were given \$50 a month, GiveDirectly found that for every \$100 donated, the total impact was between \$250 and \$270. But just as important have been the studies that show common concerns about direct giving—that money would be spent on alcohol or cigarettes, or that work would decrease—are nothing but prejudicial assumptions.

For donors, the model also holds psychological appeal. It obviates the layers of intermediaries and opaque resource

allocation that can muddy the causal link between donation and impact. If costs are deducted from donations in a transparent way, donors have a clear sense of how their money is directly changing the life of someone across the world. That’s powerful.

The work of GiveDirectly and others has been made possible thanks to the increased ubiquity in developing countries of branchless mobile-banking operators such as M-PESA and MTN. These “mobile money” services allow funds to be transferred via text message using accounts held by the mobile network, or exchanged for physical cash via agents.

The aid applications are broad. Last year, the UN Refugee Agency named direct cash payments as its preferred method of assisting refugees—delivering just under \$1 billion in aid this way in 2022

alone, the majority to Ukraine. As refugees often flee their homes with only the bare essentials, direct cash payments prove a far more effective way for people to acquire the specific items they need.

In the UK, charity Homelessness Impact is currently trialing the first cash-payment scheme for the homeless. It points to a 2018 trial in Vancouver, Canada, which found it not only had the desired effect—people spent more money on food and spent fewer days homeless—but crucially were also able to save, a key long-term step to self-sufficiency.

So where does this go next? Some believe that a “universal basic income” (UBI) is a social welfare strategy that demands further exploration. This entails a regular payment from the government to everyone in the population with no strings attached. There are various approaches, but the basic idea is that these payments are not means tested and are large enough to cover necessities such as food, energy, and shelter. Paid in regular instalments, just like a salary, UBI is intended to provide a basic standard of living, help fight technological unemployment, free up time for training or caregiving, and save workers from taking exploitative jobs out of desperation. Indeed, in June 2023, it was announced that the idea would be trialed in England for the first time, with 30 people given £1,600 a month.

Is it a vision of the future? The jury’s out—but it could turn direct giving into something we all experience. **By WIRED**



20 FRESH THINKING AND PROVOCATIONS

## IDEAS BANK

SOURCES AS PER WIRED, AUG 2023  
OPPOSITE PAGE, IMAGE: GETTY/ANDRIY ONIURIYENKO  
IMAGE: GETTY/MARINA DEMESHKO

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# EVs will disrupt the grid—but they may also save it

It will depend on whether we can rethink how we use electricity, and payments innovations can help

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**E**lectric vehicles (EVs) could soon hit a tipping point. Improvements in batteries and charging infrastructure, alongside national policies enforcing adoption, mean that gas-powered cars may soon look old-fashioned. According to research by the International Energy Agency, EVs will make up 60 percent of new vehicles sold globally by 2030.

That's good news for the environment, but bad news for a power grid that is already groaning under strain. Solving the problem will involve rethinking how we use electricity—and the payments sector could have a role to play.

To understand why EVs are such a challenge for the power grid, consider how the wider picture of electricity production is changing. The carbon cost of using fossil fuels such as coal and gas make switching to renewable energy sources essential in tackling climate change. The problem is that they are intermittent. When the sun doesn't shine, or the wind doesn't blow, they don't generate power. With current technology, it's a situation that necessitates keeping back-up power plants, burning reliable but dirty hydrocarbon fuel, poised to step in.

Owning an electric vehicle increases the average household's electricity consumption by approximately 70 percent, according to energy supplier Ovo Energy. If everyone with an EV charged at peak time, the strain on the grid would be enormous. Clearly, that problem is exacerbated if power generation is unpredictable.

That's where emerging "smart charging" approaches can help. Tariffs that change dynamically—billing less for power when there's a surplus, and charging more when there's a shortage—can incentivize EV owners to replenish their batteries at optimal times. That's not only about matching supply to demand,

**If vehicle-to-grid technology becomes widely available, it would provide a new opportunity for payments providers.**

but encouraging staggered charging to avoid spikes in usage.

For this to be effective, it's likely that appliances such as electric vehicles will have to be able to autonomously make decisions about when to charge and by how much. The reluctance of households to switch energy suppliers to take advantage of clear savings shows how intractable consumer inertia can prove to be.

But the most transformative aspect of smart charging is how it could give EVs a new role in the grid itself. Their cumulative power storage capacity effectively represents a huge distributed battery. A typical EV battery could meet an average household's electricity needs for around four days, says Ovo. Bi-directional charging, which the company is trialing, could allow EV owners to sell their vehicle's power back to the grid when necessary in order to bolster supply. This could play a key role in a wider "smart energy" future that also embraces technology such as in-home batteries and domestic solar panels to create a grid that's more efficient and resilient.

If vehicle-to-grid technology becomes widely available, it would provide a new opportunity for payments providers.

The act of selling back to the grid could simply involve an energy supplier crediting a customer's bill by the commensurate amount. But making it feel more like income—like the consumer has "made a sale"—could nudge more people to participate in these programs.

This could just entail facilitating cash payments to customer bank accounts. But a more complex idea being explored by the financial services industry is how digital wallets could be used to gamify the experience

and build it into a loyalty program. If users accumulated credits whenever they sold power, for example, these could either be converted into cash or spent directly with their energy supplier or a third party in return for discounts.

Right now, these projects are at an embryonic stage. But with net zero commitments high on the geopolitical agenda, it's a future that may arrive faster than we think.

By WIRED

WIRED OP-ED

ILLUSTRATION: MICHELLE THOMPSON  
SOURCES AS PER WIRED, AUG 2023

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# Could “on-demand” be the future of wages?

For many people, inflation means that bills are rising faster than income, which can put them under increased financial pressure. Enter: a new model for paying wages

J.P. MORGAN OP-ED

**In the US alone, more than half the population—58 percent—are now living paycheck to paycheck, according to a 2023 CNBC report. Increasingly, people are turning to less optimal ways to borrow money—leaning on family and friends, taking on credit card debt, and in worse cases, turning to payday loan companies or unscrupulous loan sharks.**

Almost 50 percent of US wage workers have no emergency savings, giving them no cash buffer and making it difficult for them to meet an unexpected bill. Many are forced to cut back on necessities, while others can find themselves falling into debt traps. We shouldn't ignore, either, the stress that comes with constantly worrying about money—often feeding into a vicious cycle of poor financial decision-making.

### Improving financial inclusion

Most significantly, the benefits of EWA can help individuals build better finance habits over the long term, as evidenced by data from EWA-enabling products. This supports the idea that earned money is often used more carefully and rationally than borrowed money, and that EWA could help steer workers away from high-cost unsecured debt. Also, EWA has the potential to reduce absenteeism and boost productivity levels, because it can help workers quickly obtain the means to get to work or receive medical aid when sick or injured.

### How to make earned wage access work—responsibly

Matt Pierce is the CEO and Founder of Immediate, a fintech startup based in Birmingham, Alabama that helps companies offer EWA. He says the financial wellness benefits of EWA, done right, are clear. “Plainly speaking, what we’ve built is a responsible alternative to predatory lending services.” But while pay may be modernizing, bills are not. Larger monthly commitments,

such as mortgage, rent, and utilities, continue to require forethought and budgeting. Perpetually taking pay in smaller increments may make it more difficult to cover these cost-of-living expenses. Ideally, EWA should be an opportunity to meet urgent needs without resorting to high-interest-rate alternatives, and should not create additional burdens.

Ethical lending principles are therefore essential, Pierce says, if EWA is to be effective. “We do it responsibly and flexibly,” he explains. “We believe in caps and guardrails. For example, we don’t think people should get paid every day. We don’t force people into opening a new account and getting a new card to access EWA. We meet people where they are and allow them to responsibly access and move their money.”

Pierce is excited about the future of EWA and predicts exponential uptake over the next decade. “The [user] market is still less than 20 percent penetrated. So there’s huge greenfield opportunity here. This is a solution where we can really impact millions and millions of lives, and help them improve, financially. My opinion is that by 2030, every company, at least in the US, will be offering some shape or form of this.”



**By Julie Offen**  
Executive Director,  
Global B2C  
Payments,  
J.P. Morgan

### Rethinking income

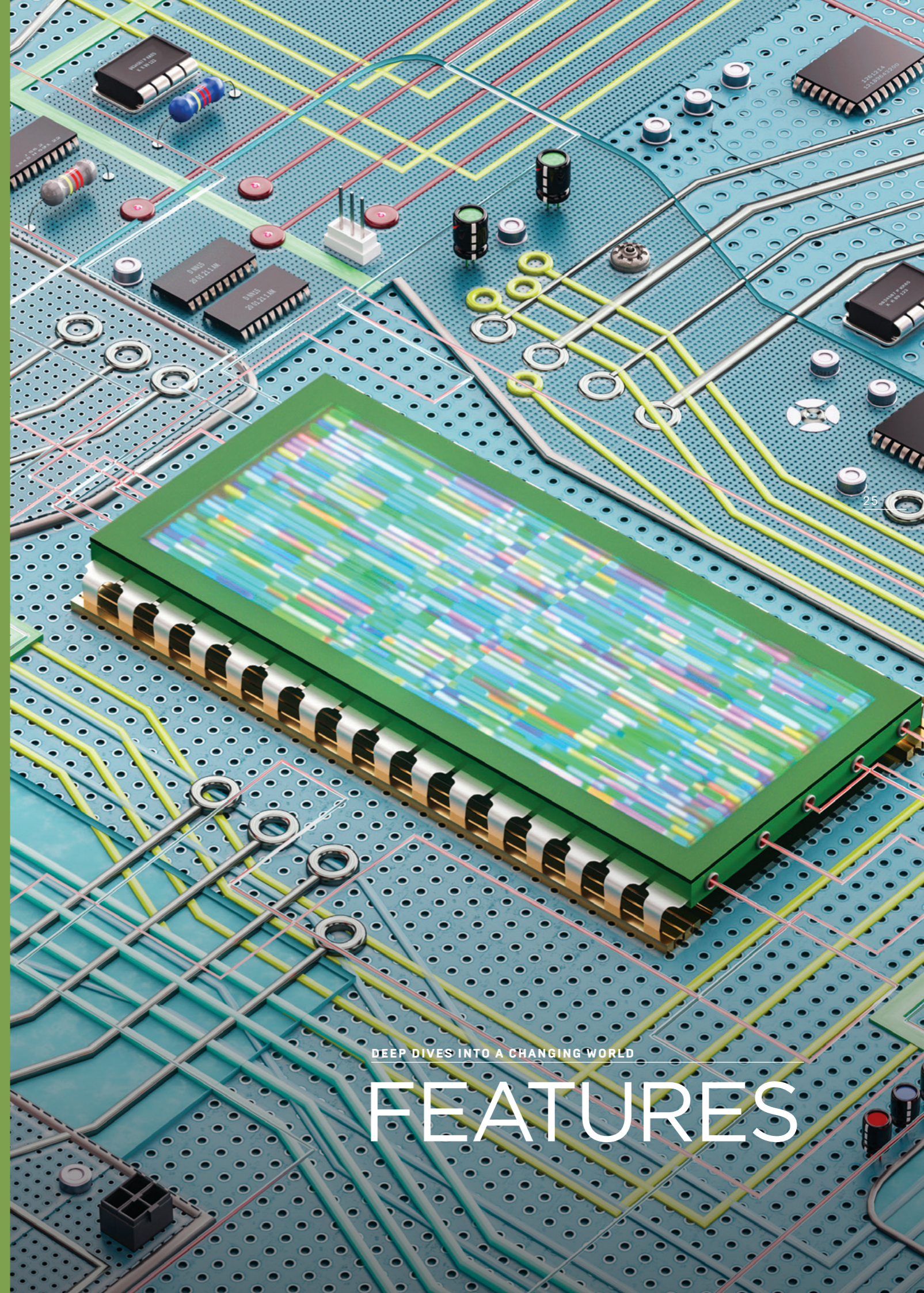
The good news is that an alternative to these stressful scenarios is emerging. In an effort to support financial security for their staff, many employers are now offering “earned wage access” (EWA) as a solution. This means giving workers access to the money they earn as soon as they earn it. It sounds like a simple idea, but in reality it represents a major change to how remuneration has traditionally been organized.

In the US, the majority of salaried employees are paid on a weekly or bi-weekly basis. In Asia-Pacific, monthly cycles are the norm, while in Europe, it can vary depending on the country and role. Meanwhile, freelancers and gig workers have little structure. They account for more than one third of the labor force in the US—but almost 75 percent do not get paid on time.

EWA allows employees or contractors to draw down their earned wages prior to a typical payroll cycle. For example, some workers may want to get paid twice a week, or even daily. But what if a worker could get their money directly into their bank account or to a digital wallet as soon as a shift is finished? What if a delivery driver could receive payment after each delivery? Platform companies, such as ride-hailing firms, could use EWA as a competitive advantage to reduce churn and ensure they have access to the best workers. But all types of employers can use EWA as an incentive, allowing their workers to access the money they have earned, faster and more efficiently.



IMAGE: BETTY/ANTON VIERETIN



DEEP DIVES INTO A CHANGING WORLD

# FEATURES



# Endless aisles. No checkouts. Total immersion.

Welcome to the phygital store of the future

ILLUSTRATION: JAMES GILLEARD





When Sears opened a new location on the outskirts of Rochester, New York, in 1990, it was one of the largest retailers in the world. Its pioneering idea had been to shift department stores, once the gleaming centerpieces of major cities, to suburban locations, where middle-class customers were increasingly located, and parking was ample.

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That same store, long since shuttered, is now undergoing another transformation. It's the latest in a long line of vacant Sears sites being redeveloped—in this case for retirement housing. It might seem like a fitting metaphor for the fate of traditional brick-and-mortar retail as it faces the ongoing e-commerce onslaught. From a peak of 3,500 locations, after its merger with KMart in 2005, there are just 15 Sears stores left. Many of America's malls are facing a similar fate. Often, online retailers snap up the empty locations to turn them into fulfillment centers.

Yet shift your focus to Asia and it's a different story. Physical retail is booming. In China, for instance, major brands are expanding their physical footprint—Starbucks is planning to have up to 9,000 stores in the country by 2025, Lego is opening another 80 in 2023, and China alone accounted for 40 percent of all luxury brand openings in 2022. So what's different? One answer is that rather than try to compete with online retailers, a new breed of store is taking digital technology and using it to enhance the in-person experience. Take S'Young International, a Chinese beauty brand specialist, which has recently opened a flagship site in Changsha. This innovative space includes AI-powered make-up consultations and tailored recommendations from virtual assistants. Customers can purchase products in the store or use a QR code to buy from

Digital screens can augment physical shopping aisles



online platforms. Other retailers are tapping into the “instant retail” trend—combining online orders with ultra-fast delivery (via “quick commerce” services such as Meituan)—to raise their offline sales.

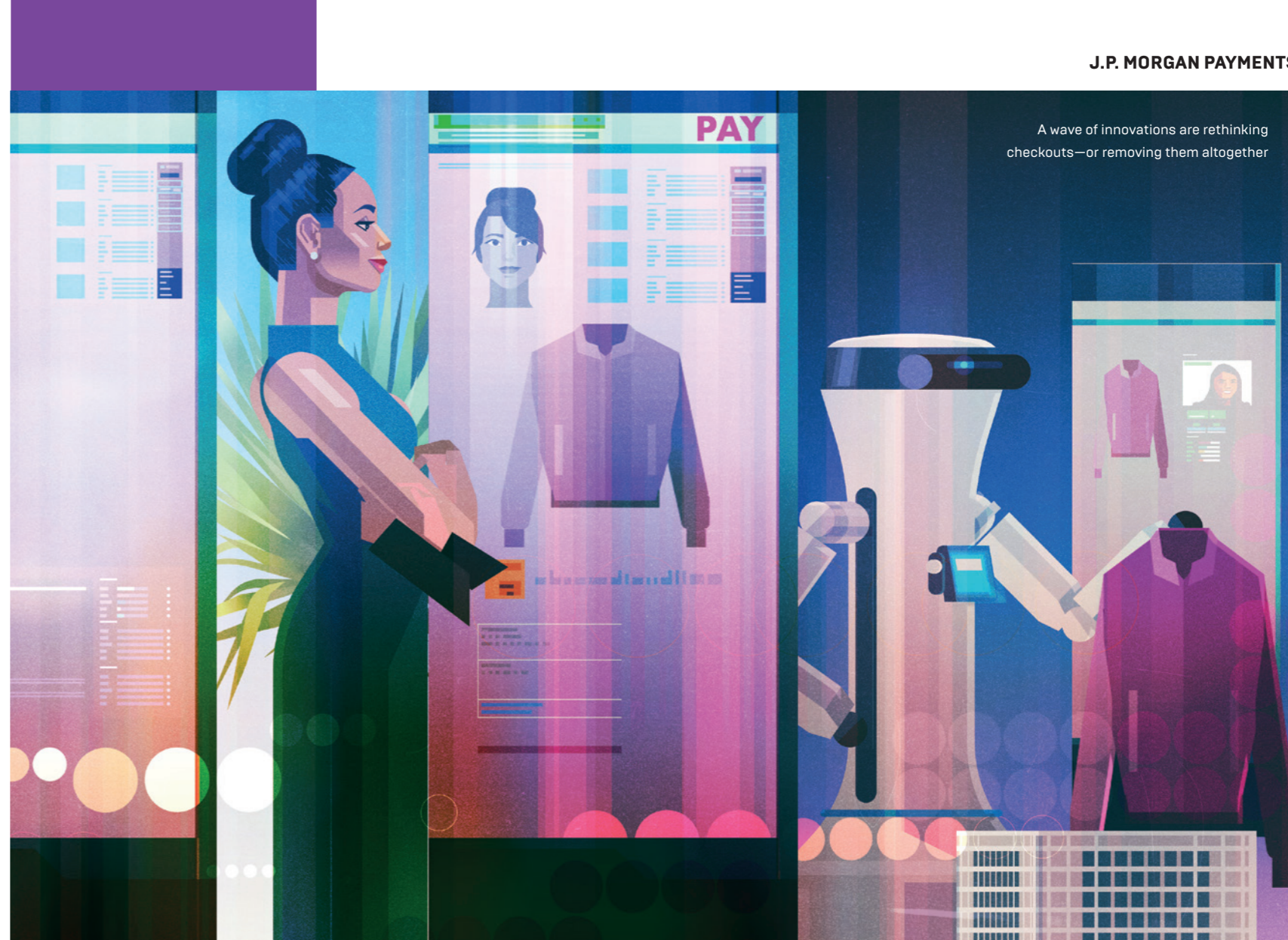
Western brands are also innovating, experimenting with new technologies such as driverless delivery and virtual reality experiences. Far from becoming a distant memory, stores could be set for a new lease of life that blurs the lines between the physical and the digital—a state that marketers refer to as “phygital”. So what are the emerging trends that could define the future of retail, and what will that mean for payments? Join us for some informed speculation...

### Death of the queue

Many shoppers, when faced with a long checkout line, have felt the urge to simply walk out of the store. Now they can, taking what they want without fear of arrest. Drawing on a combination of sensors, cameras, and radio frequency identification (RFID) tags, a store can track the items that customers pick from shelves. When they leave the premises, the goods are automatically charged to their online account. Once considered a novelty, checkout-free stores are predicted to grow globally from 250 in 2021 to 12,000 by 2027.

For stores that don't wish to do away with checkouts altogether, there are a number of other innovations that instead seek to make the experience faster and more convenient. One is facial recognition systems. Already established in Asia, “smile-to-pay” is growing in the US and Europe and can dramatically reduce wait times. Another approach is for shoppers to use their smartphone. Jie Cheng, Vice President and Global Head of Digital Commerce at snacks company Mondelez International, recalls visiting the FairPrice store in Singapore recently, where customers use their smartphone to scan the barcode of products as they put them in their basket, redeem loyalty points and then pay directly on their phone. They only need to verify their digital receipts with the large scanner screen right before they leave the premises. “So the whole transaction is happening on their mobile app while the person is in the store,” she says. “It is really a very integrated, blended experience. I believe Sam's Club in the US also uses similar ‘scan and go’ technology in their stores. It's certainly become more common now.”

Whatever the technology, the goal is to improve the last step of the shopping process. “Having a more fluid checkout is so important, whether it's paying by tapping your watch to a store associate's phone, or smiling at a camera at the checkout area,” says Lucia Li, who leads Advisory for the Consumer Goods and Retail team at J.P. Morgan Payments. “Online retailers know if you make it difficult to pay, you lose the sale. Brick-and-mortar are catching on and are looking for ways to reduce friction for consumers to complete that final step in the customer journey.”



A wave of innovations are rethinking checkouts—or removing them altogether

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### Endless aisles

Stores will continue to stock physical items because people enjoy the experience of being able to see, touch, and feel the goods that they are buying, and having a sales associate guide their decision-making. After all, this is why customers don't always order online. But new innovations are focusing on bringing the key elements and benefits of digital commerce into the physical space to elevate the customer experience.

Consider product aisles. Interactive screens in-store can show an extended range of options that aren't on the premises, giving customers near limitless choice, alongside the kind of additional product information often found in e-commerce listings. One footwear brand, for example, has used an interactive 3D screen to display hundreds of sneakers, with customers able to zoom in on any they like and take a 360 degree view. This idea can also be brought into fitting rooms, with smart mirrors that use a version of augmented reality (AR) to show you how a piece would look in a different color or style, without having to try it on. A number of startups are already operating in this space.

It is also possible to use those screens to personalize the experience. Having identified the customer—perhaps via a near field communication (NFC) beacon or having them sign in with their membership account—and analyzed their preferences and past interactions, the displays could show relevant information, targeted storytelling, or tailored

recommendations. That might be a clothing size, a recipe pairing based on previous purchases or, if a customer is interested in environmental issues, a short film on how the product was sourced.

Clearly, once those screens are part of the experience, they could also be used to ask for an associate's assistance, place orders, and pay. What's more, the pricing could be dynamic, reflecting factors such as inventory levels or wider commodity values. Customers could even be given a choice to order products at a later date, when prices are expected to be lower, like a mini-futures contract.

Dynamic pricing is already happening among online wholesalers. Frubana is a digital “one-stop-shop” in Latin America that connects restaurants and produce suppliers. “Customers can track prices on the app, and if they send a purchase order by 8pm they receive delivery the next morning,” says Gabriela Soares Bertho, the company's Head of Finance Brazil.

Stores that don't wish to install digital displays could co-opt customers' personal devices, which would also solve the problem of having to identify the customer. “If you have the app in your hand, and it knows your location, and knows even what you shop for, it can give you recommendations or point you to exactly where you want to go,” says Nainesh Nayudu, Director of Product Management at grocery chain Albertsons. One use case could be special offers, agrees Cheng. “When the shoppers walk through each aisle,” she says, “relevant promotions could pop up on their app.”

## INNOVATIONS ARE FOCUSING ON ELEVATING THE IN-STORE EXPERIENCE





Immersive experiences will give customers more reason to shop in-store

DISCOUNT WINNER

SPEND LOYALTY POINTS

### Rise of the “dark store”

If Sears could become a retail titan by designing around the car, then future stores may compete by eliminating the need for customers to drive there. What if shoppers no longer had to load up their SUVs with the weekly shop; what if, in fact, they didn’t have to carry any bags at all? Instead, as they move around the store, they could simply scan QR codes on physical items or choose products from in-store digital displays. Items they wanted then and there could be readied for collection in automated fulfillment portals near the exits, while anything else could be delivered to their home or another location via a same-day or even same-hour service. “Whether the customer starts online or in-store, you could have an increasing interdependency between the channels,” says Nayudu.

This type of flexible fulfillment would be aided by the rise of “dark stores”—mini-urban distribution centers that look much like regular stores but are closed to the public. Moving up and down the aisles are automated forklifts and robots that can detect, pick, and pack products for delivery. AI-based delivery platforms plot the quickest routes for the delivery drivers, although these too may soon become optional if delivery drones take off. By 2030, there are expected to be 45,000 dark stores around the world.

This shift would allow retailers to increase incremental sales by removing the friction caused by customers needing to carry purchases out of the store, and provide new opportunities to grow revenue by offering those delivery services.

**BY 2030, THERE ARE EXPECTED TO BE 45,000 DARK STORES AROUND THE WORLD**

### Immersive experiences

If retailers can remove major friction points around checkout, payments and fulfillment, then customers will be increasingly free to focus on the act of shopping itself. This is leading to a rise in what analysts have dubbed “retailisure.”

“I think with in-store you have more opportunity to widen the sale, to get more out of that consumer, because they’re enjoying the experience,” says Jennifer Acosta, Global Head of Media and Telecommunications at J.P. Morgan. “It’s not just the products. It’s the mood. It’s the feeling. It’s the ambience.”

One luxury retailer in Beijing has a “Mars Zone” in one of its stores, with life-size space vehicles and immersive, interactive experiences that take the shopper into the Martian landscape. Another floor is called Future Farm, and includes pens of robotic sheep and an interactive mirror where penguins mimic the movements of customers. Other retailers have carved out space for experiential stations within their physical locations. At UNIQLO, for

example, there is a real-time online shopping experience called Live Station, hosted by stylists and staff members. At Levi’s stores, the SecondHand offering allows customers to trade in their pre-used Levi’s items in return for gift cards.

These new concepts address one of the weaknesses of pure e-commerce players. For all their efficiency and convenience, they can also seem cold and functional. It’s hard for them to evoke positive emotions and connect to the end consumers. This provides an opportunity for brick-and-mortar retailers.

SOURCES: WWW.JPMORGAN.COM/PAYMENTSUNBOUND/SOURCES

Increasingly, they understand that modern shoppers—especially younger generations—don’t just want spaces that they can browse; they want something exciting that can only be done or experienced in-store. That’s also leading them to double down on entertainment, engagement, and interaction using the latest tools at their disposal, such as virtual reality (VR).

Stores may start developing VR-based games that facilitate purchases—imagine a sports store with a realistic golf simulator that allows you to win discounts or store credit for good play. “Think about the huge population of gaming participants and how much it’s growing,” says Acosta. “Being able to have that experience in a store, with other people, as opposed to just behind a screen in your room, will be a super interesting development.”

### The store as a factory

The trend across the digital economy is towards personalization. This may come into physical stores as advances in 3D printing—which allows objects to be created from digital designs by robotically building them up in layers—enables products to be produced to order. For example, there are eyewear brands that allow people to scan their face and have customized frames made that match their features.

Imagine where this could go next. Shoppers could have the option to modify a brand’s product with their own ideas, and then have the new version created in-store, in a dedicated section. Creators could then share their designs for the best “mods” on a digital marketplace, making them available to other brand enthusiasts. Access to this platform could involve a small subscription payment, while revenue sharing models could incentivize people to contribute ideas. This, in turn, would allow brands to gain more control over the fast-growing customization market,

which some are concerned about due to trademark and copyright issues. Custom shoes are already big business, with sales expected to top \$1 billion by 2030, driven by the availability of 3D printing and e-commerce platforms. There is huge potential for growth in other apparel areas, as well as sports equipment such as bikes and skateboards.

### So what does this mean for the “store of the future”?

Consumer demands for more choice, greater personalization, and unique seamless experiences across all aspects of their lives are only going to grow. As retailers deliberate the future of their physical footprint, many believe they will need to match these expectations—incorporating digital tools and seamless experiences into the physical space itself. They will need to create a new “phygital” world where customers will no longer have to follow a linear, formulaic journey in-store.

But there are benefits to retailers as well. The more connected and engaged consumers are—across any and all channels—the more data becomes available. Retailers can use this data to not only inform their decisions on new stores and store strategy—from merchandising to marketing activations to location choice—but to also monetize it as a new source of revenue by providing similar insights to brands they work with.

As with all retail trends, a fit-for-purpose payments system will be crucial to their success. “After all, without ways to monetize these concepts, they won’t be sustainable,” says J.P. Morgan’s Lucia Li. “Whether it’s the ability to shop and pay

real-time, a frictionless checkout with a tap or swipe of your palm, or embedded finance and banking options, the payments system is a crucial piece of the puzzle to help retailers and brands win over consumers in this increasingly competitive landscape.” **By J.P. Morgan**

**3D PRINTERS COULD CREATE CUSTOM PRODUCTS ON DEMAND**

3D printing may power a new era of customized products





WIRED SPECIAL FEATURE

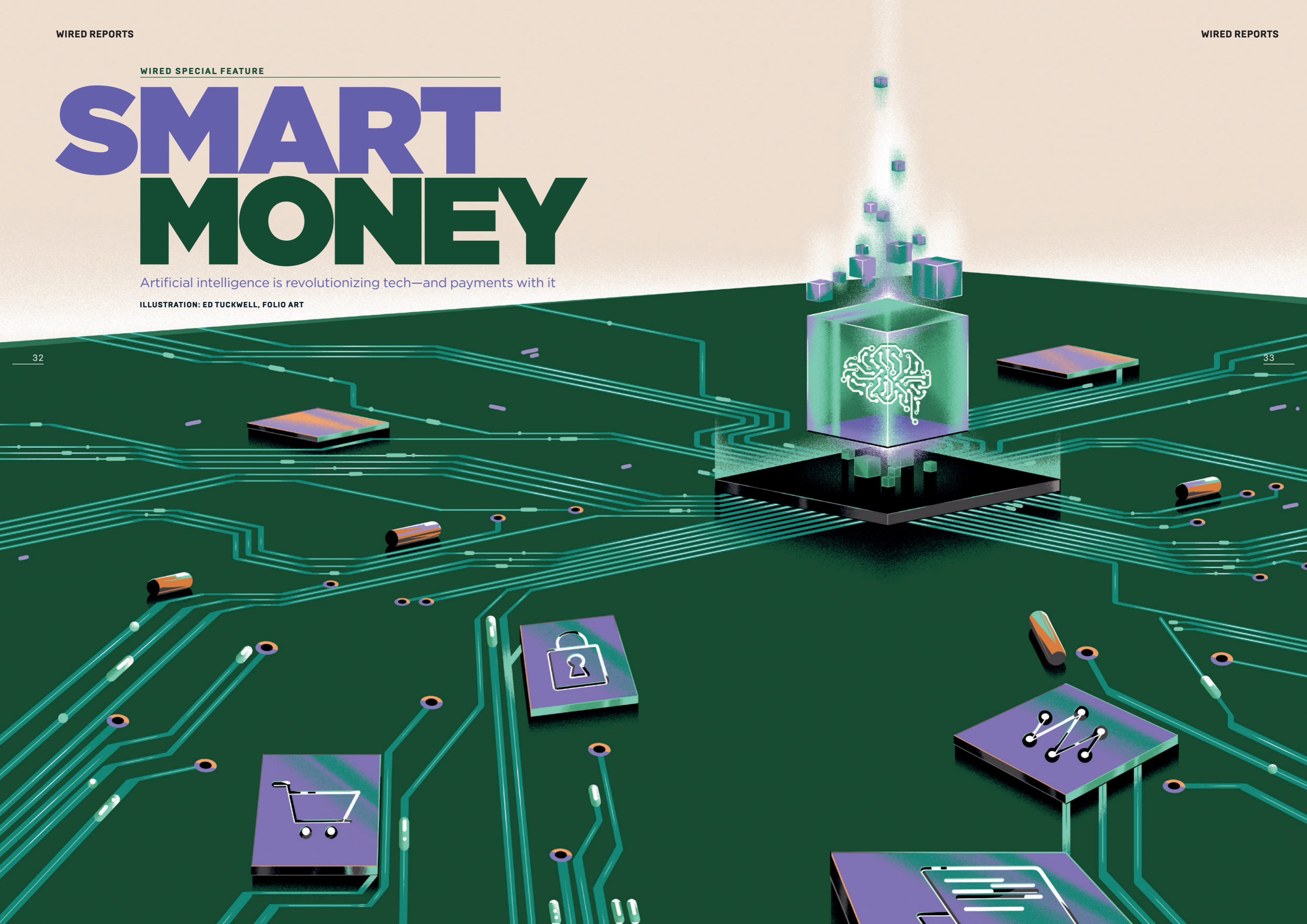
# SMART MONEY

Artificial intelligence is revolutionizing tech—and payments with it

ILLUSTRATION: ED TUCKWELL, FOLIO ART

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Right: Artificial intelligence is unlocking new opportunities for payments

Ralph Schneider's big idea came to him back in 1950. The lawyer was struck to hear his client, Frank McNamara, regale an embarrassing incident when, in a Manhattan restaurant, he had the dreaded realization that he had forgotten his wallet. McNamara had to wait for his wife to drive in from the suburbs to pay. There should be a system where people could pay for their meals later, Schneider thought. So together the pair created Diners Club, the world's first credit card. In exchange for \$5 a year, Diners Club members received a cardboard "credit identification card" enabling them to put meals from participating restaurants on a tab, and then settle up by check at the end of the month.

Schneider's idea anticipated a shift that would liberate the idea of money from physical cash. It was the beginning of a series of innovations that have revolutionized payments over the past 70 years, taking them digital, international and, more recently, mobile. "The payments industry evolves in waves," says Tony Craddock, Director General of trade group The Payments Association. And now, he says, we are on the cusp of a new wave that is set to reshape our experience of payments all over again: artificial intelligence (AI). "It is going to be a bigger wave than we've seen before."

AI is an umbrella term that describes machines simulating the capabilities of human intelligence. AI has been part of computer science for decades, but in the last 10 years it has made particular strides. This has been fueled by the rise of machine learning (ML). In simple terms, ML involves an algorithm ingesting vast amounts of historical data to discern patterns. These patterns then allow the algorithm to make sense of new data.

ML has been a boon for the payments world, as it helps address a number of core problems. One major use case is routing money around the planet's patchwork system of "payment rails", the dedicated networks that make electronic transfers possible, and automating the authorization and completion of those transactions. Another is credit scoring—crunching often disparate data points to judge risk. The ability to do this on the fly, especially with non-traditional data sources, has powered the recent wave of "buy now, pay later" credit offerings. But ML has also added value in a multitude of smaller

ways. It is the force behind business tools that can analyze transaction histories to model future scenarios; it is the reason that payment errors are more readily detected and more easily resolved; it is the functionality that lets accountancy software read digits on invoices for automatic reconciliation. Moreover, ML is critical in detecting and preventing fraud.

But a new type of AI is beginning to gain a foothold. For years, ML has mostly been about "predictive" tasks, in the technical sense of predicting the correct classification of new data. This year, however, the world's attention has been drawn to staggering advances in "generative" AI (gen-AI). These are models that can produce new content. When OpenAI's ChatGPT burst onto the scene in November 2022, it sparked particular interest in the capabilities of "large language models" (LLMs), a class of gen-AI algorithm that can understand and generate text. Users were suddenly confronted with the range of tasks that an LLM could help them do—summarize vast amounts of information, debug code, or write emails. And it could do these things well. "I've been in AI for 30 years," says Manuela Veloso, Head of AI Research at J.P. Morgan. "This is a major advancement."

With their natural language interfaces, impressive output and ability to wrangle large, unstructured datasets, gen-AI tools have caught the imagination. They not only represent a new, conversational way to interact with machines, but a way for machines to perform tasks that were previously thought to be the preserve of humans. This has spurred the digital economy to embrace gen-AI with gusto, prompting entrepreneurs to launch new startups, and tech giants to rapidly introduce new software features. It has, in turn, put the AI field as a whole center stage.

This new era of gen-AI is set to bring yet more changes to the world of payments. On the one hand, it will ratchet up the speed of innovation, because LLMs can function as a "copilot" to help write computer programs. "Developers will spend less time writing lines of code and more time designing new statistical models and mathematical tools for actuarial challenges," says Daragh Morrissey, Director of AI at Microsoft Worldwide Financial Services. This should shorten prototyping and deployment cycles for pay-tech developers. It may also assist merchants in integrating those new products into their own systems. An LLM trained on the developer's support documentation, or on a merchant's own documentation about past implementations, could enable a chatbot to field specific technical queries.

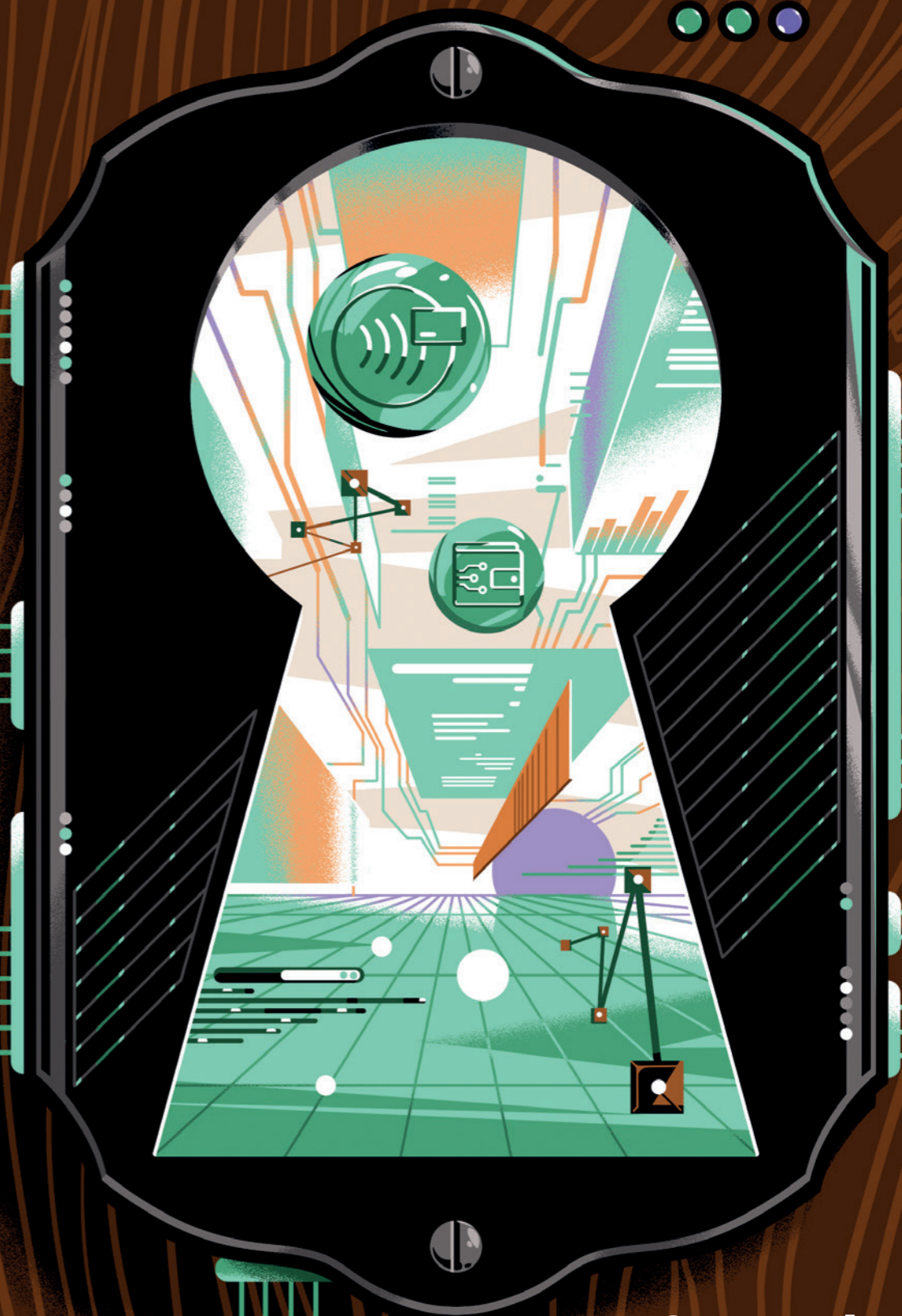
But what new ideas could AI unlock for payments themselves? Here are three nascent concepts that may have an impact in years to come...

### 1. PAYMENTS DATA THAT TALKS BACK

Virtual assistants were helping banking customers long before anyone had heard of OpenAI. Gen-AI may usher in a new generation of these tools, allowing users to have more personalized, conversational interactions.

On the one hand, this means better customer service. On the other, it could mean enabling customers to get more insights out of their payments data—and it's arguably this that would be the more profound shift. Being able to query their data via a natural language chatbot would mean customers wouldn't have to know how to use data manipulation tools, or limit themselves to an app's pre-set data analysis features. Instead, they could simply type "What categories am I spending more money on this year compared to last year?", for example, and

SOURCES AS PER WIRED, AUGUST 2023



**“Generative AI can move fraud forward at an industrial pace.”**

DAVID BRITTON, EXPERIAN



in response receive a natural language answer.

That's a vision that Microsoft believes could become reality. The Microsoft 365 productivity suite is already introducing an LLM-based "Copilot" to tools such as Excel and the business intelligence product Power BI. "We are enabling you to have a conversation with data," says Microsoft's Daragh Morrissey. "With Copilot in Excel, you can ask natural language questions to identify key trends and insights, generate visualizations, even explore 'what if' scenarios. With Copilot in Power BI, we can do all this and more with real-time analysis of data—with text summaries that update in real-time as the data changes."

To those familiar with LLMs, this might seem counterintuitive. They are not designed to understand numerical data and solve mathematical problems. Anybody who has tried to use ChatGPT to do even basic arithmetic will know this all too well. The workaround for data analytics tasks is for the LLM to take the user's natural language request and turn that

into an instruction that can be passed to a dedicated analytics engine—or converted into ad hoc computer code. This separate entity can then perform the required task and return an accurate result that can be expressed to the user in an easy-to-understand format, whether that's a graph or LLM-generated prose.

Microsoft is helping organizations bring this kind of LLM-enabled analysis to their payments data by allowing them to integrate Copilot with their systems. "We do this through 'plugins', and these enable new use cases where you can bring transactional data right into your Copilot," says Morrissey. "This will make it easier to embed Copilot capabilities into your mobile apps, and enable your customers to plan finances, ask questions about their account, and identify trends and patterns."

LLMs could allow chatbots to become more proactive, initiating tailored, context-aware conversations to help users make better payments-related decisions at the right moments. "Intelligent spending advice could remind consumers how much of their budget they've spent in areas such as dining or retail, so they can adjust their spending habits accordingly", says J.P. Morgan's Manuela Veloso.

For businesses, this kind of smart, accessible data analytics could be an especially powerful tool. Payments data could be released from its silo and more readily used to inform decisions in an accessible way across departments, drawing on real-time insights that aren't limited to what happens to be displayed on fixed data dashboards. Analysis of buying behaviors and transactions, for example, could help improve customer loyalty or influence marketing campaigns.

Financial institutions are already experimenting. "For our first wave of use cases and proof of concepts, we see banks innovating with generative AI inside their organizations and we are working with banks to help them leverage this capability to help understand patterns and trends in the payments transactions," says Morrissey.

The potential direction of travel is obvious: Could we one day have a chatbot that can independently offer nuanced, sophisticated financial advice? There is a challenge to overcome. LLMs have a notable error rate—they have a tendency to "hallucinate", to use the jargon—which is a

problem for high-stakes fields such as finance. Tackling this is a priority for AI companies, and the impact of gen-AI will likely be determined to a large degree by the extent to which this problem can be solved. There are a number of approaches, but one way to reduce hallucinations is to "fine-tune" an LLM for a specific task. This involves feeding it high-quality, diverse, domain-specific data, as well as adjusting the model's own parameters and establishing the prompts that lead to the best outcomes. LLM-based software that performs legal drafting tasks, for example, will have been fine-tuned in this way.

For Greg Davies, Head of Behavioral Science at Oxford Risk, a consultancy that builds software to help people make better financial decisions, gen-AI's potential for financial decision-making is not just about accessibility—it's also about efficacy.

His company sells software that uses conventional algorithms to offer financial advice that's tailored to users' personality types as defined by a psychometric questionnaire. But the hard part comes next, he says. "The big problem for most people when it comes to financial decision-making is not that they don't know what the right thing to do is—it's that they don't get around to doing it."

For Davies, good financial advice that works in the long term is crucial. That's why the way in which companies communicate that advice is so important, he says. "And a huge part of that is around personalization, not necessarily the advice I give you, but how I portray that advice to you; how I talk to you."

That might mean sending a reassuring email to someone as they see their energy bill payments rise and encouraging them to keep contributing money to their savings pots, even as their income is squeezed. "If I've got a ChatGPT interface I can go, 'Here are the three bullets that I want to convey', and at the push of a button, it can generate for me 100 versions of this email that will portray those three bullets to each of my clients in a way that is tailored to their preferences."

Below: Consumers can gain more control over their data



Right: AI using natural language prompts will help with ideas, planning and execution



**“With tools like Copilot, we enable you to have a conversation with data.”**

DARAGH MORRISSEY, MICROSOFT

## 2. CHAT-BASED COMMERCE EVOLVES

**Not only are banks experimenting with AI personalization** to help people manage their money, retailers are also testing out ways to help consumers spend it. In April, German shopping platform Zalando announced plans to integrate ChatGPT so users could ask questions such as, "What should I wear to a friend's wedding in Greece?" The chatbot would then give shoppable recommendations based on factors such as the weather.

Some analysts imagine that, in the future, users may be able to give natural language prompts that automatically fill whole shopping baskets with relevant goods. Perhaps you would type: "I am planning a dinner for four adults, and we want to eat spaghetti bolognese." Push a button, and there are your ingredients plus a recipe. Think of it as a new form of retail interface.

An obvious evolution of this idea would be to make it possible to pay by natural language, too. Chat-based commerce already exists. US-based Clickatell has developed a chat commerce platform that enables brands to use chatbots to communicate with customers and send them payment links over popular messaging apps, such as WhatsApp. A brand might use WhatsApp to message a customer if an item on their wishlist is available: "Hello, Marian—the yellow high-top sneakers you wanted are back in stock! You're a size six, right? Would you like to go ahead and order a pair?" If Marian says yes, the chatbot could send her a secure and personalized payment link in the WhatsApp chat.

Chat commerce is innovating fast. In April, Clickatell launched a new feature so users could permit a company's chatbot to save their payment details using technology called "card tokenization". Card tokenization is a security measure that

replaces card details with a series of algorithmically generated numbers called a token. That token can then be traded through the internet without revealing a person's real payment details. For Clickatell, this streamlines the user experience, as they no longer need to leave WhatsApp to make their payment. Instead, the chatbot would ask: "Hi, you have left an item in your shopping cart. Would you like to pay for it now using your card ending in 1395, YES OR NO?" If they answer YES, their card will be charged automatically.

For German software provider Serrala, chats are one of several channels through which it enables the online payment of bills and reminders—others include email and SMS. Whenever a bill isn't paid automatically, companies need to reach people and get them to take care of payment. "That's a very different paradigm than shoppers visiting your web shop or customer contact," says the company's Solution Architect Jeroen Dekker. "So the machine learning here is not about the payment itself, but about deciding the right message, place, and time for each interaction to drive attention and conversion."

## 3. BRINGING THE (SYNTHETIC) FIGHT TO FRAUD

**There's a normal way to behave in a shop.** Perhaps you walk through the front door, browse the products, maybe experience a moment of indecision, then make a payment. Online it's no different. "There are certain characteristics that we can identify as harmless and likely to have been authorized by the individual," says David Britton, Vice President of Strategy, Global Identity and Fraud at Experian, which uses AI to detect fraud on behalf of its retail or banking clients. It's therefore potentially significant when standard patterns aren't followed.





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IMAGE: ED TUCKWELL; FOLD ART  
SOURCES AS PER WIRED, AUGUST 2023

“Perhaps they don’t come through the front door, they enter the store through the equivalent of a side window,” says Britton. “And then instead of doing some shopping and putting some things in their cart and taking things out of a cart, they go right to the most expensive item, grab three of them and then go right to the checkout.”

To identify suspicious behavior such as this, Experian uses a tandem of supervised machine learning (AI designed to look for characteristics known to be associated with fraud), and unsupervised machine learning (where AI is searching for signs of fraud not yet discovered). To find these patterns, algorithms search through mountains of payments data as well as information on factors such as typing speed and web-page navigation.

The problem is that AI is enabling an army of digital proxies to act on the consumers’ behalf, and this is muddying the definition of what legitimate activity looks like. As we have seen, AI tools can find products we might like, notify us of payment options, or simply tell us what’s going on in our bank accounts. Bank aggregator software, which gathers information from a user’s multiple bank accounts in one place, is also growing in popularity. “Every time those systems go and look at your bank account balance, they’re acting as your proxy and logging in as you,” says Britton. Right now, he is preoccupied with a question: “How do I know that that particular bot or gen-AI entity has truly been authorized to go and act on a person’s behalf?” That unknown makes it challenging to learn what’s normal and use that information to sift out red-flag behavior.

AI is also going to give fraudsters more tools to beat standard security measures, in turn putting yet more pressure on AI to detect ever subtler anomalies in the data. “Generative AI can be used to develop materials to move fraud forward at an industrial pace,” says Britton, who is already seeing criminals use the technology to generate fake identities, backed up with fake social media accounts and fake ID documents.

Many fraud detection companies are also witnessing criminals quickly adapt to using gen-AI. Fraudsters have been creating 2D and 3D deepfake masks to trick facial recognition security systems into authenticating payments or establishing fraudulent accounts. To try to stop this happening, identity verification company Onfido has been using gen-AI itself. “We use generative AI in the same way as fraudsters do—primarily to generate deepfakes using open source methods that spoofer are already using themselves to generate data,” says Therese Stowell, the company’s Vice President of Identity Verification. These can then be used as training data for anti-spoofing systems. “This helps our AI models distinguish

between genuine faces and deepfake spoofs.”

It taps into a wider trend in the anti-fraud world: Using gen-AI to produce “synthetic data” of all stripes to better train machine learning-based tools. This type of work is important to combat overfit, Stowell says. Overfitting is when an AI model relies too much on available training data, and struggles to detect new, emerging anomalies. In deepfake detection, for example, that means some AI models can rely too heavily on characteristics known to be suspicious, such as the position of a fake face within the camera frame. But a position is easy for fraudsters to modify, she says. “So supposedly state-of-the-art defensive AI models often fail. As a result, we are using generative AI to help train our models with broader, more varied data to ensure simple adjustments do not bypass them.”

### INTO THE FUTURE...

**As AI excitement grips the fintech world, there are warnings** that the technology needs to be deployed in a way that’s transparent about what it is and how it works. “You’ve got this black box problem with AI models,” cautions Davies, of Oxford Risk. This is when a user can see the input and the output of an AI model but doesn’t know how it arrived at its decisions. As a result, you need to be clear to users about the tool’s limitations and—ideally—find ways to show the working behind those decisions.

“We’re starting to go down the route of potentially bespoke financial services,” says Bonnie Buchanan, Head of the Department of Finance and Accounting at the University of Surrey. This poses an ethical challenge for the industry. That bespoke element means it is harder to compare different outcomes. If two people apply to make a payment using a finance product such as BNPL, which uses AI to check their credit score, and one is rejected, how do they know what this was based on? “You just get a ‘computer-says-no’ response,” she says. “But it needs to be explainable.”

The payments industry has come a long way—from the Diners Club cardboard credit card to biometric security. For years, AI in payments has been most associated with efforts to fight fraud, such as the techniques used by companies like Experian to detect suspicious characteristics in huge mountains of data. But for consumers going about their legitimate business, these innovations have mostly been invisible. Thanks to recent advancements in AI, however, they will likely start to have a more visible impact. And the increasingly consumer-facing role of the payments industry means that it is now at the forefront of AI experimentation. For the moment, this is less about automating jobs, than it is about providing new tools to allow humans to do their jobs better.

“When I was in payments 20 years ago, it was seen as a back office function, we were the plumbers of financial services,” says The Payments Association’s Tony Craddock. “But payments are seen as where the money is now, because it’s the enabler of the movement of money. It’s the point at which the value exchange between two parties takes place. And when you overlay artificial intelligence onto payments, then this makes for a very, very exciting future.”

By WIRED

**“When you overlay AI on payments, it makes for a very exciting future.”**

TONY CRADDOCK, PAYMENTS ASSOCIATION

Left: Fraudsters are using AI to create deepfake facial IDs

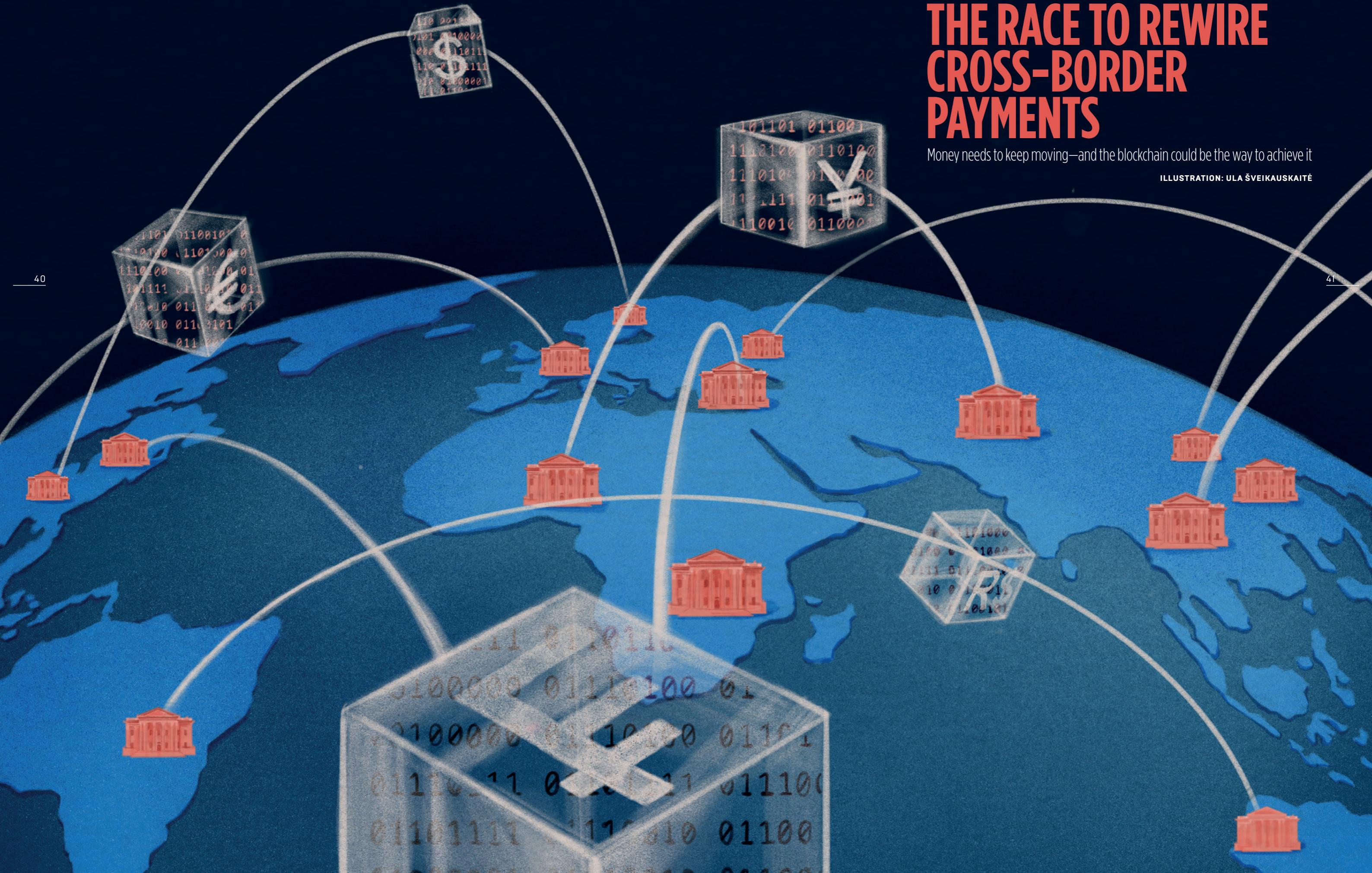
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# THE RACE TO REWIRE CROSS-BORDER PAYMENTS

Money needs to keep moving—and the blockchain could be the way to achieve it

ILLUSTRATION: ULA ŠVEIKAUSKAITĖ





# The world may be entering a period of de-globalization, but cross-border payments are on the rise. International transfers are expected to increase five percent per year until 2027. In part, this is being driven by previously unbanked populations that are now getting access to modern financial tools for the first time. But also, as established trade corridors get disrupted and supply chains become more fragmented, organizations are having to send payments to new countries—sometimes multiple new countries—as they replace established partners.

But whereas instant payments are fast becoming the norm domestically, the picture is different when businesses try to move money across borders. This is perhaps understandable when you consider that there are 195 countries all with their own payments systems, regulations, and levels of technological maturity. But it's also an opportunity. International payments are the engine of the global economy, and reducing friction could facilitate trade and help drive prosperity.

New technologies are helping seize that opportunity, whether it's the latest generation of real-time payment rails or more emergent ideas such as blockchain. To understand their significance, it's important to understand how the system works now.

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## GLOBAL PAYMENTS 101

**If a bank has a direct relationship with a bank in another country**—meaning they hold accounts with each other—then transferring the money between the two is relatively simple. Bank A simply sends Bank B a “payment message”—a computer instruction detailing what needs to happen—and Bank B credits or debits the relevant account. If there is no direct relationship then typically Bank A will partner with a “correspondent” bank that has a direct relationship with both banks. However, depending on the currencies or countries involved, a single partner may not always be possible. If this is the case, then Bank A will link with one correspondent bank, which will then link to another that can fulfill the transaction with Bank B. These chains of intermediaries were the reason why historically, cross-border payments took longer than expected.

This is now changing as banks around the world have improved communications technology and expanded their webs of relationships to speed up the process. “Globally, 84 percent of payments are now either direct payments or they have one intermediary,” explains Thierry Chilosi, Chief Strategy Officer at Swift, an international cooperative of banks and financial institutions that provides the most widely used interbank payments messaging service. What's more, these transactions are often fast, at least when it comes to back-end processing. “89 percent of the payments that flow through the Swift network arrive at the destination bank within an hour,” says Chilosi. “Half make it all the way to the beneficiary account in less than five minutes; about 80 percent take six hours, with virtually all the rest coming within the 24-hour time frame.”

But some financial institutions are also exploring new approaches that could lead to instant cross-border payments of any size, anywhere in the world.

## THE RACE TO REAL-TIME

**Many countries already have real-time payments (RTP)** systems, where the main local banks are directly connected to an automated settlement system managed by the country's central bank. These allow domestic payments to be processed around the clock and completed instantly. By increasing market efficiencies, RTPs are expected to generate \$173 billion in additional economic output by 2026, according to the Center for Economic and Business Research (CEBR).

The impact would be greater still if real-time cross-border payments were available as well. But to do this, different countries would have to link their RTP systems together. This requires technical and legal integration between the central banks of the participating countries, as well as individual banks and banking associations. Technical processes and data formats would all have to be standardized. A single regulatory and compliance regime would have to be agreed for all the participants.

Due to the complexity, linking systems up is usually only possible when parties are close trading partners with good relations and large bi-lateral payments flows. One example is Singapore, which has recently integrated its real-time PayNow network with faster payment networks in India, Thailand and Malaysia, although this is only for smaller payment amounts, such as workers sending remittances home.

The “correspondent system” underpins conventional bank transfers



Blockchain could allow banks to leapfrog existing payments infrastructure

“It's easier to build something for a few countries than to build the infrastructure and the setup for the whole world,” says Pawel Szejko, CFO of XTB, an online brokerage that has to frequently move money to client accounts across the globe. “Each country is different and has its own interests. As an online broker we have a lot of clients globally. For US dollars, the payments take a few days and it costs a lot; the charges are taken by corresponding banks. Often our clients are surprised by the fees.”

In the coming years there will likely be further attempts to sync national or regional payments systems together, but this won't be quick: A single bi-lateral link can take years to establish. “Ultimately, where we want to get to, is the ability to instantly settle any payment in any currency, anywhere, any-time,” says Jason Clinton, Head of Financial Institution Group Sales Europe at J.P. Morgan. “And that will probably require using blockchain technology.”

clearing and settlement of transfers between two parties. In the traditional system, banks keep their own separate records (ledgers) of all their transactions. When a payment is made, the ledgers of the two parties have to be reconciled. With cryptocurrencies, there is a single digital ledger, the blockchain. Every time a transaction is made, it is checked against this shared ledger to make sure the participant has the required funds to complete the transaction. What makes blockchain unique is that it is “distributed”: many computers hold copies of this ledger, and if a transaction is validated then all copies are updated. That means if one ledger is tampered with, perhaps to fraudulently boost an account, it won't be consistent with the rest of the network and the activity will be voided. With a single, shared source of truth, transactions can be securely settled and verified in minutes, without the need of a central arbiter overseeing proceedings.

Unlike public or “permissionless” blockchains, which are typically open to anyone, a number of financial institutions are using private, or “permissioned” blockchains, in which participation is controlled. A crucial benefit of a private blockchain is that it enables institutions to retain sovereignty over it, meaning they maintain control over the system and define how data is shared.

Some believe that private, permissioned blockchains are well-suited to conducting

## IS THE FUTURE ‘ON-CHAIN’?

**Blockchain technology has the potential to help financial institutions to leapfrog to an infrastructure that is able to support near-instantaneous transactions and automate complexity.**

Blockchain was initially created to enable cryptocurrencies to operate without the need for centralized

**A crucial element of a private blockchain is that it enables institutions to retain sovereignty.**



## BLOCKCHAIN DATA NETWORKS

In coming years, then, blockchain may initially be used to improve rather than supplant existing processes. One possible use case is pre-validating payment information. According to data analytics company LexisNexis, up to 50 percent of payments that don't complete or are delayed are due to simple data entry problems such as incorrectly typing the bank name and address, or getting the account numbers, IBAN or Swift BIC codes wrong.

Pre-validating the beneficiary's bank account information before the transaction is sent would reduce the risk of failed payments and fraud. But doing this internationally is challenging thanks to the privacy and security concerns around sharing data across borders. "Collaboration amongst financial industry participants is necessary to unlock the power of collective intelligence," says Onyx's Sushil Raja, Global Head of Link by J.P. Morgan, a peer-to-peer data sharing network.

Institutions would be more likely to collaborate on that kind of information sharing if those privacy and security concerns could be allayed. Some believe that a private, permissioned blockchain network could be the answer. That's because blockchains aren't limited to financial transactions, they can also enable data transactions. The immutable nature of blockchain means that information can't be altered by bad actors, and it also acts as a permanent record of what has happened: Users will know where information has gone and who has accessed it. These inherent security advantages could deliver the required level of confidence to achieve mass collaboration.

**Customer service will be key to making the current system as easy to work with as possible**

Payment providers are finding new ways to improve customer experience

## BACK TO FRONT-END

However the cross-border payments system evolves, it will take time. Industry figures note that making the current system as easy as possible to work with has to be a priority. And that comes down to something which is arguably as valuable as speed and cost efficiency: Customer service.

If an international payment doesn't arrive or is delayed, a company wants an easy way to have the problem resolved. As Frances Cavanagh, Treasury Global Process Owner for global insurance services provider WTW puts it: "A lot of time is spent chasing transactions that somebody is claiming they've not received from the bank. While some of our partners give you the ability to track these transactions through online bank portals, it's a very manual process."

Rian Kaslan, Senior Executive Vice President in Digital Business at Bank Negara Indonesia (BNI) shares those frustrations. "Gone are the days where businesses want to call someone. If they don't get instant updates and notifications, it's already considered a lack of service."

Solving this issue is certainly achievable. BNI, for example, has developed a customer portal for business customers,

BNI Direct, which provides clients with payment statuses and notifications, for both domestic and international transactions. It also provides information on the documents and information each specific country might need to process payments and transactions.

As international payments continue to transform, it will be important to stay mindful of a Silicon Valley maxim: Start with the customer experience and work back towards the technology. **By J.P. Morgan**



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Blockchain could be used to pre-validate payments for better success rates

cross-border transactions. They offer a crucial quality that has yet to be unlocked across existing international payments systems: They are always on.

"With the advancement of digital payment systems, there is an increasing need for an infrastructure that enables institutions and their clients to send and receive payments 24/7 across borders without being limited by cutoff times including across weekends and holidays,"

Naveen Mallela, from J.P. Morgan's Onyx blockchain division says. "By leveraging blockchain technology, we are able to enable a more dynamic way to manage treasury operations, especially during times when liquidity is constrained."

Blockchain-based networks could also offer a range of other benefits, such as faster settlement, and being more readily accessible to those who wish to participate. In addition to the obvious security advantages, which would help tackle fraud, they may also be more reliable as they have no single point of failure.

What's more, through blockchain's "smart contracts"—on-chain programs that execute when certain conditions are met—blockchain can automatically trigger payments based on real-time data inputs, paving the way to automating complex transactions and reducing the need for manual operations.

Pham Thi Ngoc Anh, EVP, Head of Financial Institutions Group at the Bank for Investment and Development of Vietnam agrees: "When compared with traditional banking systems, blockchain technology can provide greater reliability and

**Smart contracts can enable transactions to automatically execute, based on real-time data.**

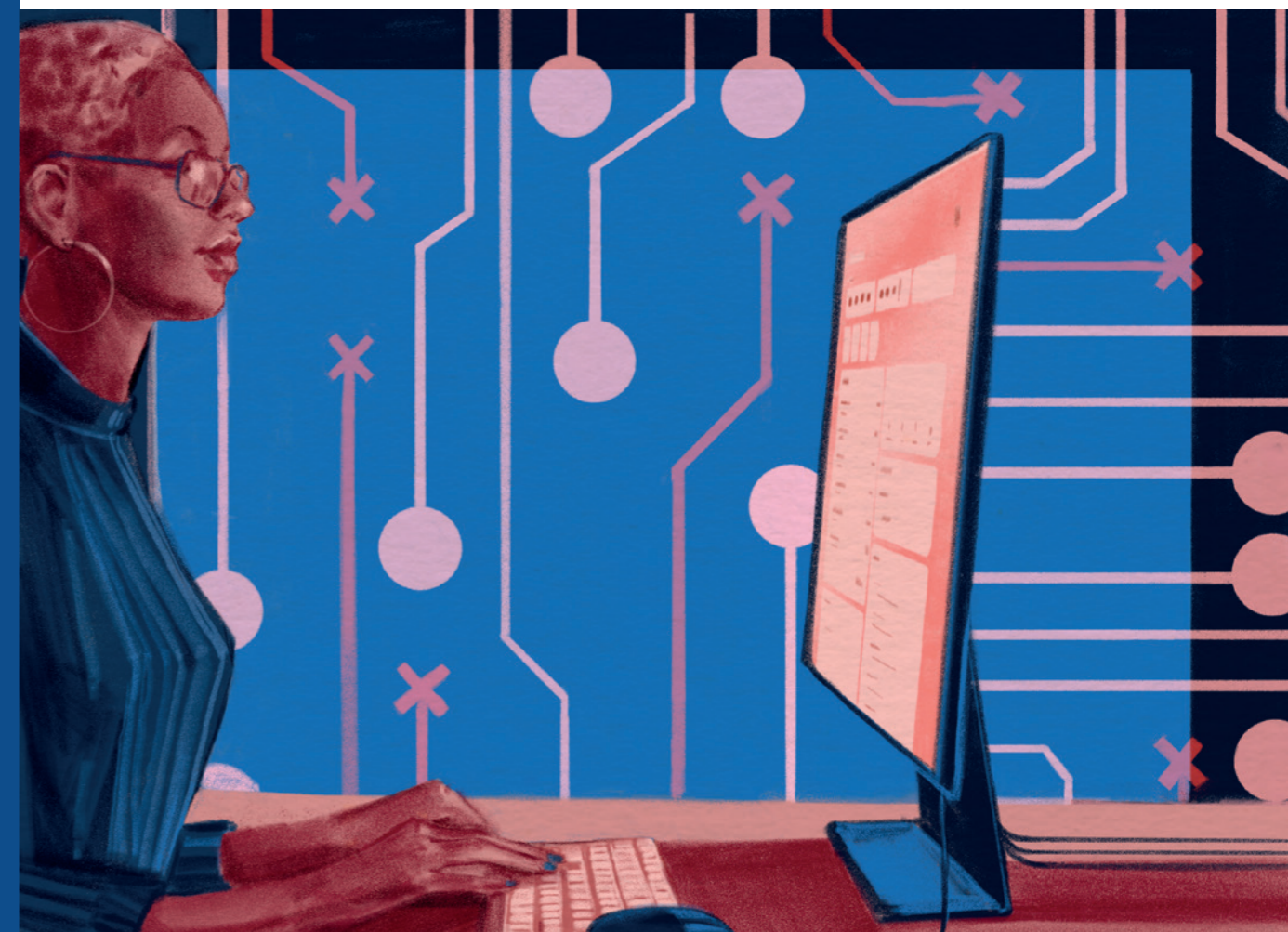
much lower costs for international payments."

Another added advantage of blockchain-based infrastructure is the ability to settle different forms of currency, including Central Bank Digital Currencies (CBDCs). CBDCs are digital forms of a country's fiat currency, backed by a country's central reserve. The J.P. Morgan Onyx blockchain division has conducted

a successful simulation to test the technical feasibility of cross-border transactions in Singapore dollar and euro CBDCs using a permissioned blockchain network in conjunction with the Monetary Authority of Singapore and Banque de France.

"Around 90 percent of central banks globally are currently working on developing a Central Bank Digital Currency," says Clinton. "But ultimately, in the short-term, blockchain will not replace existing payments systems—it will complement them." This is because blockchain faces a number of barriers to ubiquity in cross-border payments. These include regulatory uncertainty, as well as a lack of technical interoperability between blockchain networks. Different groups may develop projects, but there is no guarantee they will work together. Cooperation and collaboration at scale would remain a necessity. Unless one blockchain network becomes the global standard, the existing problem of siloed payments systems could simply be replicated.

SOURCES: WWW.JPMORGAN.COM/PAYMENTS/BOUND/SOURCES



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**BEYOND THE BALANCE SHEET**

# Kristen Morrow-Greven

VICE PRESIDENT AND HEAD OF GLOBAL PAYMENTS, NETFLIX

**K**risten Morrow-Greven has been with Netflix since 2015, just as the streaming giant was beginning to make its entry into the global market. Her career has spanned many facets of payments and technology, from her start at the Federal Reserve Bank to her time at PayPal. We grabbed a few minutes with her to discuss industry upheaval, the value of debate, and the AI revolution.



ILLUSTRATION: EVELINA DTYHEK

space and what do we need to prepare for it?"

**What's the most important quality for being a leader in payments?**

Curiosity. I think it's essential for leaders in the consumer payments space to remain curious, to continually monitor industry trends, to understand changing customer needs and preferences.

**...And what's the trait that's least helpful?**

Selfishness. A leader cannot prioritize personal gain over the needs and wellbeing of their team.

**Who is your industry mentor and what's the most useful thing they've taught you?**

My industry mentor is Reed Hastings, Netflix's Co-Founder and previous CEO. He taught me that as long as feedback is given with positive intent and provides an alternative solution, feedback can, and should, be given anytime, anywhere.

What's a secret that only people who do your job know? Many people simply don't understand payments well. While some may perceive it as a straightforward and necessary part of conducting business, the reality is that a strong payments team can navigate the complexities of payments and transform them into a catalyst for growth for the company.

**What's a secret that only people who do your job know?**

Make a fearless prediction: How will payments be different in ten years' time? In the future there's going to be a greater emphasis on instant payments and real-time settlements, reducing the time it takes for consumers to see their payments reflected in their accounts.

**Make a fearless prediction: How will payments be different in ten years' time?**

If you weren't working in payments, what would you be doing? If I had spent as many hours on my tennis technique as I have on learning the intricacies of payments, I'm sure I'd be a tennis pro by now.

**AI. Are you worried?** I'm excited about the opportunities that new technologies like AI can bring to the field of payments. AI is poised to revolutionize the payments industry by making transactions faster, more secure, and highly personalized. However, as with any technological advancement, there will also be challenges, such as data privacy and security concerns, that need to be addressed to ensure the responsible and ethical use of AI in payments.

**AI. Are you worried?** I'm excited about the opportunities that new technologies like AI can bring to the field of payments. AI is poised to revolutionize the payments industry by making transactions faster, more secure, and highly personalized. However, as with any technological advancement, there will also be challenges, such as data privacy and security concerns, that need to be addressed to ensure the responsible and ethical use of AI in payments.

**In one sentence: What do you do?**

My team and I ensure that anyone who signs-up and subscribes to Netflix has a smooth and efficient experience with payments.

**What are you currently working on?**

Strategic planning for next year. As Netflix's business grows, we're starting 2024 planning early to ensure that we have ample time to debate and discuss priorities and road maps across the global cross-functional payments team.

**In-office or WFH?**

On my team, we are in-office, at home, on airplanes and trains. No rules.

**What's the innovation that's most disrupting your world?**

Faster payments. Disruptive global events, such as the pandemic, have thrust faster payments into the focal point of the global payments landscape, and made it even more critical in financial markets and economies as well.

**What has been your proudest moment in the role?**

It happened pretty recently. After starting my career at the Federal Reserve Bank of New York, several decades ago, I was very proud to be invited back to join a payments roundtable to advise the Federal Reserve Board, prior to the launch of [US instant payment service] FedNow.

**...And what was a mistake that taught you something useful?**

Looking back on the early stages of my career, I failed to assert myself when I held differing opinions from everyone else on the team. And this left me feeling really inauthentic in the workplace. As a leader now, I really value healthy debate, and hearing other teammates' insights, even if they don't agree with me or each other.

**What's the biggest question facing payments today?**

"What regulation is going to come next in the consumer payment

**"A leader cannot prioritize personal gain over the needs and wellbeing of their team"**

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