



# Demystifying ISO 20022:

## Evaluating the benefits and limitations of new messaging standards

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### Abstract

Messaging standards are core to the payment system, enabling institutions across sectors to connect and transact efficiently and effectively. Recent payment infrastructure modernisation efforts have identified one such standard, ISO 20022, as particularly effective at enabling richer data collection, which in turn has the potential to increase payment system interoperability and efficiency. The adoption of a new messaging standard has broad implications for both domestic and cross-border payment systems, with applications not only for faster payment systems but for retail payments more broadly. However, while the benefits for financial services will be net positive, benefits will be limited for domains already using international standards (i.e. retail card payments). This paper explores the benefits and limitations of ISO 20022, examining recent private sector initiatives and their experiences with implementation.

Keywords: messaging standards, ISO 20022, history, faster payments, retail payments, cross-border payments, SEPA

### Why message standards matter

People tend to take the expediency of retail payment transactions for granted: a tap of a card or a few clicks online, some seconds pass and the transaction is complete. Similarly, people tend to appreciate how truly complex and difficult it is to connect disparate payment systems around the world — that is, ensure payment system *interoperability* — only when they experience friction in the payment system.

Many factors contribute to payment system interoperability, but for nearly 50 years the key innovations supporting automated, real-time payment authorisation were the various electronic payment messaging systems and their corresponding standards.

Broadly speaking, the success of these standards can be attributed to the common elements they share, namely interoperability, functionality and adaptability. Messaging standards enable *interoperability* by having an agreed-upon lexicon and structure for messaging data. This structure, along with local regulations, network guidelines and other standards, enables payment systems around the world to connect. Messaging standards also promote *functionality* by carrying the data elements required to perform transactions on a growing number of digital consumer devices. Finally, despite significant advances in payment technology and infrastructure, the *adaptability* of these standards has enabled new technologies and evolving consumer demands.

The evolution of messaging standards demonstrates the importance of these attributes. The first electronic payments messaging standards enabled groundbreaking functionality. Early proprietary standards such as the BankAmericard Authorization System Experimental (BASE) in the 1970s enabled automated cross-border retail transactions without manual intervention — a convenience that had profound and lasting effects on payment networks and consumer expectations (Stearns, 2013). However, these early messages were proprietary (ie specific to a single payment network) and fixed in length (ie messages had limiting size constraints), which meant these message formats were not equipped to process transactions for multiple networks and accommodating new products and rising data needs in the near future.

To address this, early card networks worked with IBM to develop a dynamic messaging standard that could accommodate growing data requirements. This ultimately became ISO 8583, (International Organization for Standards, 2003), which would later be adopted by the International Organization of Standardization (ISO) banking industry committees as the standard for all retail transactions. ISO 8583 allowed for greater interoperability across payment networks (it remains the primary standard for retail card transactions internationally), and the flexible data format easily accommodated new products and services, such as debit and enhanced security and authorisation (Stearns, 2013). Similarly, new messaging standards were being developed in the securities and high-value transaction space, such as ISO 15022 (Securities — Scheme for Messages) and its predecessor ISO 7775.

While these messaging standards have enabled payment infrastructure connections around the world, some friction remains, notably around cross-border payments (particularly large-value and remittance payments) (Financial Stability Board, 2020). In particular, domestic standards — as opposed to internationally accepted standards — for payments continue to be a significant impediment to cross-border interoperability (Gallaher, Cory, and Ahmed, 2020). Other governance-related challenges (eg transparency issues, conflicting standards for combating money laundering and the financing terrorism, etc) also create friction, as do certain technical challenges related to limited clearing hours (Financial Stability Board, 2020).

Additionally, with the expansion of new payment products and technologies, a more flexible and expandable messaging standard is needed to handle richer data. While current messaging standards allow for some flexibility, they are not always able to pass along enough information to ensure straight-through processing without manual intervention.

As governments and the financial sector work to modernise payment systems, many are looking to address some of these issues with a new standard: ISO 20022. In what follows, this paper explores why this standard is being adopted, how it is being implemented, and its perceived benefits and limitations.

## Why ISO 20022 is different

In many ways, ISO 20022 is more a collection of messaging standards for financial services than it is a single standard. It outlines the methodology and metadata for defining messages for the financial services sector, and its current application goes well beyond payments (eg securities clearing and settlement, foreign exchange trading and international trade initiation and management services) (SWIFT, 2020). This has been one of the key motivators for moving payments infrastructure to the new standard: ISO 20022 has the potential to use a common framework to create standards for specific payment domains (eg faster payments, retail payments, etc) and create greater interoperability within these domains.

Additionally, while the structure of ISO 20022 is rooted in earlier payment messaging standards, it differs from many current messaging standards in that it enables the exchange of rich data through its flexible, hierarchical structure. Further, it is also more human-readable than most messaging standards (which can be binary encoded), which makes it more accessible to new service providers and can make finding and fixing errors easier (Meehan and Tyschenko, 2013).

To reduce the need for manual intervention, payment messages need to be in a machine-readable format at the very least. When problems inevitably arise, the more human readable messages are, the easier problems are to identify. Moreover, the more flexible the structure of the message, the more information can be included, which is critical for carrying compliance-related information.

ISO 20022 addresses all of these issues: its hierarchical structure enables easy identification of attributes (machine readability), identify issues (human readability) and add fields (greater flexibility). As Figure 1 illustrates, while the ISO 20022 message example may appear to be longer, it is also easier to identify attributes because they are clearly marked and fit into a broader hierarchy.

Figure 1: Better syntax = more efficient transactions

<p><b>Deposit Bank:</b> ExampleBank in Utrecht, Netherlands (identifier EXABNL2U)  <b>Requesting corporate:</b> ACME NV, Amstel 344, Amsterdam  <b>Amount:</b> \$12,500 USD  <b>Date:</b> October 29, 2019</p>	
<p><b>ISO 2002 Message (high value)</b></p> <pre> &lt;CdtTrfTxInf&gt;   &lt;IntrBkSttlmAmt     Ccy='USD'&gt;12500&lt;/IntrBkSttlmAmt&gt;   &lt;IntrBkSttlmDt&gt;2019-10-29&lt;/IntrBkSttlmDt&gt;   &lt;Dbtr&gt;     &lt;Nm&gt;ACME NV.&lt;/Nm&gt;     &lt;PstlAdr&gt;       &lt;StrtNm&gt;Amstel&lt;/StrtNm&gt;       &lt;BldgNb&gt;344&lt;/BldgNb&gt;       &lt;TwnNm&gt;Amsterdam&lt;/TwnNm&gt;       &lt;Ctry&gt;NL&lt;/Ctry&gt;     &lt;/PstlAdr&gt;   &lt;/Dbtr&gt;   &lt;DbtrAcct&gt;     &lt;Id&gt;       &lt;Othr&gt;         &lt;Id&gt;8754219990&lt;/Id&gt;       &lt;/Othr&gt;     &lt;/Id&gt;   &lt;/DbtrAcct&gt;   &lt;DbtrAgt&gt;     &lt;FinInstnId&gt;       &lt;BIC&gt;EXABNL2U&lt;/BIC&gt;     &lt;/FinInstnId&gt;   &lt;/DbtrAgt&gt; &lt;/CdtTrfTxInf&gt;           </pre>	<p><b>Fedwire Proprietary Standard</b></p> <pre> {1520}20191029xxxxxxxxxyyyyyy {2000}000001250000 {5000}D8754219990ACME NV.*AMSTEL 344*AMSTERDAM* NETHERLANDS* {5100}BEXABNL2U*           </pre>
<p>Source: SWIFT 2020</p>	

Image description: Image depicts the hierarchical structure of ISO 20022 syntax.

## Implementing new standards: Progress and problems

Today, the use of ISO 20022 is expanding rapidly, thanks in large part to the adoption of non-card based, faster payments systems. Many prominent faster payment systems — such as those in Australia, India, Japan, Singapore and the EU — have already adopted the new standard, and others are planning to migrate to the new standard for both new and existing faster payment systems (Wezel, 2018). Europe has led the world in adoption and

implementation through the Single Euro Payments Area (SEPA), as well as through integration with its faster payment scheme (SCT Inst) (European Central Bank, 2020).

SWIFT has played an important role in expanding adoption by converting its cross-border payment system to ISO 20022 and acting as the registration authority for the standard. As the official ISO registration authority, SWIFT oversees the information repository for the standard and has driven a lot of the content creation and capacity-building work with stakeholders. Currently, SWIFT is planning to support ISO 20022 for all cross-border payment messages by the end of 2022 (while continuing to support legacy standards, such as SWIFT MT, until 2025) (SWIFT, 2021). Given SWIFT's prominent role in facilitating high-value cross-border payments, both public and private sector financial institutions are eager to capitalise on the benefits of the new standard ahead of the 2022 conversion.

However, the 2022 deadline has needed to move once already, largely due to delays in financial institutions migrating their systems over to enable dual messaging (eg ISO 20022 and SWIFT MT). Migration has been particularly difficult for smaller banks, which have struggled with the scale and complexity of the migration (Finextra, 2020).

In some cases, the public sector has also struggled to implement the new standard. For instance, the United States Federal Reserve first announced the migration of its Fedwire Funds Service (real-time gross settlement) system to ISO 20022 in 2017 but had to delay implementation multiple times due to stakeholder feedback in 2019 and further delays due to the COVID-19 pandemic in 2020 (Federal Reserve, 2021). To ensure long-term competitiveness and interoperability with faster payment systems, the private sector is also expanding its use of the standard both for existing and new products and payments infrastructure. Some recent private sector solutions for cross-border payments are already using the standard for new infrastructure to process and clear transactions, making them 'ISO 20022 native' (eg SWIFT's gpi (SWIFT, 2020) or Visa's B2B Connect platform (SWIFT, 2020)). The ISO Standards Evaluation Group for cards (which includes many stakeholders outside of payment networks as well) recently released the Acquirer-To-Issuer Cards Messages (ATICA) standards for ISO 20022, which has broad implications for the retail payments sector in the future (see "Acquirer-To-Issuer Cards or ATICA standards section below). Similarly, the ISO 20022 Card Payment Exchanges (CAPE) standards also enable card messaging between issuing and acquiring institutions.

Thus far, private sector adoption has been mostly market-driven, with few regulatory mandates. This is largely by design. For example, after extensive consultation the European Central Bank found that most stakeholders 'were of the opinion that standards like ISO 20022 are beneficial for interoperability, but most parties indicated that these standards should be implemented in a market-driven manner only' (European Central Bank, 2019). A market-driven approach is preferred because the adoption of new standards will be a significant investment with low commercial returns (as will be explored in greater depth later). This is particularly difficult given that 'most national card schemes actually operate on a relatively low-cost basis'. Given this feedback, governments have encouraged adoption in the private sector largely by taking a leadership role in adopting the standard for public sector projects.

Finally, major card networks are also integrating ISO 20022 into new and some existing payment infrastructure. However, given the widespread use of older international payment messaging standards (eg ISO 8583), the business case for full adoption remains somewhat limited. Still, significant progress is being made in areas connecting card networks to faster payment (Vocalink/Mastercard, 2020), and other payment platforms via application programming interfaces (APIs) (Visa, 2021) using ISO 20022, which is one of the many benefits of adopting the new standards, as discussed below.

## Acquirer-To-Issuer Cards (ATICA) Standards

As part of the working group on ISO 20022 specific to cards, public and private sector stakeholders have developed standards for the acquirer-to-issuer domain, which covers both card payments and cash withdrawals. The European Union spearheaded efforts on ATICA standards, but the working group now includes a broad cross-sector of industry participants from around the world.

The motivation behind developing ATICA standards was threefold. First, because billions of consumers rely on card and associated retail payment instruments, it is important to include them in ISO 20022 adoption efforts to ensure ubiquity with new payments infrastructure and

other modernization efforts. Secondly, because of the high-volume nature of retail payments along with consumer expectations for speed and convenience, ATICA standards ensure that rich data enablement does not negatively affect transaction authorization speed. Finally, to ensure interoperability across networks, the industry needed a single and common ISO 20022 standard for the card domain, preferably one that enabled compatibility with the existing industry standard, ISO 8583.

By meeting these three goals, ATICA standards should ensure quick and efficient processing for retail payment transactions after ISO 20022 adoption, regardless of whether these payments are initiated by card or mobile phone application.

## How ISO 20022 benefits the payment system

As discussed, ISO 20022 enables greater interoperability and richer data collection, which may be seen as public goods. Yet, most of the societal benefits of ISO 20022 adoption come through its secondary effects: greater interoperability can enable greater access and increased competition by removing barriers to entry, and richer data can enhance security and streamline cross-border payments. These benefits are enjoyed somewhat unevenly across domains, however, as most retail payment solutions already use international, interoperable standards and hence do not stand to benefit greatly from ISO 20022 adoption.

At its core, greater interoperability improves end users' payment experiences: by avoiding inefficiencies in moving money between multiple accounts, consumers and merchants can engage in commerce more efficiently. This goes well beyond just technical guidelines that enable machine connections.

To understand the full scope of ISO 20022's impact on payment system interoperability, it is worth defining *interoperability* and understanding that the concepts goes well beyond technical connections. A recent Visa Economic Empowerment Institute article, 'Let's talk about how we talk about interoperability', outlines three types of payment system interoperability for policymakers: *technical interoperability* (ie the ability to facilitate payment transactions between different applications/infrastructures), *network interoperability* (the ability for multiple parties to connect through a network facilitating transactions) and *regulatory interoperability* (the ability to connect payment systems across different jurisdictions governed by differing regulatory regimes).

The benefits of ISO 20022 on improving technical interoperability are quite clear: infrastructure using a common messaging standard will reduce translation efforts and redundancies. Further, the hierarchical nature of ISO 20022 makes it ideal for establishing API connections between financial institutions and technology service providers, as many existing APIs use a similar (JSON) hierarchical protocol (International Standards Organisation for Standardization, 2020). Having a common structure for APIs will also enable real-time connections and processing (eg through payment aggregator and similar services).

Broadly speaking, while messaging standards are primarily focused on improving technical interoperability, many of the unique attributes of ISO 20022 could enhance network and regulatory interoperability as well. ISO 20022's rich data capabilities will enable more compliance-related data (such as requirements relating to combating money laundering and the financing of terrorism) to be collected and transmitted across borders (Wezel, 2018). The ability to include more compliance-related information on customers, merchants and financial institutions will not only improve overall financial system integrity, it will also require less manual intervention and enable greater end-to-end automation, improving overall efficiency for cross-border payments (Finastra, 2020).

In fact, producing a harmonised version of ISO 20022, including rules for conversion and mapping, was included as building block 14 of the Financial Stability Board's cross-border roadmap. The Bank for International Settlements' Committee on Payments and Market Infrastructures is leading this work and is currently assessing the suitability of existing ISO formats for cross-border payments, and it will develop market guidance on specific use cases based on those formats (Financial Stability Board, 2020). This work has the potential to improve cross-border payment efficiency overall, including for remittance-related payments, which are vital for many in the developing world.

Beyond cross-border improvements, ISO 20022 can also improve access for underserved communities by reducing barriers to entry for new service providers and improving overall interoperability, particularly in the e-money space. New technologies, most notably mobile phone payment applications, have enabled many consumers without bank accounts to send and receive money digitally (Murthy, Fernandez-Vidal, and Barreto, 2019). However, many of these new platforms rely on closed-loop networks, which can make it difficult to connect with out-of-network accounts, financial institutions and accounts abroad. This can significantly hinder financial inclusion efforts, as inefficiencies in moving money between accounts may discourage consumer participation (Bank for International Settlements, 2016).

Additionally, the inability to connect to the broader financial system can prevent new payment service providers from entering the market, reduce overall competition, and prevent new services aimed at underserved populations from being brought to market (Bank for International Settlements, 2016). For instance, new service providers may have difficulty attracting customers if they can only connect them within their own fledgling network. Universal payment messaging standards could enhance financial inclusion by making it easier for new service providers to connect to the broader financial system.

While ISO 20022 may improve access in some sectors, the adoption of new messaging standards alone will not solve all financial inclusion challenges. They must be complemented by targeted initiatives aimed at improving access — eg streamlined and harmonised frameworks for payment systems, commitments from the public and private sectors to expand access, measures to ensure safety and trust in the payment system, and financial and digital literacy campaigns.

Finally, ISO 20022's ability to include richer data in payment messages could also improve safety and security in the payment system, leading in turn to greater end-user experiences and greater trust in the system overall. With richer data, new and enhanced products and services will be available. For instance, more data for transaction authentication could lead to better fraud detection and prevention (Finastra, 2020).

## These benefits have limits

It is no surprise to see widespread adoption by faster payment systems and the broader financial system. However, the benefits discussed above will not be gained via new messaging standards alone. They must be accompanied by some important policy measures.

First and foremost are policies promoting open and accessible payment systems, financial stability and consumer protection. This is especially true in the cross-border domain, where many of the greatest challenges are regulatory and governance related, not technical (Cunliffe, 2020).

Secondly, while interoperable payment systems appear seamless to end users, the actual work of connecting different systems can be complicated — even with common messaging standards. Regulators and payment system providers must always work to encourage interoperability between all participants in the payment ecosystem. Similarly, ensuring that all access points and participants in the payment system are safe and secure requires continued due diligence by payment service providers (both private and public) and regulators. Ensuring trust and safety is especially important in bringing underserved populations that may distrust or be unable to access the formal financial system (Bank for International Settlements, 2020).

ISO 20022 adoption will also be expensive, especially for financial infrastructure already operating with other international standards. Estimating costs is quite difficult, as adoption costs are often combined with other infrastructure-related investments. However, it is clear that given the limited commercial case for adoption for payment systems already operating on ISO 8583, cost recovery could take decades (European Cards Stakeholders Group, 2016).

Cost considerations will be especially important for developing markets. Payment system modernisation projects will have to be balanced with other reforms aimed at increasing financial access and literacy, as well as overall system integrity and stability (Gallaher et al, 2020).

Given these headwinds, the global financial system should expect to continue operating with multiple messaging standards in the years to come while work to convert infrastructure to ISO 20022 proceeds at a measured pace that makes commercial sense. Adoption should, therefore, continue to be a



focus for new infrastructure, especially in payment domains with significant interoperability challenges (ie high-value cross-border payments). For retail providers, where both domestic and cross-border payment ubiquity has largely been achieved, the priority for adoption should continue to be balanced with maintaining system reliability and reverse interoperability with existing standards as banking and payment network infrastructure is steadily updated.

Similarly, despite some convergence in payment infrastructure, consumers will continue to demand differentiated payment products to fit the needs of different transactions. Therefore, the development of ISO 20022 based standards for different domains, such as specifications for faster payments and specifications for card payments (eg ATICA standards), will be critical to ensuring future ubiquity.

## Looking to the future

Overall, migration to ISO 20022 will have positive impacts on the global payment system, from faster payments to retail payments more broadly. Private sector adoption and domain-specific standards will increase overall interoperability in the payment system, enabling transactions across a wide range of payment platforms and infrastructure, both domestically and internationally. The promise of better cross-border interoperability is perhaps the greatest anticipated benefit, which in turn could improve overall accessibility.

However, new messaging standards are not a substitute for good public policy: ISO 20022 is not a panacea. Further, adoption will likely be costly and lengthy, and financial institutions, faster payment operators and payment system providers more broadly will need to operate on multiple standards over the medium-to-long term.

Additionally, benefits will be uneven across different payment domains, so implementation should target new infrastructure and those domains most in need of improvement (eg high-value cross-border payments). Given the previously discussed challenges facing smaller firms, especially in the aftermath of COVID-19, future resources spent on implementing ISO 20022 will need special consideration to ensure they are appropriately targeted. As financial institutions, payment service providers and policymakers look to expand the use of ISO 20022 to other domains (eg low-value, retail payments) implementation may take longer or may not be needed at all. For instance, given that global card networks seem to be able to integrate with faster payment infrastructure via APIs using ISO 20022 messages while still running older standards (ISO 8583), implementation in this sector remains a lower priority.

Still, given the broader benefits outlined herein, along with the public sector's commitment to ISO 20022 for new payment infrastructure, widespread adoption seems both inevitable and welcome. Policymakers are right in promoting a market-driven approach: given ISO 20022 adoption for faster payment systems, much of the private sector using proprietary standards will follow suit.



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