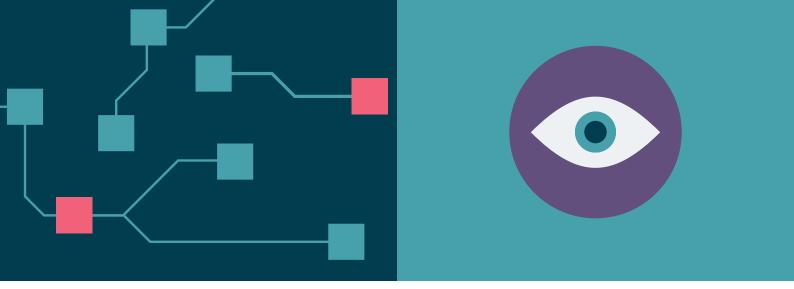


Looking Glass Payments

Digital connective tissue

Introduction	<u>3</u>
Sharp focus lens one: Partnering with AI	<u>4</u>
Sharp focus lens two: Realizing the potential of platforms	<u>9</u>
Soft focus lenses	<u>13</u>
The future of payments in focus	<u>18</u>
Conclusion	22



Introduction

Payments is fast becoming the priority for many organizations, acting as the digital connective tissue that is cutting across industries and domains. Businesses and consumers are looking for seamless, frictionless — and maybe even enjoyable — experiences. We're here to help you understand which could have the biggest impact on buyer behavior and your operations — and which are most deserving of your attention and your modernization budgets.

With an ever-growing global network of consultants and clients, <u>Thoughtworks</u> has a broad view of today's evolving technology landscape. We know what's changing, we understand the opportunities new capabilities are creating, and we can help you turn them into a competitive advantage.

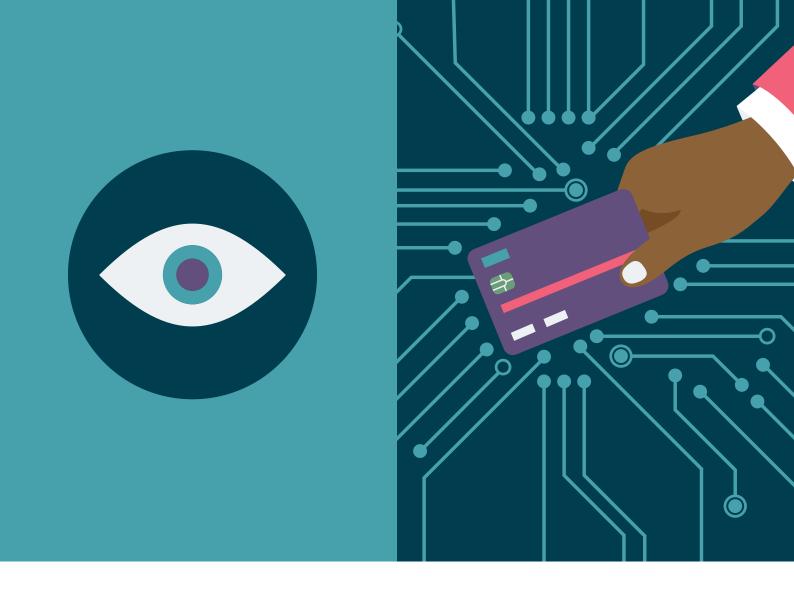
Thoughtworks' Looking Glass report is a unique exploration of more than 100 trends, which are filtered through five "lenses" to help businesses understand what those trends could mean for them. In this version of the report, we're taking that analysis a level deeper, looking specifically at what some of these trends could mean for the payments sector, and how these trends will shape the future of the industry.

Here, we'll look in detail at trends through the two lenses we feel are most relevant to the payments sector today: partnering with artificial intelligence, and realizing the potential of platforms. We're calling these our <u>sharp focus lenses</u>.

The other lenses in our Looking Glass report are still pertinent, but their impact in payments is not as immediate — we've called these our <u>soft focus lenses</u>. In this report, we wrap up by distilling the overall impact of these trends on the future of the payments sector.

Throughout the report, you'll find information on current and emerging technology trends, all contextualized for the payments industry. You'll see how big consumer trends translate into opportunities in your sector, and you'll gain vital insight to help you prioritize transformation projects and proactively drive positive change.

Page 18 has the specific technology trends we believe should be anticipated, analyzed and adopted.



Sharp focus lenses

Lens one: Partnering with AI

Artificial intelligence (AI) is slowly transforming our daily lives, whether that's Alexa helping us to pick a weather-appropriate daily outfit, or Netflix guiding us what to watch in our downtime. Al is helping elevate the customer experience, while simultaneously strengthening business models. The financial services sector has long been exploring Al's potential for building innovative solutions. And it's fair to say that for the payments industry, in particular, Al can be a game changer.

Through the Looking Glass

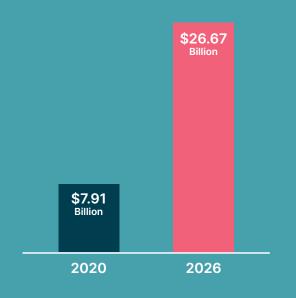
The proliferation of digital payment methods is pushing us towards a post-cash world. The number of mobile wallets in use is projected to increase by nearly 74% to reach <u>4.8 billion</u> mobile wallets in use by the end of 2025 – that's equivalent to nearly 60% of the world's population.

And it's not just changes in consumer behavior that are expected. Small and medium enterprises (SMEs) account for about 90% of businesses worldwide, yet 40% of them have unmet financial needs. That's why they're pushing traditional banks and other financial organizations to fast-track digital initiatives such as payments. Commercial banks are responding by collaborating with FinTech companies and rethinking existing business models to capture the SME segment, creating a new wave of companies, who specialize in SME needs.

New data-savvy players are leveraging technology to lower cost and deliver innovative offerings for SMEs. 'Buy now, pay later' (BNPL) firms like Klarna, Affirm and Afterpay are swiftly moving to create offerings for B2B buyers and sellers.

Elsewhere, Al-powered tools are enabling payments providers to minimize losses through fraud without interfering with consumers' demand for rapid and convenient payment options.

Global Initiatives like Open Banking and payments data standardization are enabling better collaboration, improving data aggregation and making it easier to implement innovative use cases of Al.



The global market for AI in fintech is projected to grow from \$7.91 billion in 2020 and is projected to increase to \$26.67 billion by 2026 according to Mordor Intelligence.

Source: Mordor Intelligence

Key trends in focus



Machine learning (ML) platforms provide end-to-end capabilities such as data management, feature engineering, model training, model evaluation, model governance, explainability, AutoML, model versioning, promotion between environments, model serving, model deployment, and model monitoring (e.g., Accenture myWizard, IBM Watson Studio and Wipro HOLMES). Digital identity verification and fraud detection for BNPL are consuming ML platforms with multiple providers, managing and applying ML to large, real-time data sets for effective lending decisions. Cloud platforms include Amazon Pinpoint and Amazon Sagemaker.



Online Machine learning

This field of study develops algorithms, which continuously learn, based on the sequential arrival of data. Online machine learning and ISO 20022 are also at the heart of the large-scale modernization programs for the global payments market infrastructure (PMI). In particular, in developed economies, which are being undertaken in response to demands for increased automation, cost efficiency, improved interoperability and real-time services.



Al as a service

Big cloud providers offer "ready-to-go" Al solutions as a service on their cloud platforms to address standard use cases like natural language processing, chatbots, recommendations, demand forecasting, fraud detection, optical patterns and video recognition. No advanced machine learning know-how is necessary, but customers have to train the service with their own data and can integrate trained algorithms via cloud APIs. Payment is on a pay-per-use basis. Given BNPL and retail consumer business trends, AlaaS consumption is useful and cost effective, and has no management and governance overheads.



Causal inference for ML

Causal inference study techniques help understand the cause and effect relationships between input data and outcomes. Being able to learn about the causal relationships, the ML models become generalizable, which in turn would mean that they require less training data to perform well. This IMF Paper talks about causal inference and the impact of the same in the future of economics.



Ethical Al

There are legal, cultural, security and privacy impacts associated with predictions, forecasts and decisions. These are subject to various biases and differing local interpretations. While using AI, <u>ethical AI helps us to regulate and mitigate challenges</u>.

The opportunities in payments

Adoption of AI and its sub-set such as machine learning and deep learning are creating powerful opportunities for the payment industry including:

Delivering hyperpersonalized services

Today's huge volumes of payment transaction data provide an unprecedented opportunity to understand customers and create value-added offerings. One example is risk-based authentication, where a fraud-detection engine calculates a risk profile for each channel request that leverages customer analytics to identify irregularities in users' behavior. Another use case — in loyalty and marketing — is personalization through tracking customer buying behavior and payment habits, location etc. For merchants, payments firms can analyze their customer payments behavior to provide appropriate payment options — such as Al-enabled buy now, pay later — at checkout to increase conversion rate.



Successful personalization and improved customer experiences can increase customer satisfaction by 20%

Source: McKinsey and Co.

Bringing experience optimization to business payments

Business customers have been underserved by incumbent payment options when compared to retail customers. But the increasing shift to digital retail has heightened the need for better payment options for all businesses. Increasingly, we're seeing the emergence of fintech players looking at this segment, with emerging solutions for payment processing, fraud control, demand forecasting, data-driven underwriting, collections, among others. All and machine learning technologies are providing the technical capabilities for this. One example is Intuit Quickbooks, which partnered with UK PAAS player Modulr to develop a new digital payment account service for small businesses. Modulr's payments infrastructure has been integrated within Quickbooks accounting software to support everyday issues small firms face — cash flow management, collections and late payment follow ups.

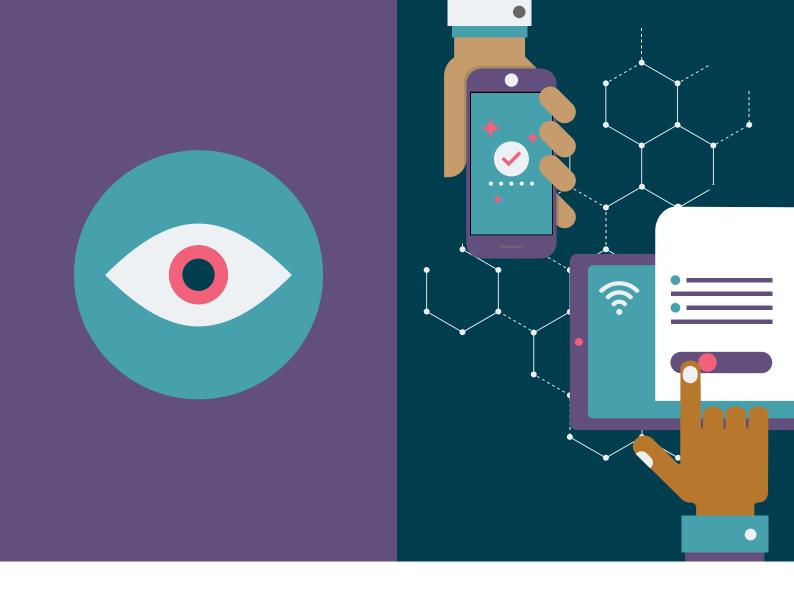
Enabling alternative payment methods

Many factors are driving the move towards cashless payments: convenience; superior experience; Covid-induced need for digital presence and availability; and real-time transaction options. This is cannibalizing traditional payment methods. **BNPL is expected to account for almost US\$955 billion** of consumer spend by 2026. Use of AI is increasingly powering digital ID infrastructure and real-time credit decisions required as foundation for these next generation products.



The global buy now pay later market size is expected to reach USD 39.41 billion by 2030, registering a compound annual growth rate 26.0% from 2022 to 2030

Source: Grand View Research, Inc

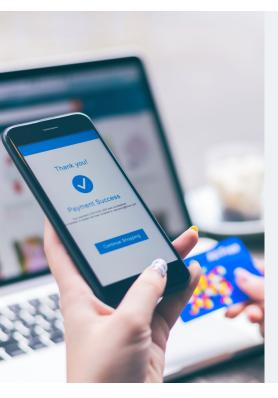


Sharp focus lenses Lens two: Realizing the potential of platforms

Platform building is core to modern payments strategy — yet it's an area that's fraught with ambiguities. Even within a business, views on what a platform is and the purpose it's designed to serve can vary widely. The result is that for all the excitement around platforms, many payment providers are disappointed in the results they get from their platform investments. This stems not just from the inherent difficulty of doing platform building well, but often from fundamental misalignment on the kind of value the platform is designed to achieve. As platform failures mount we see a new focus on resolving the uncertainties around platforms and connecting platform building to clearly defined business goals.

Through the Looking Glass

Building a platform has become a priority for payment leaders as they strive to deliver better payment methods and experiences to clients. Key to that delivery is the ability to incorporate promising technology solutions into their platforms and forge new partnerships.



Views on what a platform is and the purpose it's designed to serve can vary widely. Such use cases may include:

- Building omnichannel platforms that tackle customer experience
- Delivering infrastructure and platforms that support real time payments
- Creating data platforms capable of deriving real-time insights from payments data
- Establishing blockchain-based platforms that support digital tokens
- Offering a payments-as-a-service business model enables non-payment companies to offer payment capabilities to their customers, thus enabling embedded payments

Before taking the plunge, it's important to understand what terms like "platform" and "platform strategy" mean, and how this can contribute to positive business outcomes. In essence, a platform is a foundational yet flexible technology that makes it possible for an organization to facilitate, support and deliver services inside a given ecosystem or market.

Key trends in focus



Edge computing

This technology brings data storage and processing closer to the devices where it is stored, instead of relying on a central location thousands of miles away. This is done to prevent data, particularly real-time data, from suffering latency issues that can affect the performance of an application. Since less energy is used to transport data, edge computing is potentially more sustainable as well. With a lot of financial infrastructure players moving from their own data centers to public cloud, major payment network players are adopting edge computing.



Smart contracts

A smart contract is a programmable business agreement for automatic execution of actions according to agreed terms. Distributed ledgers and smart contracts are predicted to become more common as globalization continues to increase. The global procure-to-pay market is expected to grow to \$9.2 billion by 2026 and smart contracts are slated to improve the automation capabilities in this area. While there are still concerns around scalability, energy usage and transaction throughput, smart contracts still hold significant promise in supply chain financing.



Evolutionary architecture

In a fast-moving sector, where innovation is happening at a breakneck pace, traditional approaches to enterprise software stacks — which might not change for a decade or more — are woefully inadequate. Evolutionary architecture challenges the perception of fixed software architecture and rigid decision making, ensuring systems and architecture can be incrementally improved over time, along with business requirements.



Growing industry wide open standards

Industry standards bodies drive consistency around technical standards (such as W3C and IEEE). We are currently seeing a growing number of industry-specific standards, which drive better interoperability between companies. Examples are GS1 standards like GTIN for product IDs. There are also government initiatives to encourage interoperability and give customers more portability, such as the Open Banking initiative in the UK. In the payment space, standards such as ISO20022 are emerging as the go-to standards for **creating interoperable cross-border real time-payment systems**.



Platform business

When a company creates value by facilitating interactions among consumers, peers and service providers, all participants benefit from a 'flywheel' effect as the platform grows and scales. The global payments-as-a-service business is **projected to grow** to a \$22.2 billion market by 2028. As regulatory influence and customer expectations grow, more organizations are going to rely on payment-as-a-service providers to address the payment capabilities for their business.

The opportunities in payments

Opportunities in payments leverage the customer preference for convenience and frictionless interactions, often making the experience of payments itself seamless, omnichannel and often invisible. These evolving expectations with regard to payments are creating many opportunities for organizations in the payment industry, including:

Adopting a Mobile First Approach

Consumers are rapidly adopting new and more convenient payment options, such as digital wallets and mobile payments. Financial services firms are also recognizing the power of mobile or digital wallets, adopting super apps to build insular ecosystems. These apps are driving usage at scale and helping financial institutions to move to a platform-based business model.

Unlocking value with faster, cheaper and safer payments

Real-time payments (RTP) can remove clearing and settlement bottlenecks and create an environment where consumers, merchants and financial institutions can transact and transfer money instantly, 24/7. Besides being fast, real-time payments have brought in bi-directional communication integrated information flows, instant payment notifications and immediate settlement results. These have resulted in a more efficient payment journey.

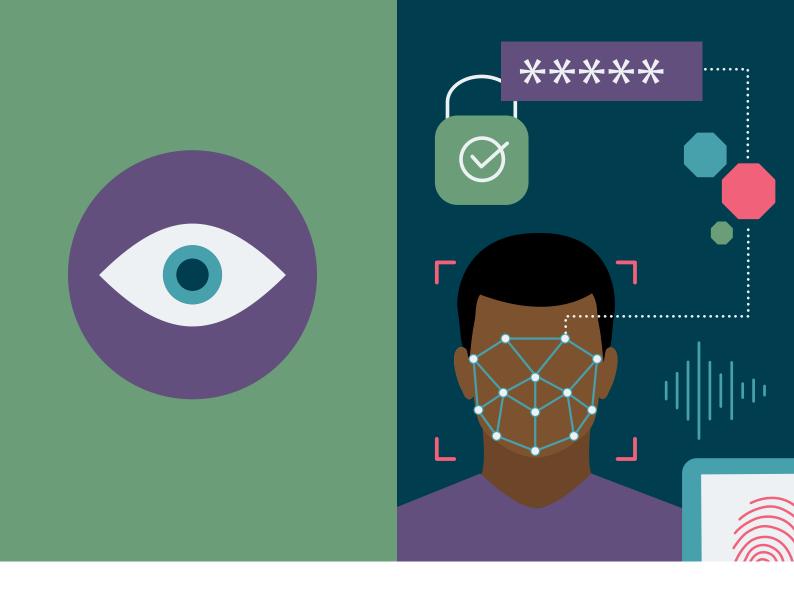


Payments-as-a-service becomes the option of choice

Payments-as-a-service is becoming the option of choice for cost effectiveness and go-to-market speed, as customized payment technology struggles to accommodate dynamic regulatory and technology updates.

Digital tokens and central bank digital currencies (CBDCs) emerge as the key enablers when it comes to the future of finance

Despite the recent slump in the crypto markets, the rise of a parallel monetary system and the impact this has had on the regulated monetary system has been profound. With use cases spanning metaverse, Web3, as well as payment infrastructure players such as <u>Mastercard</u> and Visa supporting crypto payments, these blockchain-based token and payment solutions have definitely created an impact in the payment landscape. While the use of cryptocurrencies as a means for payment has taken a hit, this has surely led to the rise in related initiatives such as CBDCs.



Soft focus lenses

There are several trends that are still important to take into consideration as you plan for the future.

Soft focus lens #1:

Evolving the human-machine experience

The way we interact with the digital world — and our expectations of it — are constantly changing. The expansive range of capabilities of most everyday devices, including voice and facial recognition, means there are now many new opportunities human-machine experiences can be evolved and extended in ways that have a tangible commercial impact.

The internet of things payments market size will reach USD 5.4 Trillion by 2028 from an estimated USD 155.53 Billion in 2021 (growing at a compound annual growth rate of 66% globally)

Source: introspectivemarketresearch.com

2028

USD 5.4 Trillion

Internet of things payments market size

2021

USD 155.53 Billion

Internet of things payments market size

The opportunity at a glance

Anywhere, anytime, anyhow, anyone, anything capability

To improve customer shopping experiences merchants must seek to make payment as frictionless as possible. The Internet of Things (IoT) is the driving force in making this happen. For payments, IoT means that a consumer could pay in almost any way possible.

The need for payments to be processed automatically has implications for businesses and consumers. Instead of using a physical card or saved card in an app, as per Apple Pay, consumers could pay using multiple devices such as a voice-activated device ("Siri, order me a burger."), wearable device, etc. For a business, this means enabling things other than a standard in-store terminal to authorize payments. The IoT extends connectivity between things without the need for human intervention.

Improved spending visibility

Today there are numerous financial mobile applications that tell users their spending, saving habits and how customers can save more, but the integration of IoT technology can enhance this process even further. It can help users by identifying their spending patterns and provide insights on specific spending areas. Providing the user such detailed information is a great value-add rather than those payment statements which only provide information for the sake of it.

Soft focus lens #2:

Expanding impact of hostile tech

As people and enterprises rely more on technology for making payments digitally, they are also more subject to unintended — or downright hostile – consequences. This has opened avenues for criminal activity against unsuspecting users, merchants, and payment firms during authentication and transaction authorization. Identity theft, chargebacks, account takeover, card-not-present (CNP) and triangulation frauds have surged exponentially.

Over the years, fraud attacks have evolved and have become more sophisticated. Attackers now use highly customized tools and intrusion techniques, developed specifically for a given campaign. Apart from causing monetary losses, such frauds lead to reputational damages and have regulatory risks.



E-commerce losses to online payment fraud were estimated to be \$20 billion globally in 2021. That is a growth of over 14% compared to the \$17.5 billion dollars recorded in the previous year. A study from Juniper Research has found that retailers are set to lose \$130 billion in digital CNP fraud between 2018 and 2023.

Source: Juniper Research

While fraud prevention has garnered much attention, the spotlight is also falling on data privacy. The evolving nature of embedded payments that encompass not just local but cross-border payments, means there is ambiguity over who owns the customer data — and who is accountable for privacy issues. As per this report from Global Payments, protecting customer data and privacy is among the top three trends for payment-focused organizations.

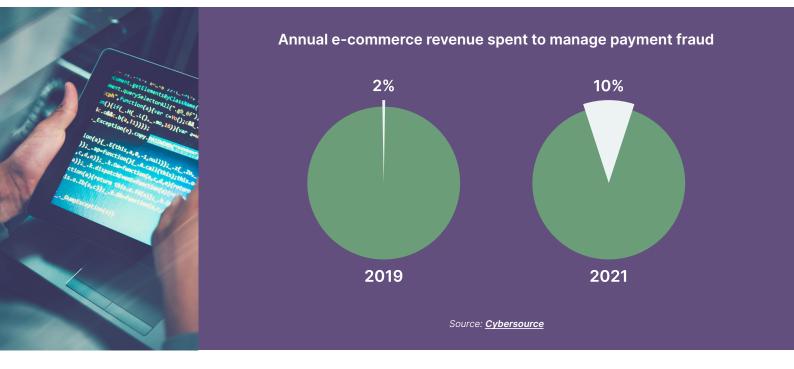
Globally, we're seeing regulations stepping up in this space, for instance the EU's General Data Protection Regulation, the California Consumer Privacy Act, and Brazil's General Data Protection Law. Lately we are seeing the rise of <u>data localization needs</u> being spearheaded by regulatory bodies in different countries to ensure customers' sensitive payment data is protected.

The opportunity at a glance

Al-enabled fraud loss reduction

According to a <u>report by Cybersource</u>, across the globe the percentage of revenues spent by e-commerce firms to manage payment fraud has increased from 2% in 2019 to 10% in 2021. Advanced Al techniques are increasingly used to detect and thwart fraudulent payment transactions. The Al algorithms can be trained to detect hidden patterns in transactional data.

The trained algorithms can be used to precisely classify a new transaction as fraudulent or not. A key trend to look for is the solution provided by cloud providers such as <u>AWS</u> and <u>Google Cloud</u> for online fraud detection. If you have data and want to develop your own model, then cloud computing can be used for training and deploying the model cost effectively.



Frictionless checkouts

As consumers continue to demand more security and, at the same time, increasingly frictionless checkouts, technologies will evolve to leverage additional passive authentication methods such as location, transaction time, and even predicted behavior.

Interoperability

Collaborative frameworks, such as the <u>FIDO</u> alliance, that aim to address the issues of lack of interoperability and multiple standards in IoT devices are being embraced to remove any security leaks in the system.

Biometric authentication

Methods such as voice, face detection, and iris biometrics can help payment firms and merchants to differentiate fraudsters from legitimate customers during checkouts and payouts.

Soft focus lens #3:

Accelerating towards sustainability

The growing focus on environmental, social and governance (ESG) considerations is among the biggest ongoing seismic shifts in the investment landscape. Increasingly, consumers are concerned about climate change and social impact, and are ready to make choices that help combat environmental and sustainability challenges.

As investors, along with consumers and governments, demand ESG accountability from companies, going green, improving corporate governance and advancing diversity and inclusivity have gone from 'nice to haves' to business imperatives.

The payments industry is responding to these challenges by helping the entire set of ecosystem players — including the consumer, merchants, fintechs, banks, processors, as well as the infrastructure players — become more aware of the impact of their own operations on the environment as well as providing the investments, tools and technologies for the consumer or merchant to measure and manage the impact of their actions on the environment.

2021: Global Green Technology and Sustainability Market size

USD 10.9 Billion 2028: Global Green
Technology and
Sustainability Market size

USD 44.4 Billion It is forecasted to grow exhibiting a compound annual growth rate of

26.4%

Source: globenewswire.com

The opportunity at a glance

Tackling payment-associated emissions

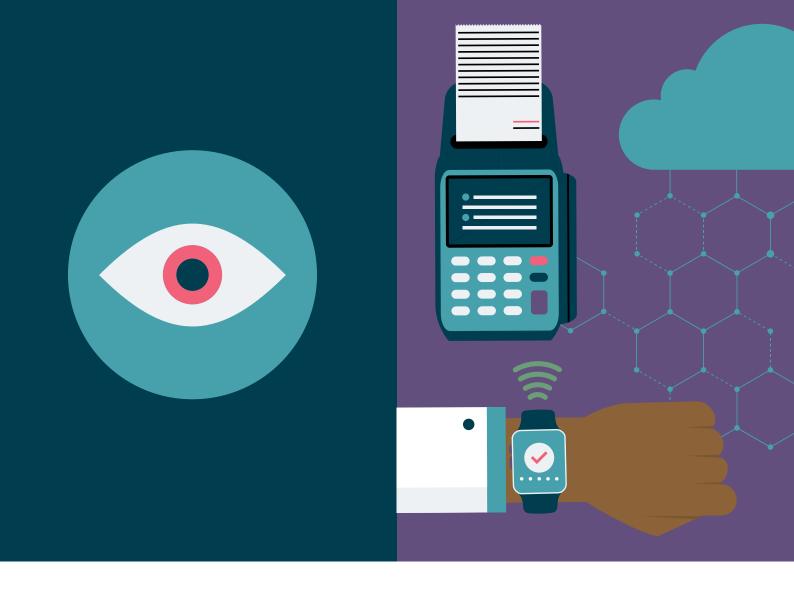
Payment organizations can use their network influence to both advocate sustainable targets for ecosystem players as well as providing the tools and technologies that can help the end customer assess the impact of their lifestyle choices. As an example, network players such as Mastercard have been working with **Doconomy** to provide solutions that enable payment providers to calculate the environmental impact, like carbon footprint, of every card transaction. Elsewhere, the **Cloud Carbon Footprint tool**, an open-source project sponsored by Thoughtworks, enables payments companies to identify carbon reduction opportunities — and potential cost savings — associated with their cloud workloads.

Changing consumer behavior

Payment networks have a key role to play in influencing customer adoption towards a sharing economy by allowing consumers to participate through the safe, convenient and affordable sharing of products. An example of this would be how seamless payments have enabled ride-sharing business models.

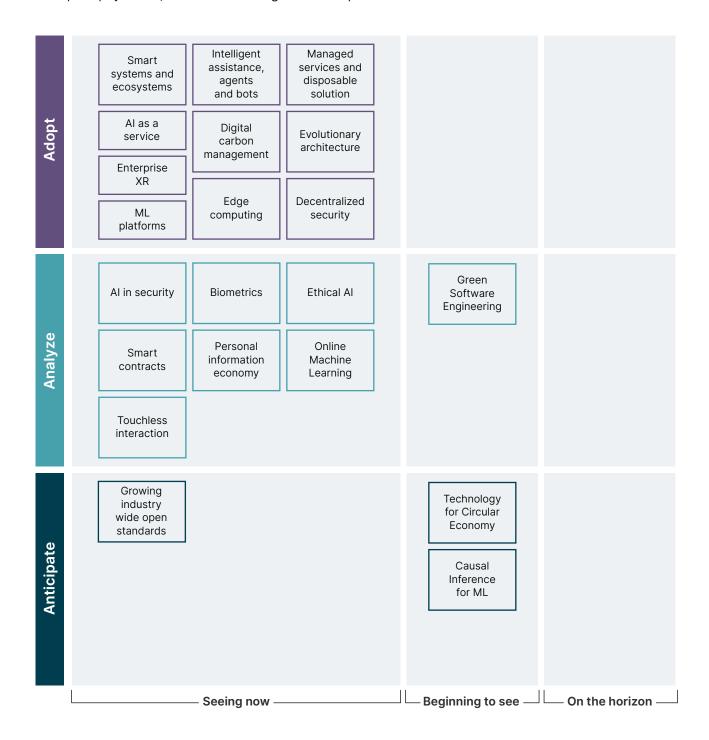
Supporting UN sustainability goals

As per the <u>UN Task force on Digital Finance</u>, digital payments play an important role in the development of the global digital economy and in achieving several Sustainable Development Goals, specifically the ones related to access to finance.



The future of payments in focus

To help prioritise your actions in these areas, we have summarized these trends to specific buckets that would help drive initiatives. In the chart below, we've included the emerging and maturing technology trends most likely to impact payments, mentioned throughout the report.



The big picture

Payments are everywhere — from being the last stop at checkout to fueling an enjoyable, invisible, seamless experience. The global payments landscape has witnessed a steady stream of innovation, enabling the rapid adoption of payment methods and a steady increase in transaction volumes. And non-financial services organizations — notably big tech players — <u>are driving much of this innovation</u>. This will inevitably disrupt the payments sector.

Payments - A strategic focus area for BigTechs and Fintechs

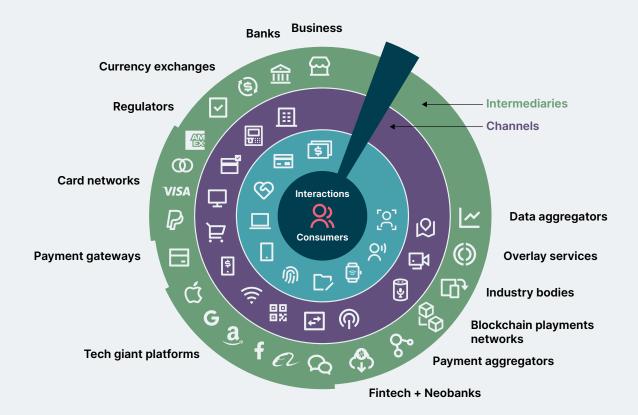
US Big Tech	Financial services activities provided				Banking status		Services for banks		
	Payments	Account mgmt.	Credit	Insurance	Asset mgmt'.	Licensed	JV or minority stake	Data	Cloud
Google	•								
Apple	•	•	•	•			•		
Facebook	•	•				•			
Amazon		•		•			•		
Microsoft	•					•		•	
Paypal									
Fintech									
Square	•								
Klarna	•		•						
Chinese Big Tech									
Baidu	•								
Alibaba									
Tencent									
JD.com	•								
Xiaomi							•		

Source: https://www.oliverwyman.com/our-expertise/journals/state-of-financial-services.html

The dynamics in the payments sector have facilitated a change in the way funds flow across businesses. We are witnessing a gradual shift in preference from physical cash to alternative digital payment methods, across both business and retail customers.

Technology has been the backbone fuelling these innovations. However, with the ubiquity of the technologies out there and with innovations happening both at a customer experience and infrastructure level, making choices has become complicated. With payments moving from a utility function, to having separate business units (carved out to track profitability), it becomes imperative that business leaders understand which innovations are worth pursuing and which should be ignored.

How can payment providers avoid the downsides of new solutions, and ensure they deliver on their promise?



The evolving and complex landscape of payments

- Flexible payments (Buy Now Pay Later / Pay Flexible)
- Payments data standardization and monetization
- Shift from Retail to business customers
- Mobile first approaches towards payments
- Real time faster, cheaper, safer payments
- Payments-as-a-Service (PaaS)
- Digital tokens and Central digital banking currency
- Anywhere, anytime, anyhow, anyone, anything capability
- Digital commerce and increased frauds

As we can see from the above trends, there is a wide variety of areas such as infrastructure, data, customer experience, omnichannel, business segment or evolving payment preferences that organizations wanting to build a payments capability can focus on. Given that technology will be vital to deliver these capabilities, for leaders spearheading this change, getting a good understanding of the technologies shaping these business trends will be crucial. As digital payments becomes the new norm for doing commerce, there exists opportunities for incumbent players and emerging players to innovate across the infrastructure, data, security, customer experience, merchant experience, platforms and ecosystem services layers.



Conclusion

Emerging and maturing technologies promise to transform the way the payment industry evolves. For payment-focused organizations, the biggest challenge at hand is prioritization and being relevant in an increasingly competitive landscape where customer-facing enterprises want to look at controlling the payment interface and data. For consumers, the biggest challenge remains how their payments and personal data is getting used and how they are protected from fraud and other data breaches.

At Thoughtworks, we work closely with organizations across all industries to carefully analyze their needs and work backwards to determine which technologies and capabilities are best suited to deliver the results they want to achieve.

As you look to the future and consider what you want your services to look like over the coming years, we're here to help you explore your options, prioritize your budgets and efforts, and bring your vision of smarter, more efficient, and more accessible payment services to life.

To find out more, and learn how our team can help you, talk to us today.

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Thoughtworks is a global technology consultancy that integrates strategy, design and engineering to drive digital innovation. We are 12,000+ people strong across 50 offices in 18 countries. Over the last 25+ years, we've delivered extraordinary impact together with our clients by helping them solve complex business problems with technology as the differentiator.

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